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Environmental Management Plan (EMP) for the Proposed Orchard at Ndonga Linena

Kavango East Region

Version – Draft

02 July 2025

Ndonga Linena Green Scheme

Kavango East Region

Scoping Report for the
Environmental Impact Assessment (EIA)
and development of the Environmental
Management Plan (EMP) for the Proposed Orchard development at Ndonga Linena Green Scheme
Kavango East Region

02 July 2025

LEGAL NOTICE

PROPONENT

Ministry of Agriculture, Fisheries, Water & Land Reform

PROPOSED PROJECT

Development of an Orchard at Ndonga Linena Green Scheme
Kavango East Region

ADDRESS OF PROPONENT

Government Office Park, Luther Street
Private Bag 13184
Windhoek Namibia
Tel: +264 61 2087111

PROJECT LOCATION

Ndonga Linena Green Scheme, Kavango East

PROJECT COMPETENT AUTHORITY

Ministry of Environment, Forestry and Tourism (MEFT), Ministry of Agriculture, Fisheries, Water & Land Reform

ENVIRONMENTAL ASSESSMENT PRACTIONER

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Contents

ABBREVIATIONS AND ACRONYMS	
AADD	Average Annual Daily Demand
AfDB	African Development Bank
BID	Background Information Document
CBD	Convention on Biological Diversity
DWSSC	Directorate of Water Supply and Sanitation Coordination
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ESA	Environmental and Social Assessment
EIA	Environmental and Social Impact Assessment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No 7 of 2007)
EMP	Environmental Management Plan
ESAP	Environmental and Social Assessment Procedures
EMP	Environmental and Social Management Plan
EVIMA	EVIMA Water Environmental Engineering Namibia (Pty) Ltd
GLR	Ground Level Reservoir
GRM	Grievance Redress Mechanism
Ha	Hectares
hrs	Hours
I&AP	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
LFPR	Labour Force Participation Rate
km	Kilometres
kPa	Kilo Pascal
ABBREVIATIONS AND ACRONYMS	

kW	Kilowatt
m	Meters
m^3	Cubic meters
M^3/d	Cubic meter per day
m^3/h	Cubic meter per hour
mm	Millimetres
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT: DEAF	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs and Forestry
mWh	Meters water head
NamWater	Namibia Water Corporation
PPP	Public Participation Process
SADC	Southern African Development Community
SR	Scoping Report
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United Nations Convention to Combat Desertification

DEFINITIONS

Alternatives: A possible course of action in place of another that would meet the same purpose and need. An alternative can include other locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The 'without project' (or no-go) alternative provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid negative impacts.

Baseline data: Data that describes issues and conditions at the inception of the SEA. Serves as the starting point for measuring impacts, performance, etc., and is an important reference for evaluation.

Cumulative effects/impacts: Are combined or additive effects on the environment over time or space when added to other past, present or reasonably foreseeable actions. They may seem to be insignificant when seen in isolation, but collectively they have a significant effect.

Ecosystem approach: As advocated by the Convention on Biological Diversity (CBD), the ecosystem approach recognises that people and their environment are part of the broader ecosystems on which they depend. Environmental management should therefore be implemented in an integrated way.

Environment: The physical factors of the surroundings of the human being including land, water, atmosphere, climate, and the biological factors of fauna and flora as well as the cultural, social, and economic aspects of human activity.

Environmental Assessment: Generically, a method or procedure for predicting the effects on the environment of a proposal, either for an individual project or a higher-level "strategy" (a policy, plan or programme), with the aim of taking account of these effects in decision making.

Environmental impact:

- Effects on the environment and natural resources that may be positive and/or negative and produce benefits and/or costs.

- ❖ *Direct impacts* are those that take place at the same time and in the same space as the activity.
- ❖ *Indirect impacts* occur later in time or at a different place from the activity.
- ❖ *Cumulative impacts* are the combined or additive effects on the environment of individual projects over time or of several projects in one geographical area. They may seem to be insignificant when seen in isolation, but collectively they may have a significant effect.
- ❖ *Irreversible impact* are impacts that cannot be reversed in time, it results in the irreplaceable loss of a resource.

Environmental Impact Assessment (EIA): The application of impact assessment to a specific project. Typically, an EIA is carried out on a project that is already defined (i.e. in feasibility stage) and seldom considers landscape scale or cumulative impacts. An EIA may consider cumulative impacts, e.g. in respect of similar existing or planned projects, especially in the absence of a strategic framework for development (or a SEA). An EIA is the systematic evaluation of a project to determine its impact on the environment and natural resources.

Environmental Quality Objective: An EQO specifies a target for environmental quality. If EQOs are set by enforceable regulations, they are usually referred to as Environmental Quality Standards.

Environmental Report: The report required as part of an environmental assessment, which identifies, describes and evaluates the likely significant effects on the environment of implementing a PPP.

Environmental sustainability: Management of natural resources and the environment that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Indicator: A measure of variables over time, that reveals progress (or lack thereof) towards objectives, and provides a means of measuring what actually happens against what has been planned in terms of quantity, quality and timeliness.

Inter-generational equity: Inter-generational equity implies that the current generation chooses a development path that does not jeopardize the ability of future generations to achieve similar or better development options.

Issue: A context-specific question that asks 'what, or how severe, will the impact of some activity/ aspect of the development be on some element of the environment?'

Limits of Acceptable Change: Extremes of environmental quality beyond which society would find further change unacceptable. The LAC thus relate to levels of environmental quality (biophysical) that are either desired by or would be tolerable to society (largely qualitative values).

Mitigation: Means actions to avoid, reduce, control or offset the potential adverse environmental and socio-economic consequences of a PPP, and include engineering works, technological improvements, management measures and restitution through replacement, restoration, compensation or any other means, to minimise harm to human health or the environment.

Monitoring: Actions taken to observe, take samples or measure specific variables in order to track changes, measure performance of compliance, and/or detect problems. The objective of monitoring should always be to improve management.

Objective:	A statement of what is intended, specifying the desired direction of change in trends.
Offset:	An offset replaces or provides 'like for like or better' substitutes for residual negative impacts on the environment. Such offsets could include formal commitment to managing substitute areas of comparable or greater value for conservation, entering into a secure and permanent conservation agreement with the conservation authority, setting aside protected natural areas, establishing a trust fund for conservation, thereby enabling land acquisition and/or management, etc. Offsets focus on areas of recognised value to conservation and on ensuring the persistence of landscape-scale processes.
Opportunity cost:	The lost opportunities that might result from the implementation of a certain alternative. For example, a mine in a national park will likely reduce the tourism potential of the area. Therefore, there are opportunity costs to the building of the mine, namely the reduction of actual and potential touristic activity.
Policy:	A broad statement of intent that reflects and focus the political agenda of government and initiate a decision cycle; a general course of action or proposed overall direction that a government is or will be pursuing that guides ongoing decision making.
Plan:	A purposeful forward-looking strategy or design, often with co-ordinated priorities, options and measures that elaborate and implement policy.
Precautionary principle:	Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.
Project:	Means the execution of construction or renovation work or other developments, installations, schemes, activities or other interventions linked to a specific development that can be "ring-fenced".
Programme:	A coherent, organized agenda or schedule of commitments, proposals, instruments and/or activities that elaborate and implement policy. A programme usually has a number of projects that cascade below it.
Responsible Authority:	The organisation which prepares and/or adopts a plan or programme subject to SEA.
Risk:	Likelihood of occurrence of an event and estimated magnitude/severity of its impact on the environment.
Scoping:	The process of deciding the scope and level of detail of an SEA, including the environmental effects and alternatives which need to be considered, the assessment methods to be used, and the structure and contents of the Environmental Report.
Screening:	The process of deciding whether a plan or programme requires SEA
Significance:	Determination of severity of an impact taking into account objective or scientific data as well as societal values. Any exercise in judging the significance of an impact should thoroughly consider (a) the importance of the environmental or social attribute in question to project decision makers, (2) the distribution of change in time and space, (c) the magnitude of change, and (d) the reliability with which change has been predicted or measured.
Stakeholder:	Individuals or organisations who may be interested in, potentially affected by, or influence the implementation of a PPP. In the context of an SEA applied to

	development co-operation, stakeholders may include the government, donor agencies, local community, NGOs and civil society
Strategic Environmental Assessment (SEA):	Generic term used to describe environmental assessment as applied to policies, plans and programmes (PPPs). Refers to a range of analytical and participatory approaches that aims to integrate environmental consideration into PPPs and evaluate the interlinkages with economic and social considerations. Impact assessments at strategic level encourage an 'opportunities and constraints' type approach to development, where such things as natural resources and ecosystem services at landscape scale define the 'framework' within which development can take place and the types of development that could be sustained.
Significant environmental effects:	Effects on the environment which are sufficiently great or important to be worthy of attention.
Transboundary impacts:	Means an environment, health or social impact on another state.
Trigger:	A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input.
Threshold:	Levels that should not be exceeded; points at which irreversible or serious damage could occur, either to ecosystems and/or to social systems (health, safety or wellbeing). Could also be described as a tipping point.
Trade-offs:	Refers to losing one quality or aspect of something in return for getting another quality or aspect. It implies a decision made with the full comprehension of both the upside and down side of a particular choice.
Uncertainty:	The inherent unpredictability of response of the environment to an impact, the lack of knowledge and/or understanding of cause-effect-impact relationships between the development activity and the environment, and/or gaps in information that do not allow confidence in predictions of impacts.
Vulnerable communities:	Those communities who rely heavily on those ecosystem goods and/or services likely to be affected or who live in dynamic, sensitive or harsh ecosystems, where extreme conditions make them particularly vulnerable to additional negative impacts.

1. INTRODUCTION

The Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR) operates about 800-hectare farm at Ndonga Linena in Kavango East Region. The main objective for the development of an Agricultural Project to support food production and employment creation in the region and the Republic of Namibia in line with National Development Plans, the Green Scheme initiative and Vision 2030. The Irrigation Project produces cash crops for sale to the local, regional and international market.

As part of the agricultural development at Ndonga Linena Green Scheme the MAFWLR plans to develop an orchard for food security, biodiversity, and community well-being. Orchards are a sustainable food source, provide habitat for various wildlife, and foster community engagement. Orchards also play a role in climate regulation and soil conservation.

The higher-level development objective of the project is to increase food production and food security, including access to better nutrition and enhanced standards of living for the local communities in the project areas. Key indicator to measure the achievements of this goal is the increased agricultural production. The project development objectives are to increase agricultural development in the project area by enhancing the production of high value crops and increasing employment opportunities and income for local communities and Kavango West Region. Therefore, this project is in line with Namibia's development trajectory as highlighted in the Vision 2030, National Development Plans and the Green Scheme initiative of the MAWLR.

A baseline scoping assessment was undertaken according to Namibian legislative and policy frameworks. The scoping process also involved development of the EMP. The MAFWLR appointed Evima Consulting Engineers, Environmental and Town Planning Consultants to undertake a baseline independent study, for environmental authorisation for the project. The project involves the preparation of land and infrastructure for cultivation of fruits (Oranges, Nartjies, etc) and the subsequent operations of the farm.

2. PURPOSE OF THE ENVIRONMENTAL MANAGEMENT PLAN

This EMP is developed to outline measures to be implemented in order to minimise environmental impacts associated with this development. The EMP serves as a guiding tool for the contractors, MAFWLR and agencies on the roles and responsibilities concerning environmental management onsite and also provides an environmental monitoring framework for all project phases of the proposed development. This EMP is aimed at taking a pro-active approach by addressing potential problems before they occur.

The EMP stands as a standalone document which can be used during the various phases of the development. In addition, the EMP will also provide specific recommendations and mitigation measures on how to minimise negative impacts and therefore protecting the socio-economic and environment.

Efforts have been made to associate the impacts identified, mitigation measures proposed and associate costs including management and monitoring. The principal stakeholders responsible for implementation of the mitigation measures and monitoring are included in the activity schedule. Most of the responsibilities for implementation of the mitigation measures remain on the construction contractor and the operator. During preparation of this EMP the consultants were guided by the prevailing Namibian environmental policies, laws, and guidelines. The objectives of the Environmental Management Plan (EMP) are:

- ❖ To bring the project into compliance with applicable national environmental and social legal requirements and as stipulated under the various safeguard operational policies and legislation;

- ❖ To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts and/or to enhance the project beneficial impacts;

- ❖ To address capacity building requirements to strengthen the proponent's environmental and social capacities.

3. PROJECT LOCATION

The planned orchard is located within the Ndonga Linena Green Scheme in Kavango East Region. See figure 1 below.

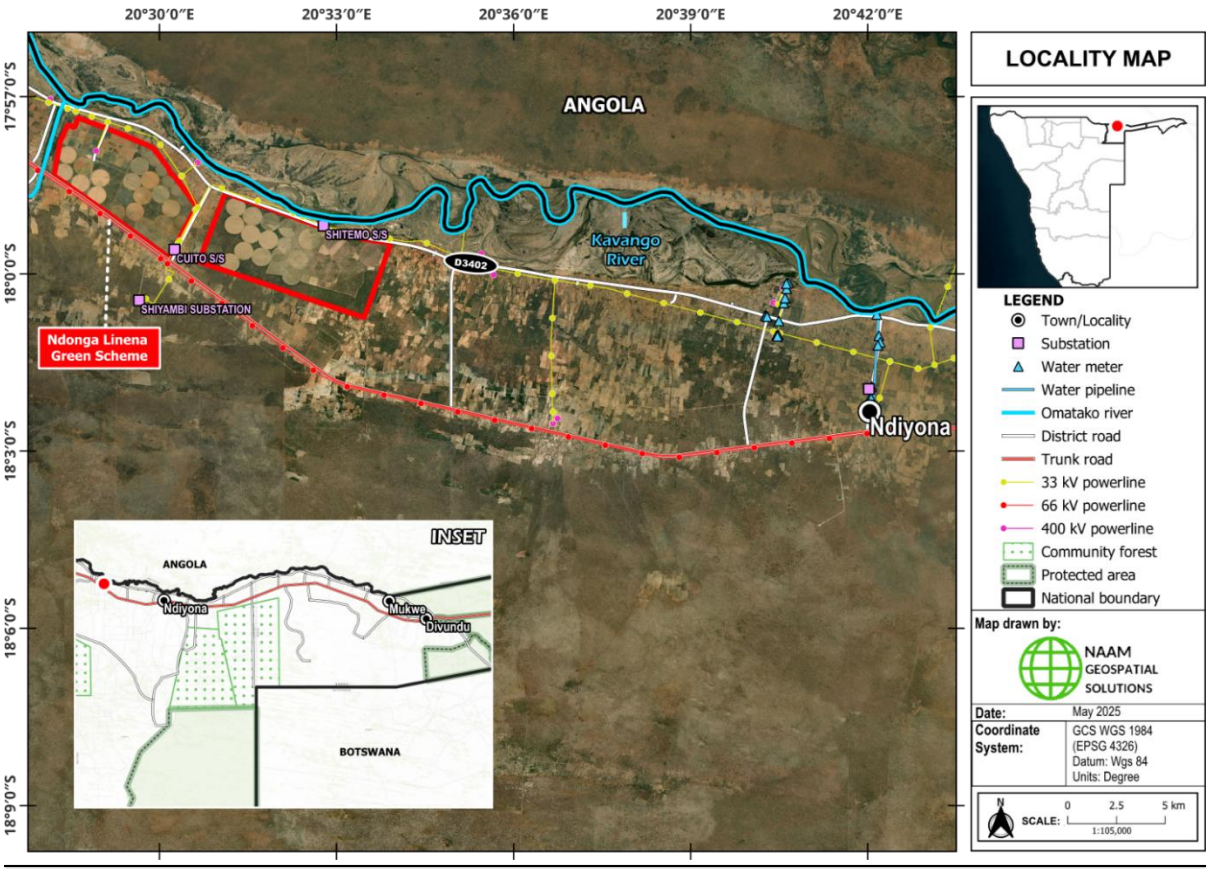

Figure 1: Project Location

4. PROJECT DESCRIPTION AND INFORMATION

4.1 Background to the Development

MAFWLR plans to develop about 83 ha of the 678-ha land at the existing Ndonga Linena agricultural scheme. The first process will be a development phase of preparation of land and installation of

infrastructure for the cultivation and processing of the fruits. The second process will be the operational phase which will include the cultivation, harvesting, processing and transport of produce. Water for irrigation purposes will be obtained from the nearby Okavango River. The information available for the assessment of the project includes all infrastructure, development and operational requirements of irrigable land to be planted.

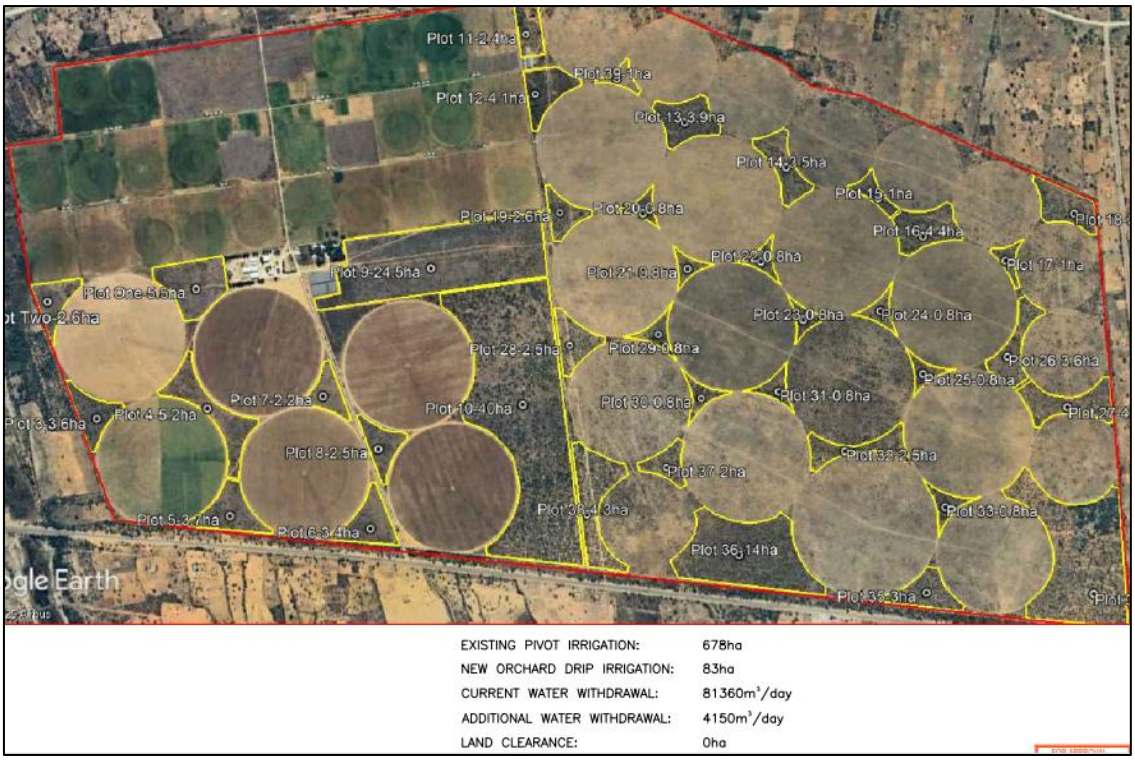

Figure 2: Details of the existing farm and proposed locations for orchard development

4.2 Land Clearing and Infrastructure Construction

4.2.1 Land Clearing

Land clearing will be done by contractors making use of bulldozers and excavators. The entire plant together with roots will be removed in order to prevent regrowth and allow for soil preparation using ploughs and discs. All vegetation removed, belongs to the Government of the Republic of Namibia. Normally for projects of this nature a permit (Forest Act, 2001 (Act 12 of 2001) will be required for land clearing and the permit conditions stipulates what must be done with the removed vegetation. However in this case the Green Scheme is a brownfield site and the vegetation to be cleared is just regrowth as the area has already been used for crop production.

4.2.2 Irrigation Installation and Water Supply

Water for irrigation purposes will be obtained from the Okavango River which is 3 km from the site. Various permits must be obtained as per the Water Act, 1956 (Act No. 54 of 1956). Feasibility to abstract the required amount of water will be determined by the Ministry of Agriculture, Water and Forestry, based among others the quota of water allocated to Namibia for abstraction from the Okavango River.

At the farm the water will be stored in reservoirs. The capacity will be enough to store water to supply the farming for one day. Radio automation will be installed between pumps and the orchard. Water is currently pumped and purified from the reservoir into elevated water tanks for potable use.

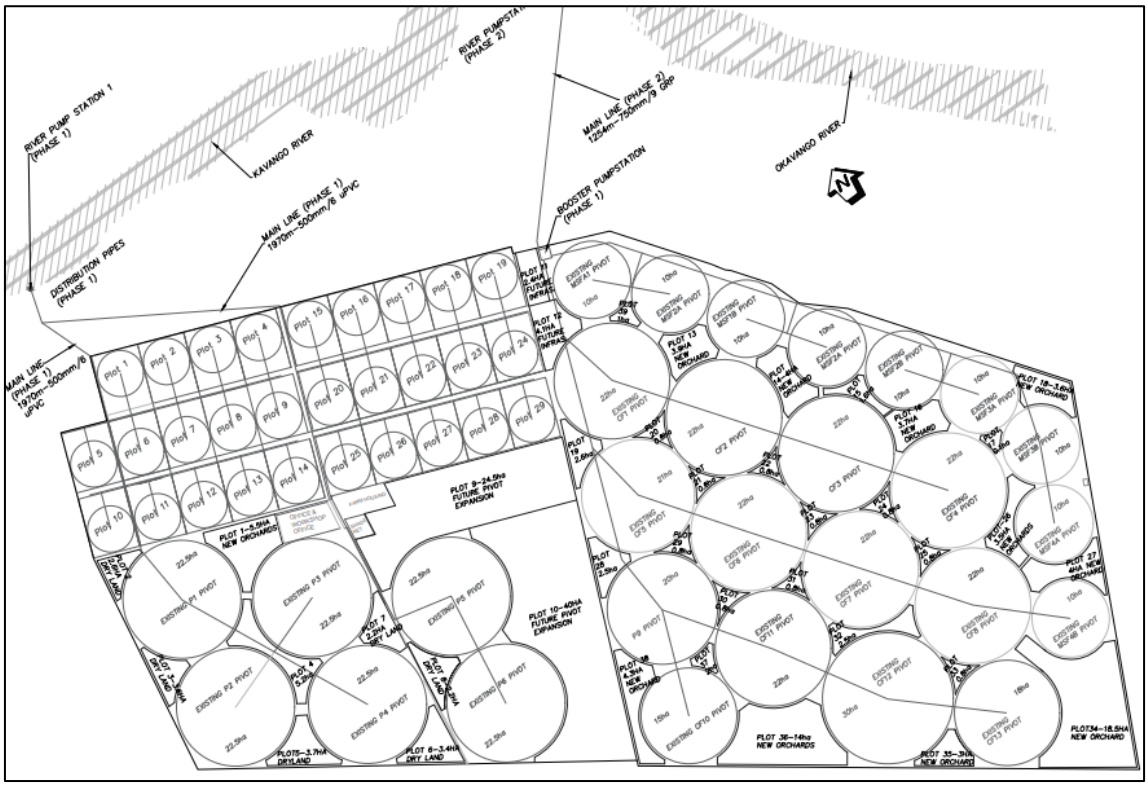

Figure 3: Layout of the farm and proposed orchard development areas

4.2.3 Electrical Supply

Electricity is supplied from the main grid for both the pump station and the farm and this will be extended to the orchard.

4.2.4 Fuel Installation

A diesel consumer installation is already constructed on the existing Green Scheme. Spill control as prescribed by the Petroleum Products and Energy Act will be installed according to SANS specifications. A consumer license exists as required by the Petroleum Products and Energy Act, 1990 (No. 13 of 1990).

4.2.5 Pesticide and Chemical Storage

All pesticides, fertilizers and other chemicals for the Orchard that may have potentially hazardous impacts on the environment will be stored in storerooms designed to prevent the release of these products into the environment or the exposure of employees to the products. Poisonous substances must be locked away with suitable signage. The Health Regulations of the Labour Acts must be consulted for the design and construction of such storage facilities and consideration can be given to SANS 10206 of 2010 dealing with the storage and handling of pesticides. Approvals for all pesticides and chemicals must be in place.

4.2.6 Sewage Installation

A septic tank system already exists for handling sewage. A revised effluent disposal permit must be obtained as required by the Water Act, 1956 (Act No. 54 of 1956) to include the orchard.

4.2.7 Buildings, Accommodation and Storage

Additional construction to the existing Ndonga Linena Green Scheme will include 10 worker houses, a workshop and an office. The main buildings should be protected by an alarm system.

4.2.8 Roads

An access road within the farm will be through the existing roads. No new roads are envisaged to be developed for the orchard development,

4.3 Operations

The operational phase of the farm will consist of the growing of crops, and harvesting. An estimated total of 50 people will be employed of which 25% will be permanent and 75% on a seasonal basis. Seasonal work will be for approximately 7 months from September through to March.

4.3.1 Soil Preparation

Soil has to be prepared for both the seedbeds and the field. Soil preparation will consist of mechanical breaking and mixing of top soil using ploughs and discs connected to tractors with seeds being planted directly in the field.

4.3.2 Fertilizing and Pest Control

At various stages prior to planting and during plant growth a range of fertilizers and pesticides (insecticides, fungicides and herbicides) will be applied either by spraying with knapsack sprayers or through the irrigation systems. A fungus, Trichoderma, will also be applied to the soil. It serves as a biological symbiont that acts as a biocontrol agent against other disease-causing fungi. *Trichoderma* spp. occurs worldwide and the advantages in using it for horticulture have been shown in many studies and it also reduce the number of chemical pesticides that may be used (Harman et al. 2004, Pandya et al. 2011).

All pesticides, fertilizers or other agricultural remedies will be products registered with MAFWLR or other competent authorities. Stored pesticides, chemicals or any other hazardous materials that reach its expiry date or become obsolete will be disposed of according to its Material Safety Data Sheets (MSDS) requirements and at an approved location.

4.3.3 Irrigation

Irrigation of plants will be administered using drip irrigation systems. Water will be sourced from the Okavango River. The main advantages of drip irrigation are that it uses less water than flood irrigation and water can be applied in a more controlled manner and at any time of the night or day.

4.3.4 Harvesting

Harvesting will be through a mixture of hand picking and machine harvesting.

5. LEGISLATIVE FRAMEWORK

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an EIA, as per the Namibian legislation. The following legislation governs the EIA process in Namibia, pertaining to the proposed development.

5.1 The Namibian Constitution

Article 95 of Namibia's constitution states that:

"*The State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at the following: (l) management of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future in particular the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory*."

This article recommends that a relatively high level of environmental protection is called for in respect of management of ecosystems, pollution control and waste management.

Article 144 of the Namibian Constitution deals with environmental law and it states:

"*Unless otherwise provided by this Constitution or Act of Parliament, the general rules of public international agreements binding upon Namibia under this Constitution shall form part of the law of Namibia*"

This article incorporates international law, if it conforms to the Constitution, automatically as "law of the land". These include international agreements, conventions, protocols, covenants, charters, statutes, acts, declarations, concords, exchanges of notes, agreed minutes, memoranda of understanding, and agreements (Ruppel & Ruppel-Schlichting, 2013).

5.2 Environmental Management Act

The Environmental Management Act require that all projects, policies, programmes, and plans that have a detrimental effect on the environment must be accompanied by an EIA. The development under assessment is listed as a project requiring an impact assessment as per the following points from section 9 in the Government Notice No. 29 (2012):

- The construction of facilities for - the transmission and supply of electricity.
- Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance, 1976.
- The clearance of forest areas, deforestation, afforestation, timber harvesting or any other
- related activity that requires authorisation in term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law.
- Pest control.
- The abstraction of ground or surface water for industrial or commercial purposes.

- Any water abstraction from a river that forms an international boundary.
- Irrigation schemes for agriculture excluding domestic irrigation.

5.3 Forest Act (Act 12 of 2001)

The Forest Act makes provision for the protection of the environment and the control and management of forest fires. Section 23 provides for control over afforestation and deforestation:

(1) unless approval has been given by the Director, no person shall:

(b) clear the vegetation on more than 15 hectares on any piece of land or several pieces of land situated in the same locality which has predominantly woody vegetation; or

(c) cut or remove more than 500 cubic metres of forest produce from any piece of land in a period of one year.

(2) The Director may require a person seeking authority required under subsection (1), to prepare an environmental impact assessment report and the report shall, in addition to the requirements imposed by any law for such reports, contain information and analysis which the Director requires."

Further Part V: Use of Forests and Forest Produce, states under section 24, Control over Forests and Forest Produce, that

"(1) Forests and forest produce shall, in Namibia, subject to the permission of the owner of the land or the management authority of a classified forest and to the terms of a licence issued under this Act, be used in accordance with an applicable management plan.

(2) No person shall:

(a) destroy or damage vegetation or harvest forest produce;

(c) build a road, building or structure;

(d) disturb or remove soil; or

(e) carry out agricultural activities or graze animals, in a classified forest unless he or she has been authorised to do so by a management plan, a forest management agreement or a licence issued under this Act."

The following sections apply to licencing in forested areas:

Section 27, Licence to Harvest

"(1) A person who wishes to obtain a licence to cut or remove forest produce from a forest reserve shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been designated or appointed for the area where the forest reserve is situated."

Section 28, Licence to Graze or Carry on Agricultural Activity

"(1) A person who wishes to obtain a licence to graze animals or to engage in agricultural activities in a forest reserve shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been designated or appointed for the area where the forest reserve is situated."

Section 30, Licence to Construct Roads or Buildings

"(1) A person who wishes to obtain a licence to construct a road or a building in a forest reserve shall, in the prescribed form and manner, apply for the licence to a licensing officer who has been designated or appointed for the area where the forest reserve is situated."

5.4 National Forest Policy

The Mission of the Directorate of Forestry is to "practise and promote the sustainable and participatory management of forest resources and other woody vegetation, to enhance socioeconomic development and environmental stability." The Environmental Forestry Programme manages designated forest areas for conservation to yield both national and global benefits.

5.5 National Policy on Human Wildlife Conflict Management

The objectives of the Policy are:
1. To develop future human-wildlife conflict management legislative framework.
2. To develop a standardised monitoring system for human-wildlife conflict management.
3. To establish best practice mitigation measures for human-wildlife conflict management.
4. To develop innovative mechanisms to reduce the level of human-wildlife conflict.
5. To provide clarity on the question of compensation with regard to damages caused by wildlife.

5.6 The Water Act (Act No. 54 of 1956)

The Water Act remains in force until the new Water Resources Management Act (Act No. 24 of 2004) comes into force. Although the new Water Resources Management Act was approved by parliament in 2004 it has yet to be signed by the Minister and is currently being amended to take into account practical aspects of implementation. Thus, the Water Act of 1956, generally referred to as the Old Water Act, remains applicable until it is officially repealed. This Act gives the Minister the power to, amongst others, investigate water resources, plan water supply infrastructure, develop water schemes, control water pollution, protect, allocate and conserve water resources, inspect water works, levy water tariffs, in certain respects make provision for the control of the use of sea water for certain purposes and advise on all matters related to the water environment in general. It further controls the disposal of effluent. It basically makes the Department of Water Affairs responsible for the use, allocation, control, and conservation of Namibia's surface and groundwater resources. It clearly defines the interests of the state in protecting water resources.

5.7 Plant Quarantine Act, 2008 (Act No. 7 of 2008)

This Act commenced in 2012 and provides for the preventing, monitoring, controlling and eradication of plant pests; to facilitate the movement of plants, plant products and other regulated articles within and into or out of Namibia; to provide for the certification of the phytosanitary standards of plants and plant products exported from Namibia; and to provide for incidental matters.

5.8 Soil Conservation Act (Act No. 76 of 1969)

The Soil Conservation Act and its amendments contains the law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources Namibia; and to provide for matters incidental thereto.

5.9 Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)

This act was made applicable in Namibia by Act 17 of 1972 and it deals with the registration of fertilizers, farm feeds, agricultural remedies and stock remedies; and to regulate or prohibit the importation, sale, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies. Under this act, only fertilizers and pesticides or any other products as controlled by this Act, which is registered with the Ministry of Agriculture, Water and Forestry (MAFWLR), may be used on agricultural or other land.

5.10 Biosafety Act, 2006 (Act No7 of 2006)

The Biosafety Act provide for measures to regulate activities involving the research, development, production, marketing, transport, application and other uses of genetically modified organisms (GMO) and specified products derived from genetically modified organisms. Section 20 states that "(1) A person must not deal with a GMO or GMO product unless:

(a) the person is authorised by a permit issued under this Act to deal with the GMO or GMO product; or

(b) dealing with the GMO or GMO product is exempted under section 21;" and

"(2) A permit holder must conduct dealings with a GMO or GMO product in accordance with

any limitations or conditions to which the permit is subject."

5.11 Atmospheric Pollution Prevention Ordinance of Namibia (No. 11 of 1976)

Part 2 of the Ordinance governs the control of noxious or offensive gases. The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. The registration certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process.

5.12 Hazardous Substances Ordinance (No. 14 of 1974)

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Services. Its primary purpose is to prevent hazardous substances from causing injury, ill health or the death of human beings.

5.13 Petroleum Products Regulations: Petroleum Products and Energy Act, (No. 13 of 1990)

The regulations of the Act stipulates that a consumer installation for petroleum products, with a volume of 600 litre or more (in areas outside of the control of local authorities), requires a certificate issued by the Ministry of Mines and Energy. Furthermore, the Act prescribes the South African National Standards (SANS), as listed in section 4.22 as the criteria to which consumer installations must be constructed, operated and decommissioned.

5.14 Foreign Investment Act 27 of 1990 (as amended by Foreign Investment Amendment Act 24 of 1993)

This Act provides for the promotion of foreign investments in Namibia but has environmental relevance in the sense that the granting of preferential investment status, which carries with it certain foreign exchange control benefits, is influenced, inter alia, by the impact which the activities of the enterprise in which the proposed investment is to be made is likely to have on the environment. In issuing a certificate of Status Investment the Minister is obliged to have special regard to the impact which the activities of the enterprise in which the proposed investment is to be made likely to have on the environment and, where necessary, the measures proposed to deal with any adverse environmental consequences.

5.15 Public Health Act (No. 36 of 1919)

Under this act, in section 119:

"No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."

5.16 Labour Acts and Regulations

The Labour Act of 1992 (act 6), the New Labour Act of 2007 (Act 11 of 2007) and Government Notice 156 of 1997: Labour Act, 1992: Regulations Relating to the Health and Safety of Employees at Work, governs working conditions of employees. These regulations are prescribed for among others safety relating to hazardous substances, exposure limits and physical hazards. Special consideration must be given to:

Chapter 3: Welfare and Facilities at Work-Places

Chapter 4: Safety of Machinery

Chapter 5: Hazardous Substances

Chapter 6: Physical Hazards and General Provisions

5.17 National Heritage Act of Namibia (No. 27 of 2004)

This Act provides for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. The client should ensure that if any archaeological or palaeontological objects, as described in this Act, are found in the course of the development, that such findings be reported to the line Ministry immediately. If necessary, the relevant permits must be obtained before disturbing or destroying any heritage significance as envisaged by this Act.

The Act defines as protected:

"*any remains of human habitation or occupation that are 50 or more years old found on or beneath the surface on land*" and considers the possible impacts of:

"*any physical intervention, excavation or action that may result in a change to the nature, appearance or physical nature of a place*"

Part VI, Section 55 of the Act makes provision for an archaeological impact assessment of activities or developments carried out where archaeological sites are believed to exist. Since the promulgation of the National Heritage Act, the mining industry has tended to adopt the precautionary principle and commissioned an archaeological impact assessment of large exploration and mining projects.

5.18 Pollution Control and Waste Management Bill

Of particular reference to the above, the stated project, Parts 2, 7 and 8 apply.

Part 2 provides that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23.

Part 2 also further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances. The competent authority for the purposes of section74 shall maintain a register of substances notified in accordance with that section and the register shall be maintained in accordance with the provisions.

Part 8 provides for emergency preparedness by the person handling hazardous substances, through emergency response plans.

5.19 Multilateral Environmental Agreements for Namibia

The 2002 SADC Protocol on Forestry applies to all activities relating to development, conservation, sustainable management and utilisation of all types of forests and trees, and trade in forest products throughout the SADC Region. The objectives of this Protocol are to: a) promote the development, conservation, sustainable management and utilisation of all types of forests and trees; b) promote trade in forest products throughout the Region in order to alleviate poverty and generate economic opportunities for the peoples of the Region; and c) achieve effective protection of the environment, and safeguard the interests of both the present and future generations.

The Protocol is guided by the following principles:

1) In implementing this Protocol, State Parties shall co-operate in good faith and shall be guided by, and give effect to, the principles and approaches set out in this Article.
2) State Parties shall have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to use their forest resources to meet their environmental and sustainable development needs anda responsibility to ensure that

activities within their jurisdiction or control do not cause damage to the environments and forest resources of other states.

3) State Parties shall protect, conserve and develop their forests and ensure that forest resources are used in a way and at a rate that does not lead to the long-term degradation of the forest, thereby maintaining the potential of forests to meet the needs of present and future generations.
4) State Parties shall facilitate, promote and continually improve policy and legal frameworks that promote sustainable forest management.
5) State Parties shall endeavour to protect and, where possible, restore natural forests, to maintain the essential ecological functions of these ecosystems.
6) State Parties may, upon request, give nationals of other State Parties access to forests for cultural or spiritual purposes with due regard to national laws.
7) State Parties shall not use lack of scientific certainty as a reason for postponing measures to prevent or minimise potentially serious or irreversible harm to forests.
8) State Parties shall take appropriate measures to anticipate, prevent or minimise the causes of deforestation and other damage to or destruction of forests.
9) State Parties shall facilitate public participation in decision-making regarding the sustainable management of forests and the use of forest resources.
10) State Parties shall recognise that communities are entitled to effective involvement in the sustainable management of forests and forest resources on which they depend and to share equitably in the benefits arising from their use.
11) State Parties shall ensure that the person or entity whose wilful or negligent action, inaction or authorisation causes direct or indirect damage to forests, shall bear the cost of the elimination of such condition, or of compensation for such damage, including costs of restoration.
12) State Parties shall be encouraged to operate in partnership with nongovernmental organisations, inter-governmental organisations and other entities and institutions.

The 1985 Vienna Convention for the Protection of the Ozone Layer aims to protect human health and the environment against adverse effects resulting from modifications of the ozone layer. Parties undertake to cooperate in research concerning substances and processes that modify the ozone layer, on human health and environmental effects of such modifications, and on alternative substances and technologies; and in systematic observation of the State of the ozone layer. Furthermore, parties commit themselves to cooperate in formulation and implementation of measures to control activities that cause adverse effects through modification of the ozone layer, and, particularly, the development of protocols for such purposes, and to exchange scientific, technical, socio-economic, commercial and legal information relevant to the Convention, and cooperate in the development and transfer of technology and knowledge.

The Convention has two annexes: setting forth important issues for scientific research on and systematic observation of the ozone layer; and describing the kinds of information to be collected and shared under its terms.

The 1992 United Nations Framework Convention on Climate Change (UNFCCC) was adopted to regulate levels of greenhouse gas concentration in the atmosphere, so as to avoid the occurrence of climate change on a level that would impede sustainable economic development, or compromise initiatives in food production. The Parties are to protect the climate system for present and future generations. One commitment under this convention is to promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs

of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention. The parties should work in cooperation so as to obtain maximum benefit from initiatives in the control of the climate systems. National inventories on greenhouse gas emissions have to be prepared by the parties and programmes for the control of climate change have to be formulated and implemented. It is further provided to undertake cooperation in technology for the control of change in the climate system; incorporate suitable policies for the control of climate change in national plans; and to undertake education and training policies that will enhance public awareness in relation to climate change. Also dealing with climate change is the Kyoto Protocol to the United Nations Framework Convention on Climate Change that came into force in Namibia in 2003.

In 1992 in Rio de Janeiro, at the United Nations Conference on Environment and Development, Namibia signed the **Convention on Biological Diversity (CBD)** and this was ratified in 1997.

Under article 7 Namibia is obliged to:

c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use.

(d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings.

Under article 14 of the convention EIAs must be conducted for projects that may negatively affect biological diversity. Being a member of the United Nations Forum on Forests Namibia and all other member countries agrees that, while taking national sovereignty, practices and conditions into account, should make all efforts to contribute to the following global objectives through the development or indication of voluntary national measures, policies, actions or specific goals:

- Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;
- Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people;
- Increase significantly the area of sustainably managed forests, including protected forests, and increase the proportion of forest products derived from sustainably managed forests; and
- Reverse the decline in official development assistance for sustainable forest management and mobilize significantly-increased new and additional financial resources from all sources for the implementation of sustainable forest management.

The United Nations Convention to Combat Desertification(UNCCD) brought attention to land degradation in the drylands where some of the most vulnerable ecosystems and people in the world exist. The 10-year strategic plan and framework adopted to enhance the implementation of the Convention for 2008-2018 include the strategic objective to generate global benefits through effective implementation of the UNCCD. The expected impact of this objective is that land

management and combating desertification/land degradation will contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.

The Stockholm Declaration on the Human Environment, Stockholm 1972. Namibia adopted the Stockholm Declaration on the Human Environment on 28 August 1996. It recognizes the need for: "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment". Among the proclamations are, in short:

- Natural resources must be protected
- Wildlife must be protected
- Pollution must not exceed the environment's capacity to clean itself
- Oceanic pollution that is damaging must be prevented
- Rational Planning must prevent or resolve conflicts between environment and planning

South African National Standards (SANS) and Codes of Practice Mentioned is made here of the standards referring to the storage and dispensing of liquid fuels. These standards serve to make fuel installations safe with respect to health and the environment during construction, operations and decommissioning. Under Namibian law (Petroleum Products and Energy Act No 13, 1990) all consumer installations must abide to the relevant SANS standards.

- SANS 100131: Above-ground storage tanks for petroleum products
- SANS 10089-3 (2010): The petroleum industry Part 3:

The installation, modification, and decommissioning of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations. To prevent pollution of the environment, spillage control procedures must be in place according to SANS 10089 and SANS 100131 standards, or better, including impounding around the loading areas by bunding with appropriate slopes of1:100, construction of bund walls and/or floors that are liquid tight and that are not prone to deterioration under the effects of any petroleum product.

5.20 Greenhouse gas emissions

The concentration of greenhouse gases in the atmosphere has grown mainly as a result of human activity. Greenhouse gases trap heat that would otherwise escape into space and they radiate it back towards the earth's surface: a phenomenon known as the 'greenhouse effect'. The growth of greenhouse gas emissions may be linked to rising temperatures, otherwise referred to as 'global warming'. In the context of climate change, Namibia has committed itself to reducing its impact through two conventions: the UN Framework Convention on Climate Change (UNFCCC, 1992) and the Convention to Combat Desertification (CCD, 1994). Namibian developed a National Climate Change Policy and has adopted legislation or policies specifically targeted at climate change, its constitution is obliged to support efforts to address climate change under its Environmental obligations. In keeping with the Department of Environment and Tourism, an indirect framework for Namibia's adaption to climate change is also provided in several existing socio-economic and natural resource policies. As the country only contributes a minor portion of the world's greenhouse gasses, focus is not placed on reduction but rather on the country's adaption to change.

Namibia has accordingly taken an active role in international climate change negotiations, and is part of the Africa group and G77+ China. Namibia compiles greenhouse inventories and reports its greenhouse gas emissions Formally to the United Nations Framework Convention on Climate Change. The presence of

large quantities of invasive vegetation act as a sink that removes carbon dioxide from the atmosphere, annually off-setting

5.21 The Ndonga Linena Green Scheme contribution to greenhouse gasses

Agriculture is responsible for 7% of total emissions of greenhouse gases into the atmosphere. The main source of greenhouse gases from agriculture is the emission of nitrous oxide (N_2O) from soils treated with nitrogen-based fertilizers to aid in growing crops and grazing livestock. The next leading source is emission of methane (CH_4) by ruminant livestock, especially cattle, through their burps and other digestive outgassing. Collectively, soils and livestock (at 40% and 25%, respectively) are responsible for nearly two-thirds of all agricultural greenhouse gas emissions. Other sources include carbon dioxide (CO_2) from the operation of farm equipment (13%), CH_4 and N_2O from manure management operations (11%), and CO_2 from cropped and grazed soils (5%). The rest (6%) results from a variety of minor sources

N_2O emitted from soils is particularly significant, because it has a heat-trapping greenhouse effect that is approximately 310 times greater than that of CO_2. N_2O emissions result from the biological processes of nitrification and denitrification. Put simply, nitrification occurs when a nitrogen-containing compound called ammonium, which is a main ingredient in many fertilizers, is transformed by microbes in the soil into another compound called nitrate. (To a lesser degree, manure applied to fields is also a source of ammonium.) Denitrification occurs when microorganisms metabolize the nitrate and convert it to N_2O (and other byproducts). This process proceeds especially fast when soils are wet and nitrate levels are high. Ultimately, 1 to 5% of the nitrogen added to agricultural fields in fertilizer and manure is lost to the atmosphere via soil N_2O emissions.

6. RESPONSIBILITIES FOR IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PLAN

6.1 Responsibilities for Environmental Management

MAFWLR will be responsible for environmental control on site during the construction and operational phase. It is very important a pre-work briefing meeting be held at all times to reach an agreement on specific roles of various parties and penalties for non-compliance. MAFWLR will be the executing agency for the project construction with the Farm Manager taking the role of execution. This EMP will be implemented by several institutions which are directly or indirectly involved in this project. These institutions are MAFWLR as the project implementer or proponent, Ministry of Health and Social Services (MoHSS), MEFT, Kavango East Regional Council, Constituency Councillor office, and the Traditional Authority, design engineers, and contractors who will be commissioned to construct the irrigation infrastructure. However, the overall responsibility for compliance with the environmental management plan rests with MAFWLR.

Ministry of Agriculture, Fisheries, Water and Land Reform

The Ndonga Linena Farm management Office is mandated to coordinate and supervise agricultural activities and to provide extension services to farmers in the area. Apart from control of pests, the Agriculture Office has limited contributions to the operations of the scheme. The MAFWLR regional extension office will liaise to provide extension services to the orchard project for fertilizer and pesticide management and efficient utilization of irrigation water. This will be undertaken through the extension services framework. The MAFWLR agronomist will be the focal point for training in IMP and agrochemical application and will liaise with the Agricultural Officers for technical support. MAFWLR will also monitor abstraction rates as well as water quality draining from the farm into receiving environment to conform to the water permit.

Efficient Water Use

Inefficient use of water at the orchard could cause water logging, increased health concerns and loss of water downstream. The MAFWLR Irrigation Engineer will coordinate training in efficient irrigation water.

Ministry of Environment and Forestry and Tourism

MEFT being the oversight authority over the environment in Namibia, its role will be reviewing of the EMP, approval, monitoring of environment indicators as well as identify in this monitoring plan and advising on environmental issues related to this EMP.

Contractors

The contractors will be in charge of designing and constructing the infrastructure according to the findings and recommendations of this the Scoping Report and the EMP. The contractor(s) will be responsible for the complete implementation of design mitigation measures in the EMP.

Ministry of Health and Social Services

Due to existing health impacts especially malaria in and around the project area, the role of MoHSS will be to promote environmental health, health prevention methods including sleeping in treated nets, indoor residual spraying and monitoring incidences of malaria, cholera and bilharzia.

6.2 Training and Induction

The proponent will be responsible for ensuring that environmental awareness education of all employees and contractors is done satisfactorily. MAFWLR must ensure that employees and contractors are made aware of environmental requirements of the project. This EMP must form part of the Terms of Reference for all contractors, sub-contractors and suppliers. All contractors, sub-contractors and suppliers will have to sign an agreement to assure that they understand the EMP and that they will comply. All senior staff should familiarize themselves with the full contents of the EMP and its implications. Senior staffs (Foreman/Supervisor) are expected to train and assist the rest of the employees on the contents of the EMP.

6.3 Environmental Incident Reporting

All environmental incidents occurring at the proposed site will be recorded. The incident report will include time, date, location and nature of the incident, extent of the incident, actions taken and personnel involved. All complaints received from neighbouring communities or businesses should be directed to the Farm Manager and channelled to the appointed Environmental Control Officer (ECO). In addition, the proponent's management should also be able to respond to the complainant within a week

(even if its pending investigation). It is important that the issues raised are considered and the complainant feels that their concerns have been addressed to and wherever possible actions taken to address these. All complaints should be entered in the environmental register and all responses and actions taken to address these should be recorded.

6.4 Environmental Monitoring

Periodic environmental monitoring must be taken on a regular basis. Monitoring should be done in order to ensure compliance with all aspects of the EMP. Findings should be communicated to all responsible officers per the chain command.

6.5 EMP Administration

Copies of this EMP shall be kept at the site office and should be distributed to all senior staff members, including those of the contractors.

6.6 Non-Compliance of the EMP

Problems may occur in carrying out mitigation measures or monitoring procedures that could result in non-compliance of the EMP. The responsible personnel should encourage staff to comply with the EMP, and address acts of non-compliance and penalties. MAFWLR is responsible for reporting non-conformance with the EMP, to the ECO. The proponent's management in consultation with the ECO must thereafter, undertake the following activities:

- Investigate and identify the cause of non-conformance
- Report matters of non-conformance to MAFWLR
- Implement suitable corrective action as well as prevent recurrence of the incident
- Assign responsibility for corrective and preventative action
- Any corrective action taken to eliminate the cause of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered

6.7 Environmental Register

AN environmental Register should be kept on site in which incidents related to actual impacts are recorded. This will include information related to incidents such as spillages, dust generation and complaints from adjacent neighbours. It should also contain information relating to actions taken. Any party on site may complete the register, however it is envisaged that the Farm Manager, the contractor and the ECO officer will be the main contributors and who will also be the main parties involved in suggesting mitigation measures.

6.8 Responsible Parties

The implementation of the EMP should be the responsibility of proponent MAFWLR Farm Manager and during the construction phase of the intended development. Below are the responsibilities of the people required during the construction phase to implement a range of environmental management related issues.

6.8.1 Environmental Control Officer:

A qualified Environmental Control Officer (ECO) should be appointed by MAFWLR (proponent) or the Contractor to monitor and review the on-site environmental management and implementation of this EMP. The Environmental Control Officer will be responsible for the following responsibilities:

- Monitoring of all the Contractor's activities for compliance with the various environmental requirements contained in this EMP;
- Providing of an environmental register at the site to be filled in by any person reporting an environmental incident, issue or concern and inspected by the ECO officer on a regular basis to check for issues raised and actions taken;
- Ensuring that the EMP conditions are adhered to at all times and taking action;
- Ensuring that environmental impacts are kept to a minimum;
- Notifying the Environmental Authorities immediately of any events or incidents that may cause significant environmental damage or breach the requirements of the EMP;
- Environmental Awareness Training courses to be conducted to the Contractor's entire team of workers;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Reviewing and approving method statements in consultation with the Farm Manager;
- Reporting to MAFWLR and the Farm Manager on a regular basis and advising of any major environmental impacts. Attending the site meetings (when necessary);
- Inspecting the site and surrounding areas regularly, and monitoring an ongoing environmental awareness programme in conjunction with the Farm Manager;
- Requesting the removal of people/or equipment not complying with the specifications of EMP;
- Keeping both a written and photographic record of progress on site from an environmental perspective, and an ad hoc record of all environmental incidents;
- Undertaking continual review of the EMP and submitting a report to the relevant stakeholders; and
- The ECO officer will submit all written instructions and verbal requests to the proponent via the Farm Manager and Project Engineer.

6.8.2 The Contractor

- ❖ The Contractor shall ensure adherence to, and compliance with the construction EMP in a legal and timely manner;

- ❖ Ensure that all staff members, subcontractors and suppliers have a comprehensive understanding of the EMP and adhere to the provisions for the duration of the construction phase;

- ❖ Develop a layout of the operations of the construction site indicating the position of all construction activities including but not limited to: site offices, ablution facilities, storage areas, workshops, batching plant, stockpile areas. Waste disposal facilities, hazardous substance storage area, access routes etc. Any changes to this layout plan will need to be reviewed in conjunction with the ECO;

- ❖ Ensure that all recommendations made in monitoring and audit reports are implemented throughout the construction phase;

- ❖ Accept liability for any and all work required in terms of the environmental specifications resulting from environmental negligence, mismanagement and/or non-compliance;

- ❖ Ensure that all staff, sub-contractors and suppliers are aware of the environmental issues relating to the construction activities that they are undertaking on site and of all mitigation and precautionary measures that must be implemented.

6.9 Construction phase

It is recommended that all principles contained within this Environmental Management Plan (EMP) apply to all construction activities. The proponent should be responsible for the following:

- ❖ Ensuring that all identified environmental impacts are managed in accordance with the EMP;

- ❖ Ensuring that all monitoring and compliance auditing occurs in line with the EMP;

6.10 Planning and Design Management

It should be noted that, the proponent together with the engineer must ensure that this Environmental Management Plan is also included in the tender documentation that is to be given to the Contractor (to be appointed) and the Contractor must adhere to all requirements as well as management actions outlined in this EMP. The project documents address all aspects of the planning and design phase, such as detailed architectural, infrastructural and engineering services layout and design. All members of the planning and design team are to be in possession of this EMP and must be aware of the environmental aspects, risks and mitigation measures.

6.11 Environmental Awareness

An environmental awareness plan must be implemented for both the construction and operational phases. The EMP will thus provide the basis of the information to be supplied as well as any other relevant documentation including any specialist reports. All construction and operational staff as well as suppliers

and regular out-sourced contractors will be required to attend a general orientation session prior to the commencement of any activities. All impacts that could potentially arise and affect the environment will be discussed and explained in detail as well as required mitigation measures. The consequences of not following the mitigation measures stipulated in the Environmental Management Plan will be addressed.

It is recommended that all permanent staff receive detailed training relative to their job description. This training will focus on the environmental issues and impacts that are directly linked to their activities. In addition, staff members will be required to report all incidents so that the appropriate mitigation measures can be implemented in a timely manner.

6.12 Access routes, Traffic and Work sites

With regards to traffic, the Contractor should be responsible for the control of all project related traffic. This will include building material suppliers and ensure that all construction vehicles or those associated with the project use designated routes within working times.

No new tracks/roads shall be established and only existing roads may be used and those that are planned. Work sites shall be clearly demarcated and road signs erected where needed. The general public should not have unauthorised/uncontrolled access to the project location during this phase. Vehicle access will be limited to one or two entrances to facilitate control. Access must be of a high standard to prevent unauthorised access from entering the site.

The entrance will be manned during the operation hours; and access routes will be closed to prevent unauthorised entry. A notice board, in two languages (English & Rukavango), must be erected at the entrance and must state entrance requirements and operating hours of the site, the operator/responsible person and emergency telephone numbers. Suitable signs must also be erected on the approach roads and on-site, to direct drivers and to control speed.

Road access to the working face of the development must be maintained at all times in a manner suitable to accommodate vehicles normally expected to use the facility. Roads must be regularly graded and wetted to control dust, where necessary. Furthermore, on-going controls, such as fencing and policing, must be implemented.

6.13 Fire and Safety Management

All electrical installations, wiring and systems at the project location, must be approved by a qualified electrician who will issue a Certificate of Compliance. Proper handling, storage, use and disposal of any hazardous waste (e.g. hydrocarbons, paint, batteries, radioactive waste, etc.) should be conducted. Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

No uncontrolled fire, whether for cooking or any other purpose, is to be made at the project location during both the construction and operation phases. The Contractor shall take all reasonable measures and active steps to avoid increasing the risk of fire through activities on site and prevent the accidental occurrence or spread of fire; and shall ensure that there is sufficient fire-fighting equipment on site at all times. This equipment shall include fire extinguishers. The Contractor should be prepared for such events.

6.14 Staff Management

The Contractor must ensure that their employees have suitable personal protective equipment and properly trained in firefighting and first aid. Training records must be kept for future references.

6.15 Ablution Facilities

The Contractor shall provide temporary toilets on site for the workers and these toilets should be in a walking distance of the work area. The Engineer/ECO on site shall approve the location of the toilets and shall also not be placed closer than 50m to water resources (e.g. streams). The toilets (1 toilet per 15 users is the norm) to be provided where construction is occurring. Workers need to be encouraged to use these facilities and not the natural environment.

Waste from chemical toilets should be disposed of regularly and in a responsible manner by a registered waste contractor. Discharge of waste from toilets into the environment is prohibited. All toilets shall be secured to the ground to ensure that they do not overturn during high winds or for any other reason. It is the responsibility of the Contractor to ensure that no spillage occurs when the toilets are cleaned or emptied and that these contents are removed from site.

6.16 Waste Management

Waste will be generated in the form of rubble, cement bags, pipe and electrical cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase. The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed of at the hazardous landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and house-keeping procedure monitoring should be maintained by the contractor.

Waste in the form of solid waste from households, businesses and institutions will also be generated during the operational phase. Waste will be removed and disposed of at an authorised Landfill within the area by the proponent, their contractors or alternatively liaise and arrange with the Regional Council.

However, the Contractor shall provide sufficient waste skips on site during the construction. These waste skips should be in pairs to ensure that one is always present as the other is being emptied. No waste of any sort shall be burnt or buried on site. The waste skips are expected to be emptied on a daily basis.

6.17 Cement and Concrete Batching

Concrete mixing directly on the ground shall not be allowed and shall take place on an impermeable surface. All run-off from batching areas shall be strictly controlled, and cement contaminated water shall be collected, stored and disposed of at a suitable waste disposal facility.

6.18 Hydrocarbons Management

If any spillage occurs, contaminated soil shall be collected in a holding tray or drum and which will then be disposed of at a hazardous waste disposal site. Any spillage of more than 200 litres must be reported

to the Ministry of Mines and Energy as per the Petroleum Products Act. The Contractor shall take all reasonable measures to prevent surface or groundwater pollution from the release of oils and fuels.

6.19 Information Board

The Contractor will be responsible for erecting information boards on site. The number and locations of these boards shall be agreed upon by the ECO officer. The contents of the information board shall be provided by the Farm Manager and will essentially be to advise the public of the construction activity and the prohibition on entering certain areas. The information board shall also provide the contact number of the ECO, to ensure that the public can access relevant information and lodge any complaints during the construction phase of the intended development.

6.20 Flood Management

The intended development will be designed in such a way that surface water run-off is well developed. Storm water management of the intended development should be a key aspect of flood management within the development. All culverts should be kept clean to allow storm water to flow freely.

6.21 Stockpiling, Handling, and Storage of Building Materials

The Contractor shall ensure that stockpiles and storage yards be demarcated in areas that are already disturbed or where they will cause minimal disturbance. The Contractor/ECO shall indicate which activities are to take place in which areas within the site (e.g. mixing of cement, stockpiling of materials, etc.). These activities must be limited to single sites only. All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the Contractor to, and used or worn by the staff whose duty it is to manage and maintain the Contractor's and his sub-contractors and supplier's plant, machinery and equipment.

6.22 Excavation, Backfilling and Trenching

The Contractor shall ensure that all excavations are not to be left open for more than 2 days, thus it is recommended that excavations should be opened and closed the same day. Warning signs should be erected around the excavated area to clearly demarcate the area against access. In addition, soil that was/has been removed shall be used to backfill areas where required and excavated material shall be stockpiled along the trench within the working servitude.

6.23 Erosion Control

The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the ECO. The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible.

6.24 Servicing and Re-fuelling of Construction Equipment

All maintenance and repair work will be carried out at the farm equipment maintenance centre within an area designated for this purpose, equipped with necessary pollution containment measures. The ground under the servicing and refuelling areas must be protected against pollution caused by spills

and/or tank overfills (bunded/lined). The Contractor may only change oil or lubricant at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up/removed immediately. Construction vehicles are to be maintained in an acceptable state of repair.

No vehicles or equipment which leaks or causing spills will be permitted to operate at any of the construction sites. These will be sent immediately back to the maintenance yard for repair. Fuels required during construction must be stored in a central depot at the construction camp. This storage area should be located on a slab and be contained within a bund capable of containing at least the volume of one of the containers.

6.25 Noise

Construction phase of the development shall only occur from Mondays to Fridays between the hours of 08H00 and 17H00. The Contractor/ECO shall ensure that people from adjacent areas must be kept informed of the need and extent of noisy disruptive processes. The use of radios, television sets and other such equipment by workers must be controlled and noise levels kept to a level that does not disturb the neighbouring business properties.

6.26 Dust

The Contractor shall take precautions to the satisfaction of the ECO to limit the production of dust and damage caused by dust. Dust suppression measures shall be agreed upon in consultation with the engineer/ECO. The following measures must be implemented to limit/minimise dust impacts:

- Construction vehicles to only use designated roads;
- During high wind conditions the Contractor must make the decision to cease works until the wind has calmed down; and
- Cover any stockpiles with a suitable material, such as plastic or shade-cloth, to minimise wind-blown dust.

6.27 Heritage/Archaeological Sites

Any archaeological resource be found on both sites; construction work should be ceased immediately. It is therefore the responsibility of the Contractor to inform the ECO of any archaeological resource found on site or in close proximity of the site. The ECO shall report the incident to the National Heritage Council of Namibia and during this time further construction work may only resume once clearance is given by the archaeologist and/or specialist.

6.28 Site Demarcation and Rehabilitation

The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project. The sites should be fully rehabilitated (e.g. clear and clean area, rake, pack branches, etc.) including all disturbed areas and protect them from erosion. Only indigenous plants which are able to establish easily and will need less maintenance because they have already adapted to the local conditions should be considered.

6.29 Site Management

It should be noted that areas outside this designated working zone shall be considered **"NO GO"** areas. The offloading zones must be clearly demarcated when offloading goods to enhance safety around the project location.

7. OPERATIONAL PHASE

7.1 Waste minimisation

There should be a full examination of process by-products and wastes to identify options for waste minimisation. In some cases, substituting raw material may lead to changes in the process. Often, re-using or recycling by-products reduces waste production. Recovering valuable materials from waste streams can be economically and environmentally sensible.

Some waste minimisation options to consider are:

- changing the processes or equipment
- changing the composition, packaging or durability of products
- changing or reducing raw material inputs
- improving the control of the process
- improving the materials handling and cleaning operations
- improving the maintenance and repair of equipment
- recycling waste internally
- re-using waste on site
- recovering materials from waste streams

7.2 The visual environment

The choice of aesthetically pleasing colours and finishes will enhance the look of premises. Features such as trees, shrubs, rock walls and grassed slopes incorporated into the landscaping will not only help with the visual impact, but also diminish the effect of operational lighting beyond the boundaries of the premises.

7.3 Preventing contamination

Once streams, process operations, raw materials, fuel supplies and product ranges have been identified, the methods of storing and handling materials and ways of segregating, treating and disposing of wastes must be addressed to minimise the potential for land contamination and air and water pollution. Underground tanks can leak into soils for long periods before being detected, leading to high clean-up costs.

7.4 Management strategies

Industry and control authorities should together develop management strategies that reflect good conservation practices and conform with environmental regulations. Techniques and procedures to integrate all waste management options should be adopted wherever possible. A beneficial re-use strategy should be initiated after the waste management strategy.

Cleaner production and waste minimisation aims directly at the source of the waste generation and attempts to eliminate waste before it is produced, or to reduce the amount generated. Waste should be disposed of only after all preventive and minimisation measures have been taken. The MAFWLR should develop management strategies for proposed and existing premises. The strategies should aim to:

- minimise the quantity of waste generated
- prevent pollution arising from the disposal of waste
- prevent nuisance pollution such as odours, dust and smoke
- minimise environmental health risks
- improve the efficiency of processes through energy savings

Opportunities for recycling exist in all types of industry, in commercial and government organisations and for public groups. Operators should nominate a staff member to supervise the recycling schemes.

7.5 Water pollution control measures

- All processing areas must have concrete floors graded to wash down drains.
- All chemical storage areas and chemical-based odour control equipment must be located on impermeable concrete floors with bunding capable of containing 110 per cent of any spillage.

7.5.1 Storm water runoff

Storm water should be controlled using the following techniques.

- Storm water should be diverted away from intensively used holding areas, bulk chemical storage and liquid waste collection areas and treatment and disposal areas. This can be done by roofing or isolating unloading areas, stockyards and processing plant, as well as by building diversion drains and bunding.
- Contaminated storm water should be collected in waste water ponds, aerated and irrigated without any off-site runoff.
- Clean storm water must be kept away from contaminated areas and directed to the storm water drainage system. It may be collected for stock watering or washing down.

7.6 Dust

Below are techniques that reduce dust emissions:

- Fabric filter type dust collectors should be used for dust control.
- Surfaces of saleyards, unsealed roads and parking areas should be sealed.
- Windbreaks (incorporating lines of trees) should be used near large coal stockpiles.
- Stockpiles should be dampened with water sprays and have their axes parallel to the direction of the strongest winds.

- ❖ Dusty process operations should be serviced by filtered ventilation hoods.
- ❖ Warehouses should use good housekeeping to alleviate dust generation.

7.7 Noise control

7.7.1 Existing premises

The following noise control measures should be considered.

- ❖ Erect noise barriers such as screens around noisy equipment and operations.
- ❖ Use visual signals and portable telephones instead of hooters and telephone bells in operational areas.
- ❖ All ventilation and extractor fans should be noise efficient or fitted with silencers, and all ducts should be lined with sound-absorbent material.
- ❖ Restrict external workshop activities and vehicle access to 7 am to 6 pm, Monday to Friday and 7 am to 1 pm on Saturdays. Generally, only work conducted inside noise-insulated workshops should be permitted during the evening (6 pm to 10 pm) and night-time (10 pm to 7 am).
- ❖ Limit vehicle movement (especially trucks) to and from the site to normal working hours only.
- ❖ Fit efficient exhaust mufflers to diesel forklift engines, other noisy vehicles and air-powered tools.
- ❖ Keep equipment in good repair and attend promptly to lose or rattling covers, worn bearings and broken equipment.
- ❖ Locate mechanical equipment on mounts designed to isolate structure-borne vibration and noise.

Noise from operations should not exceed the levels in the table 2 below.

Table 2: Compliance noise limits (based on background sound levels) for existing sources or places to protect existing or proposed dwellings and other noise-sensitive places or commercial areas

Time period	Dwelling or other noise sensitive place	Commercial place
Daytime (7 am to 6 pm)	Background + 5 dB(A)	Background + 10 dB(A)
Evening (6 pm to 10 pm)	Background + 5 dB(A)	Background + 10 dB(A)
Night-time (10 pm to 7 am)	Background + 5 dB(A)	Background + 10 dB(A)

Compliance limit levels are measured as the average of the maximum A-weighted sound levels adjusted for noise character measured over a 15-minute time interval.

7.8 Training employees

Training employees is a vital part of any environmental management practice. Staff should be aware of the environmental management program and environmental controls at varying levels of detail,

depending on their duties. All staff need to be advised that if they fail in their duties, they are just as liable to prosecution and penalty as their employer. Training programs should contain common elements such as familiarisation with the company environmental policy and commitment to waste prevention, recycling and raw materials conservation. Employees should be encouraged to suggest new ideas. It is the responsibility of the occupier of the premises to ensure all operational staff are instructed in the use of equipment, processes and emergency conditions that might result in pollution.

7.9 Summary of Environmental management plan

Table below provides a summary of the environmental aspects and impacts associated with the development.

CONSTRUCTION PHASE

Activity	Adverse Impacts	Mitigation Measure(s)	Implementation Schedule	Responsibility
Construction of irrigation canals, drainage and networks	Movement obstruction due to construction for both animals and human	Use of culverts and construction of access roads	During construction phase	Project designer and contractor
Civil Works: clearing site/Site clearing /earth moving	Topsoil stock piles and excavation waste	Minimize extent of disturbance and protect and conserve project area	During construction	MAFWLR
		Secure stock piles through installation of soil traps	During construction	Contractor
		Reuse the overburden earth to rehabilitate stripped and excavated zones and to fill the burrows		

Activity	Adverse Impacts	Mitigation Measure(s)	Implementation Schedule	Responsibility
		Upstream afforestation for catchment protection		
		Creation of buffer zones downstream Creation of Sedimentation Basin		

OPERATION PHASE

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
Drip Irrigation	Water wastage	Line transfer canals	Construction and Operational phases	Designers
		Water abstraction permits	Operational phase	MAFWLR
	Encroachment into marginal sensitive Yala swamp	Provide buffer zone between the blocks and Yala swamp on the southern part of the project area	Design phase	Design engineers
	Soil salinization	Flush irrigated land regularly	Operational phase	MAFWLR

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
	Increase in Malaria	Create awareness on malaria prevention methods		Ministry of Health and Social Services
		Provide treated mosquito nets		
		Indoor residual spraying in homesteads around the project area	Operational phase	Ministry of Health
	Changes in hydrology	Control water abstraction by installing water meter	Operational phase	MAFWLR
	Soil Erosion	Terracing of the sloppy areas of the land	Continuous	MAFWLR
		Contour drainage to slow down surface runoff		
		Regulate water abstraction through practices		
	Reduced water flow downstream	Control abstraction rates by observing environmental flows calculations	During design, construction and operation phases	MAFWLR

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
	Microclimate modification	Install master meters	Design phase	Design engineers
		Proper design and operation of spillways and gates (timing and volume of discharges)		
		Minimize extent of disturbance	Construction and operational phase	Contractor and MAFWLR
		Planting trees to restore ambient climate		

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
Application of agrochemicals (fertilizer and pesticides)	Water pollution	Adoption of IPM strategy	Operational phase of the project	MAFWLR
		Provide domestic water points in the blocks		
	Emergence of pests and crop diseases	IPM approaches are proposed. Adopt mixed cropping practices. At the farm level, the agronomist should discourage mono-cropping.	Operation phase	

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
	Birdlife poisoning	Adoption of IPM strategy	Operational phase	MAFWLR
	Water resources pollution	A training program on application of agro-chemicals under field conditions. Create buffer zones downstream and draining of the irrigation water into wetland	Planning and operation	MAFWLR

Activity	Adverse Impacts	Mitigation Measures	Implementation Schedule	Responsibility
	Soil erosion	Terracing of the sloppy areas of the land.	Operational phase	MAFWLR and construction contractor
		Contour drainage to slow down surface runoff.		
		Land levelling to prevent erosion		

	Displacement of staple food crops in favour of high economic value rice	Agricultural extension officers to promote importance of diversifying crop production and good farm practices such as intercropping and rotational cropping	Planning and Operational stages	MAFWLR
	Human Wildlife Conflict	Provide for a fence and 5-metre-wide trench in the design on the project area boundary	Design and construction phase	Design engineers' in consultation with Ministry of Works

DECOMMISSIONING PHASE

Activity	Adverse Impacts	Mitigation Measure(s)	Implementation Schedule	Responsibility
Civil works	Burrow pits that could provide vectors habitat	Rehabilitate through levelling and planting of vegetation	During decommissioning construction	MAFWLR

8. MONITORING AND AUDITING PLAN

This monitoring plan defines and identifies monitoring activities that will take place during development and implementation of the project. It defines timelines and responsibilities as well as identifies the indicators and data collection methods to be applied. The plan also identifies the training and capacity building needs of the institutions and persons to implement it.

As indicated in the monitoring schedule below, monitoring will be done by numerous institutions and persons but coordinated by while the focal person will be the Environmental Control Officer.

To ensure effective and reliable data collection, the key persons from the institutions to be involved in the monitoring will be trained on the indicators to be monitored, sampling methods, and data collection techniques to be used. Evima will organize a 2-day training program at each of the Green Schemes. The key resource persons for this training will be the environmental specialist hired by MAFWLR. Participants for this training will be from the institutions involved in implementation of the monitoring plan which are MAFWLR as the project implementer or proponent, MoHSS, MET, Kavango West Regional Council, Constituency Councillor office, and the Traditional Authority, design engineers, contractors who will be commissioned to construct the irrigation infrastructure.

It is critical that MAFWLR coordinates with partners to monitor water abstraction and environmental flows so as to ensure that intended objectives of the project to conserve water through efficient water use are achieved. A regular log of water abstraction quantities should be kept at Farm Manager office.

Regular water quality sampling exercises will be undertaken. Monitoring data will be shared among the monitoring team to ensure that adopted mitigation activities are adequately addressed and implemented. As an example, water quality data should be shared with irrigation and agricultural officers to ensure that farming techniques such as application of fertilizers and pesticides have minimal impact on the quality of water.

During monitoring activities, MAFWLR will regularly consult with the Public Health Officer to obtain data on public health status especially on waterborne or water related diseases. Appropriate mitigation measures where necessary will be arrived at through consultations between the MAFWLR Environmental Officer, site engineer, and the Public Health Officer and other related government officers as well as the Constituency Councillor. Monitoring, development of mitigation measures and implementation of the same should always include the local community leaders to improve rate of success and strengthen the environment management capacities of local communities.

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements whereas, environmental auditing is the process of comparing the impacts predicted with those which have actually occurred during implementation. The ultimate purpose of environmental monitoring and auditing is to confirm that all relevant programmes, legislation, laws, and policies are adhered to and abided by and that the environmental specifications are being implemented in an effective and correct manner. Monitoring and auditing are intended to promote environmental best practice, ensure protection of resources and support sustainable development.

8.1 Monitoring methods

In order to ensure that the above objectives are adhered to, the following monitoring methods will be employed:

- Aspect monitoring;
- Incident reporting;
- Site inspections;
- Site monitoring and reporting;
- Independent external auditing

8.2 Compliance

Compliance involves actions and programmes designed to ensure that all relevant environmental laws, legislations, standards and other requirements such as permits are followed and adhered to.

8.3 Non-compliance

Failure by the Contractor, operator and their staff together with their suppliers to comply with all relevant programmes, laws, legislations, policies and mitigation measures laid out in this Environmental Management Plan will result in the following actions and consequences:

- Failure to comply or respond to notifications and recommendations within a specified timeframe will result in written warning being issued;
- Failure to comply or respond to warnings within a specified timeframe will result in fines being issued;
- Continued and wilful failure to comply or respond will result in the suspension of site activities until compliance is reached to the satisfaction of the ECO. In the event of severe negligence or failure to comply, all site activities may be terminated.

One of the most effective impact management tools is planning and implementation of mitigation measures in accordance with the schedule of actions contained in the EMP. Frequent follow-up of activities and adjustment to respond for unforeseen impacts/ other changes is extremely critical component of management and mitigation plan.

Detailed base line conditions are presented on section five, which is vital to monitor impacts of the project against those conditions. All measurements of impacts considered to arise due to the presence/implementation of the project will base on the condition values of the intended parameters.

The following are indicators that will be used for the monitoring of the impacts of the Project:

- Water consumption and alternative source development;
- Volume of waste generated and handling & disposal mechanisms;
- Complains associated to waste disposal and amenities (odour, environmental hygiene etc);
- Compensation and rehabilitation status of the displaced people;
- Traffic accidents occurred;

- ❖ Over all environmental hygiene and sanitation of the project site and its influence area;

A monitoring team from the identified stakeholders should be organized to undertake the monitoring of environmental and social impacts of the Irrigation Farm. The team is expected to comprise representatives of MAFWLR as the project implementer or proponent, MoHSS, MEFT, Kavango East Regional Council, Constituency Councillor office, and the Traditional Authority, design engineers, contractors.

Impact	Parameter	Indicator	Method	Frequency	Responsibility
Birdlife poisoning	Poisoned birds	Bird deaths	Number of bird deaths	Daily	MAFWLR and MET
Population influx	Population	Change in total human population within the 10 km radius of project area	Census reports	Continuous	Constituency Councillor and Regional Council
Emergence of pests and crop diseases	Pests and crop diseases	Signs of pests and diseases in crops/ Incidence and spread of pests and diseases	Incidence and spread of pests and diseases through crop field assessment	Seasonally	MAFWLR and MAFWLR
Water-borne diseases	Water-borne diseases	Increased cases of malaria and bilharzias among other waterborne diseases	Review of health records at the divisional level health centres	Quarterly	MHSS
Safety Hazard	Accidents	Incidences and accidents occurrences	Review and evaluation of incidents and accidents register	Monthly	MAFWLR
Land Use Change	Change in land use	Project area boundary	Project area boundary review	Continuous	MAFWLR, Kavango West Regional Council
Human-wildlife conflict	Conflict	Incidents reported	Incidents review	Monthly	MEFT

Impact	Parameter	Indicator	Method	Frequency of Measurement	Responsibility
Reduced Water flow	Quantity	Percentage of water abstracted to be kept, Adhere to Environmental Flows, Flow Rates Per Second	Water meter at the intake weir	Monthly	MAFWLR
Water logging and soil salinization	Salt builds up in soil	Soil salinity	Sample soil pH testing	Yearly	MAFWLR
Water pollution	Quality	Nutrients (Nitrates, phosphates, potassium, Ammonia[1], pesticide residue, COD & BOD[2], Turbidity, E-*Coli*	Quarterly during wet and dry season (samples should be taken from the inlet and outlet points of the developed area Incidences of water borne diseases	Seasonally and quarterly	MAFWLR, MAFWLR
Soil erosion	Soil	Soil productivity and gullies	Observation and look out for siltation and reduced retention capacity	Continuous	MAFWLR
Water Wastage	Water Quantity	Abstraction quantities *vis a vis* water quantity	Abstraction Quantity Data	Monthly	MAFWLR

[1] Free Ammonia (NH3): Less than 0.2 mg/l: The lethal concentration for a variety of fish species is in the range 0.2 to 2.0 mg/l NH 3

[2] Biochemical Oxygen Demand (5-day at 20 °C): BOD is not a pollutant itself, but is a measure of organic pollution. Waters with BOD levels less than 4 mg/l are deemed clean while those with BOD more than 10 are considered polluted. High BOD concentrations may limit water use for public consumption, fisheries and irrigation.

		requirements for irrigation			

ANNEX 1: SCREENING NOTICE

REPUBLIC OF NAMIBIA
Ministry of Environment, Forestry & Tourism

2025-05-22

Dear Evima Consulting Engineers and Project Managers,

Thank you for applying for an Environmental Clearance Certificate.

Your application has been registered with application number **250522005836**

Thank you

Phillip Troskie Bulding
P/Bag 13306, Windhoek | Tel: +264 61 284 2111 | DEA: +264 61 284 2701

ANNEX 2: ENVIRONMENTAL MONITORING REPORT

Environmental Monitoring Report
For the development of an Orchard at Ndonga Linena Green Scheme

09 July 2025

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1. SCOPING REPORT

Orchards are vital for food security, biodiversity, and community well-being. They offer a sustainable food source, provide habitat for various wildlife, and foster community engagement. Orchards also play a role in climate regulation and soil conservation. It is on this background that the Ministry of Agriculture Fisheries Water and Land Reform (MAFWLR)has embarked on a project to develop orchards within the current available land at Ndonga Linena and Shadikongoro Green Schemes.

As part of the orchard development programme a scoping process to assess the environmental and socio-economic impacts of the project was undertaken. The objective of this study was to analyze the socio-economic and socioenvironmental status of the affected areas during pre and post construction, assessing the Government's capacity to implement the proposed mitigation measures, and make appropriate recommendations, including potential capacity building and training needs and their costs, identification of projects potential environmental and social impacts resulting from the projects and proposing mitigation measures, preparation of emergency response measures to accidents as appropriate e.g.: Environmental Management Plan (EMP). As part of the scoping process, a detailed literature review on the existing baseline information and research undertaken in the projects area was collected. The review of available data sources helped in describing the environmental and social set up of the area.

A field trip was undertaken to the site and this involved assessing the flora and fauna in the area in and around the green scheme. Furthermore, environmental monitoring and auditing was undertaken to assess the environmental, health and safety of the existing facilities including office space and staff houses.

In undertaking this environmental impact assessment for the proposed irrigation development potential sources of risk to the ecological and social environment were first identified. Each source of risk identified was described and its potential environmental impact considered. Some of the potential negative impacts identified through the scoping process include:

- Limited loss of vegetation.
- Limited air pollution.
- Soil pollution.
- Soil erosion.
- Health and safety of workers at project sites.
- Land use change.
- Increased water use.

Various methods and techniques were applied in impact identification, prediction and evaluation. The consultants with the help of stakeholders identified and analysed potential impacts linking these with specific project activities and phase. First the task was to consider both positive and negative impacts of the project. While considering the impacts, the study examined them in light of their characteristics i.e. nature (positive or negative), extent (spatial), occurrence (one-off, intermitted or constant), magnitude, whether reversible or irreversible, direct or indirect, probability of

occurrence and significance with and without mitigation. The exercise also examined the cumulative effects of impacts and particularly on land use and water quality.

The Green Scheme is fully fenced hence there is no human wildlife conflict. This also makes the farm secure from potential burglars.

Overall environmental safeguard and compliance of the project is within the relevant legislation and policy framework. The impacts assessed in the scoping report also indicated that the project negative impacts will be mitigated through implementation of the Environmental Management Plan (EMP) and monitoring. Therefore, as the Environmental Assessment Practioner we recommend that the Ministry of Agriculture Fisheries Water and Land Reform be granted an Environmental Clearance Certificate (ECC) for the development of the orchard. Once the ECC is issued the Proponent will have to fully comply with permit conditions and the EMP.

2. ENVIRONMENTAL MONITORING REPORT

2.1 Fauna and Flora, habitats

The Ndonga Linena Green Scheme area: occurs in the Kalahari Sands and consists of:

- *Burkea-Combretum* woodland is a unit typically dominated by high Burkea at varying densities with kiaat, false mopane and Mangetti occurring less frequently. *Terminalia sericea* dominates the low tree layer and the shrub layer is open with *Baphia massaienesis, Bauhinia peterisana* and *Grewia retinervis* giving most of the cover. *Diospyros chamaethamnus,* a mat-forming woody species is common in areas burnt often. Grass cover is generally low.

- *Burkea*-kiaat-false mopane woodland occurs west of the Kavango River on undulating sandy plains. Burkea dominates the tall tree layer which with false mopane, kiaat and mangetti trees provides a dense woodland. Grasses are predominantly perennials with species such as *Schmidtia pappophoroides, Stipagrostis uniplumis, Aristidia stipitata* and *Digitaria eriantha* characteristic at low cover.

- *Burkea* shrubland has little value for grazing. Trees of over four meters high are rare. The shrub layer is characterized by *Terminalia sericea*, *Philonoptera nelsii, Bauhinia petersiana*, *Baphia massaienesis, Burkea africana* and *Grewia retinervis.* The shrub layer can be as much as 50% in areas badly damaged by fire.

- *Burkea*-teak woodland is a unit on well-developed dunes in eastern Bwabwata NP. There is a tall tree layer made up largely of Burkea, teak, false mopane, kiaat and mangetti. A second layer of trees, six to eight meters high is present. The shrub cover is low and grasses are predominantly annuals.

- Omuramba (Mulapo) fringe woodland unit forms a distinct fringe along the slopes of dunes and mulapo margins. Camelthorn, leadwood and knob-thorn trees form a distinct layer 10-15m high covering a substantial

area. The vegetation is characteristic of both heavy soils and Kalahari sands and provides important habitat for wildlife.

- Omuramba (mulapo) grassland is found in the mulapo valleys throughout the Kalahari sand areas. The grass *Imperata cylindrical* dominates the wetter areas while a variety of palatable species grow in the drier areas such as *Schmidtia pappophoroides, Brachiaria nigropedata,Digitaria eriantha* and *Antephora pubescens.* These are some of the best grazing resources in the park. The sandy loam soils are extensively cultivated at Omega.

- Open camelthorn woodland is limited to a small area in the Kwando Core Area on clay loam soils. Camelthorns are well distributed and tall (15m) and there is a distinct understory of low trees. Perennial grasses are well represented so this area is presumed to have a high value as a grazing resource.

- Teak savanna is widely distributed in the park and occurs in areas of deflated dunes where the landscape consists of gently rolling sandy plains. Tall teak trees are prominent but occur at moderate densities, giving the landscape a savanna-like appearance. The shrub layer is sparse with a relatively high proportion of perennial grasses.

- Teak woodland is tall, often fairly dense and widely distributed on deep well drained sandy plains and dunes. A very dense layer of shrubs may be present.

Vulnerable vegetation types in the Okavango valley woodlands and Okavango Valley fields and Shrubland. These vegetation types are characterized by tall riparian forests following the courses of the two rivers (and occurring on the many islands) and occurring at various widths, but in some instances only a few tens of meters. It is in fact hard to know how wide the riparian forests were because of severe degradation in places.

Parts of the riparian woodlands and thickets in along the area are still intact. These areas and the rivers themselves are the habitat for highly prized (by birdwatchers) bird species such as Souza's shrike, rock pratincole and white-backed night-heron. Permanently wet areas are home to several aquatic and semi-aquatic species, amongst which are some healthy populations of hippo and crocodile and less conspicuous species such as the spotted-necked otter and the Cape clawless otter. Floodplain grasslands form important habitat for wetlands mammals such as lechwe, sitatunga and reedbuck. There is concern over the status of some of the grassland and wetland species that occur along the river, e.g. tsessebe. Other species are absent and should be considered for reintroduction e.g. oribi, Sharpe's grysbok and puku.

2.2 Waste Management

The objectives of waste management plan is to:

- Ensure waste is managed accordingly.

- ❖ Comply with requirements.

Waste management has been implemented successfully during the operation reporting period.

1) Solid waste, hazardous and general waste within suitable bins that are clearly labelled.
2) Bins/drum are collected by the farm workers and are taken to the landfill site. The landfill is not well constructed and poses a risk. A new landfill that meets requirements of the Ministry of Environment, Forestry and Tourism needs to be developed
3) The site uses septic tanks which are monitored and maintained by plumbers

Figure 1: The existing waste Management site does not meet requirements of the legislation for waste management. New waste management should be developed

2.3 Petroleum and chemical management

Large quantities of petroleum and chemical products, which are potential sources of water pollution are stored and handled accordingly. The following management practices are employed:

1) Fuel storage tanks are bunded and kept in underground tanks. Other chemicals are stored in storage locker rooms for safe keeping.
2) Spill kits, drip trays and absorbents, are kept in the hangers for safe removal of spilled oil and fuel through immediate containment and spill recovery methods.
3) Grease and suspended solids from various sources such as service vehicles and maintenance are stored in a locker room and disposed of at designated sites.

2.4 Water Management

Water at the farm is stored on elevated reservoirs. Water quality monitoring should be considered as water could be stored for long periods may not frequently be cleaned and liable to contamination.

2.5 Impact on Air Quality and Noise

Land-use planning and management is an effective means to ensure that the activities of the planned orchard. The main goal is to minimize any potential noise. No noise complaints have been recorded during the reporting period.

2.6 Monitoring Recommendations

Based on the results of the overall performance monitoring activities coordinated by Evima CC the following are the summary of the recommendations:

- That this report be forwarded to the key Namibian Government statutory Organs of the State responsible for Agriculture (Ministry of Agriculture Fisheries Water and Land Reform) and environment (Ministry of Environment, Forestry and Tourism (MEFT);

- If there is a need for new modifications that may require regulatory approvals such as an increase in the size or additional new land to the orchard, the proponent will be required to apply for a new / amended ECC before such modifications may be implemented, and;

- The Proponent shall undertake regular monitoring and prepare reports to be submitted to MEFT annually.

- The EMP should be the guiding document throughout project implementation to ensure mitigation measures for negative impacts.

3. ENVIRONMENTAL AUDIT OF EXISTING CONDITIONS ON THE GREEN SCHEME

The following observations were made during the auditing undertaken at Ndonga Linena Green Scheme:

1) The green scheme uses the septic tank system for sewerage. During the auditing process no spillages were observed. Ablution facilities at the offices and staff houses are clean, septic tanks are well managed.

2) The farm management staff collects and dispossesses solid Waste at a waste management site that is situated within the Green Scheme farmland. The current solid waste site is not compliant with waste management legislation and policy frameworks. Construction of an official designated waste management site is recommended to ensure compliance

3) Skip bins and drums are located around the office and staff houses. No waste segregation occurs. Solid waste is disposed of at a landfill which is not properly developed and managed. It is recommended that a new landfill which meets

requirements of the Ministry of Environment Forestry and Tourism be commissioned and developed. Furthermore separation, waste reduction, re-use and recycling should be introduced at the Green Scheme.

4) The farm is connected to the main powerline. The farm lights does not affect the local communities.

5) Oils are stored in separate rooms which is locked at all times. Vehicle petroleum and diesel are stored at designated fuel storage and pumpstations. The tanks are underground and pump station is erected fuelling vehicles and equipment that requires fuel

6) There is protective equipment (drip trays, spill absorbents, etc.) available on site. However, there is no treatment on site for waste oils

7) A water reservoir is on site; water is sourced from the Okavango River which is approximately 3 km from the Green Scheme.

8) The biodiversity of the area around the Green Scheme and associated fringe woodlands is considered to be moderately sensitive, while the riparian woodlands are highly sensitive. Broadleaved woodlands are considered to be less sensitive. Typical trees include mukusi or Zambezi teak (Baikea plurijuga), mukwa (Pterocarpus angolensis), musheshe, (Burkea africana), mungongo (Schinziophyton rautanenii) and several others. Plant species composition varies greatly between grassland, broadleaf woodland on deep sands, mixed woodland on the loamier soils of the alluvial floodplains of the Kavango River, and riparian woodland. Baikea plurijuga, Pterocarpus angolensis, Burkea africana, Schinziophyton rautanenii are all protected species.

9) The most important bird species with the project area are viewed as those classified as endangered (hooded vulture, white-backed vulture, tawny eagle, martial eagle, bateleur, southern ground-hornbill), vulnerable (secretary bird, white-headed vulture, lappet-faced vulture and) and near threatened (marabou stork, peregrine falcon, kori bustard) from Namibia (Simmons et al. 2015) as well as those classified by the IUCN (2021) as critically endangered (hooded vulture, white-headed vulture, white-backed vulture), endangered (lappet-faced vulture), 4 vulnerable (secretary bird, tawny eagle, martial eagle, southern ground-hornbill) and near threatened bateleur, and kori bustard

10) The area around the green scheme is not used as a feeding ground for wildlife. There is no recorded human wildlife conflict incidents in and around the Green Scheme. The most important wildlife species within the area are those classified as rare (Nycteris hispida, Kerivoula argentata, Kerivoula lanosa, Mastomys shortridgel, Civittictis civetta, Paracynictis selousi) and endangered (Lycaon pictus, Lutra maculicollis, Equus (burchelli) quagga) under Namibian legislation and those classified by the IUCN (2021) as endangered (Lycan pictus), vulnerable (Loxodonte africana, Smutsia (Manis) temminckii, Acinonyx jubatus, Panthera pardus, Panthera leo, Hippopotamus amphibious, Giraffa camelopardalis) and near threatened (Hipposideros vittatus).

11) No noise complaints have been recorded. Noise emissions is generated during the ploughing season, and servicing of equipment these are short term minimal noise.

12) The fence around the farm is secure and intact and hence no intrusion from wildlife within the green scheme area.

13) No heritage sites observed around the area

14) Although there are fire extinguishers, these are old were not functional at the moment of doing this report. Some of the extinguishers are expired. No training has taken place in more than five years. There is a need to purchase fire equipment and regularly train staff on fire mitigation. There is an emergency area observed on site. However, the farm has no regular fire drills to prepare staff members for mitigation of fire risk.

Figure 2: Fire management and mitigation extinguishers

4. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

The EMP for the proposed project is presented in the Appendix. It provides detailed environmental management options to ensure the impacts of the proposed project are avoided, minimised or mitigated. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed during project execution, although additional mitigation measures might be included if unforeseen events force the proponents to address these.

The management measures should be adhered to during all stages of the project activities. All persons involved in the proposed activities should be made aware of the measures outlined in the EMP to ensure activities are conducted in an environmentally responsible manner.

The objectives of the EMP are:

- To include all components of the project
- To prescribe the best practicable control methods to lessen the environmental impacts associated with the project
- To monitor and audit the performance of operational personnel in applying such controls, and
- To ensure that appropriate environmental training is provided to responsible operational personnel.

The project has clear social and economic benefits and will contribute to the improvement of the quality of life for the people associated with it and the neighbouring community and society in general. The project will not impact any serious conflict with any major national physical or environmental protection policies. The on-site or off-site anticipated impacts identified are of varying significance and these could be adequately mitigated to reduce any threat to the environment. When the environmental management plan is fully implemented and the health and safety and environment policy is set up. Then this will result in an overall improvement in the environmental quality or the project area and its surrounding. From the foregoing discussions, it is recommended that;

- All activities concerning the orchard shall be strictly monitored by a contractor or a designated official who shall be trained and experienced enough to judge the appropriateness of the works being carried out.

- Implementation of an environmental management plan is an integral part of growth and development of any organisation and makes employees and contractors aware of the need to take a responsible approach to the management of the environment in their operations. This overall objective is to achieve continual improvement through monitoring and measuring performance.

- Waste management strategy is critical to such operations. Application of refuse, return, refill, reduce, reuse, recycle and recover- are good practices for the operational activities.

- The proponent shall comply with the relevant principle laws, by-laws and guidelines issued for the development of such projects.

- Annual environmental audits should be carried out on the project in order to ensure the compliance of the project with mitigation measures outlined in the Environmental Management Plan (EMP).

ANNEX 3: VERIFICATION CHECKLIST

Verification Checklist for Ndonga Linena Green Scheme

Fully Compliant	
Partial Compliant	
Non- compliance	

QUESTIONS	STATUS		OBSERVATIONS
WASTE MANAGEMENT, SEWAGE, AND SANITATION			
Is the sewage and effluent infrastructure intact			Septic tanks intact. No sewage spillages were observed
What is the method of disposal of waste			The farm management staff collects and dispossesses solid Waste at a waste management site that is situated within the Green Scheme farmland. Construction of an official designated waste management site is recommended to ensure compliance with the Legislation and policy framework.
Is there a whereby aspects such as waste separation, waste reduction, re-use and recycling as well as disposal is incorporate. Any solid waste is disposed of at a landfill			No there is no integrated waste management system in place. However, skip bins and drums are located around the office and staff houses. Solid waste is disposed of at a landfill which is not properly developed and managed. It is recommended that a new landfill which meets requirements of the Ministry of Environment Forestry and Tourism and other competent authorities be commissioned and developed. Furthermore separation, waste reduction, re-use and recycling should be introduced in the Green Scheme.
Waste stored in separate labelled containers			Multiple bins provided however no labels observed on site
Waste equipment still in good condition			Yes, bins and drums are in good condition.
Ablution facilities are intact			Ablution facilities at the offices and staff houses are clean, septic tanks are well managed
ENERGY SOURCES			
What is the source of energy?			Connected the main powerline

QUESTIONS	STATUS		OBSERVATIONS
Any light pollution at night?			None, Green Scheme does not have lights affecting local communities
HANDLING OF OILS, FUELS HAZARDOUS SUBSTANCES/HYDROCARBONS			
Oils, fuels, and greases inventory list in place and inventory kept and relevant MSDS available			Oils are stored in separate room and which is locked at all times. Vehicle petroleum and diesel are stored at designated fuel storage and pumpstations. The tanks are underground and pump station are above ground fueling vehicles and equipment that requires fuel
Spill response material equipment on site and in order			Protective equipment (drip trays, spill absorbents, etc.) available on site.
Any hazardous substance treated onsite?			No treatment on site, waste oils are collected and stored in drums
Any service areas on site, e.g., workshop?			Yes, well-kept, and clean
Fuel handling and storage tanks capacity?			Fuel handling and storage tanks are on site, spill kits were observed on site and no visible leaks have been observed.
Are hydrocarbons bunded?			Hydrocarbon tanks is well bunded and equipped. Waste fuel container observed and is well bunded
What fire protection equipment is found on site?			Extinguishers are located at the offices and staff houses, however most of them are old and not in working condition. Ambulance and paramedics are 100 km away from the site.
WATER MANAGEMENT			
What are the water sources? And are the facilities in good condition			A water reservoir is on site; water is sourced from the Okavango River.
Distance from the nearest water body?			The Okavango River which is approximately 3 km from the Green Scheme.
FAUNA AND FLORA			
Description of the habitat and vegetation type			The biodiversity of the area around the Green Scheme and associated fringe woodlands is considered to be moderately sensitive, while the riparian woodlands are highly sensitive. Broadleaved woodlands are considered to be less sensitive. Typical trees include mukusi or Zambezi teak (*Baikea plurijuga*), mukwa (*Pterocarpus angolensis)*, musheshe, (*Burkea africana)*, mungongo (*Schinziophyton rautanenii)*

QUESTIONS	STATUS		OBSERVATIONS
			and several others. Plant species composition varies greatly between grassland, broadleaf woodland on deep sands, mixed woodland on the loamier soils of the alluvial floodplains of the Kavango River, and riparian woodland.
Are there any protected plant species?			*Baikea plurijuga*, *Pterocarpus angolensis, Burkea africana*, *Schinziophyton rautanenii* are all protected species.
Are there any Protected bird species			The most important bird species with the project area are viewed as those classified as endangered (hooded vulture, white-backed vulture, tawny eagle, martial eagle, bateleur, southern ground-hornbill), vulnerable (secretary bird, white-headed vulture, lappet-faced vulture and) and near threatened (marabou stork, peregrine falcon, kori bustard) from Namibia (Simmons et al. 2015) as well as those classified by the IUCN (2021) as critically endangered (hooded vulture, white-headed vulture, white-backed vulture), endangered (lappet-faced vulture), 4 vulnerable (secretary bird, tawny eagle, martial eagle, southern ground-hornbill) and near threatened bateleur, and kori bustard
Is the area a potential feeding ground for wildlife?			No. The area around the green scheme is not used as a feeding ground for wildlife. There is no recorded human wildlife conflict incidents in and around the Green Scheme.
Are there any protected wildlife species			The most important species within the area are those classified as rare (*Nycteris hispida, Kerivoula argentata, Kerivoula lanosa, Mastomys shortridgel, Civittictis civetta, Paracynictis selousi*) and endangered (*Lycaon pictus*, Lutra *maculicollis*, Equus (*burchelli*) quagga) under Namibian legislation and those classified by the IUCN (2021) as endangered (Lycan pictus), vulnerable (*Loxodonte africana*, *Smutsia* (Manis) *temminckii*, *Acinonyx jubatus, Panthera pardus, Panthera leo, Hippopotamus amphibious, Giraffa camelopardalis*) and near threatened (*Hipposideros vittatus*).
Distance from the Green Scheme to the river			3 kilometers
NOISE MANAGEMENT			
Noise generating equipment/plant in good working order			Yes, although much of the Noise emissions is generated during the plowing season, and servicing of equipment these are short term minimal noise.

QUESTIONS	STATUS	OBSERVATIONS
Noise incidents reported, recorded, and addressed		No noise complaints have been recorded.
SITE ESTABLISMENT AND DEMARACATION		
Site fencing and demarcation facilities remain intact		The fence around the farm is secure and intact and hence no intrusion from wildlife into the green scheme area.
FIRE PREVENTION		
Fire prevention equipment in good working condition – regularly serviced – fire breaks intact		All though there are fire extinguishers, these are old and not functional at the moment of doing this report. Some of the extinguishers are expired. No training has taken place in more than five years. There is a need to purchase fire equipment and regularly train staff on fire mitigation.
Fire emergency contact numbers available on site		Numbers for reporting fires is available.
Fire incidents reported, documented, and addressed		None observed during the reporting period.
Are there any emergency assembly points on site		Yes, emergency areas have been observed on site. However, the are no regular fire drills to prepare staff members.
HERITAGE		
Any possible archaeological sites in the surrounding? If so, is it still intact		No heritage sites observed in and around the area
OTHER OBSERVATIONS		
Any siting of reptiles (snakes, geckos, tortoise and lizards) should be reported to the local MEFT office for removal to safe areas.		
The Green Scheme must be prepared for disaster readiness with regard to fire and other disasters		
The Green Scheme must develop a landfill that meets the requirements of the Environmental Legislation and other legislative frameworks		