

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION AND OPERATION OF A CHEMICAL STORAGE WAREHOUSE IN ARANDIS, ERONGO REGION- NAMIBIA



UPDATED ENVIRONMENTAL MANAGEMENT PLAN FINAL

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ACRONYMS

TERMS	DEFINITION
BID	Background Information Document
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
GHG	Greenhouse Gasses
ISO	International Organization for Standardization
I&Aps	Interested and Affected Parties
JBIC	Junior Baiano Industrial Consultants
MET: DEA	Ministry of Environment and Tourism's Directorate of Environmental Affairs

1 CHAPTER ONE: BACKGROUND

1.1 INTRODUCTION

Coleman Transport has identified the need for mine chemicals and supplies in mines around Arandis and the rest of the Erongo region. This has thus necessitated transportation of hazardous of chemicals over long distances more frequently because of the nexus between g the growing number of mining operation within and around Arandis ands well as the need for chemicals in the mining Industry, especially Uranium mining. In this respect, the proponent has taken on a venture to construct and operate a chemicals storage facility in Arandis town to ease logistical and financial costs in supply and demand for mining chemicals nearby.

In terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007)) and the Hazardous Substances Ordinance, 1974; an EIA is required to obtain an Environmental Clearance Certificate from the Ministry of Environment and Tourism (MET) before the project can proceed.

Furthermore, as per the requirements of the Environmental Management Act No. 7 of 2007, Coleman has appointed JBIC to conduct an Environmental Assessment (EA) and develop an Environmental Management Plan (EMP) for the proposed project. This has been followed by an application for Environmental Clearance Certificate (ECC) to the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA).

In this respect, this document forms part of the application to be made to the DEA's office for an Environmental Clearance certificate for the proposed chemical storage warehouse construction and operation, in accordance with the guidelines an statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts regulations (GN 30 in GG 4878 of 6 February 2012).

1.2 PROJECT LOCATION

The proposed project site is on ERF 1528 Arandis Town, Erongo Region-Namibia. The ERF is overlooking Namibia Institute of Mining and Technology campus to the South-West.

The Locality Map Fig 1) gives a local layout view of the project site:

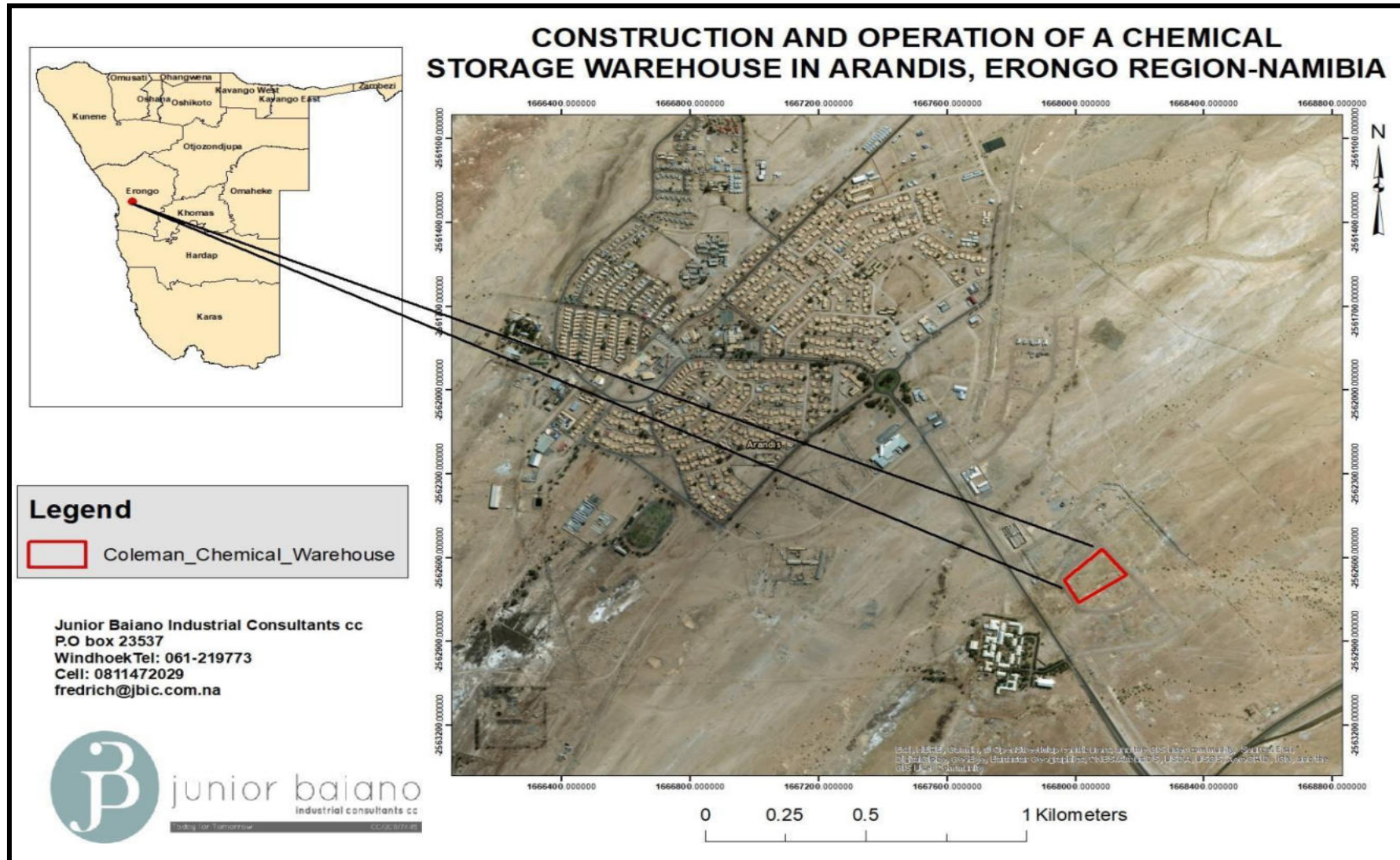


Figure 1-1: Proposed Coleman Transport Chemical Storage Warehouse: Arandis

1.3 PROJECT OVERVIEW

Coleman Transport intends to establish a chemical storage warehouse in Arandis town, to service mines in the Erongo, Kunene and parts of the Northern Regions. The proposed development entails the construction and operation of a chemical storage warehouse and associated infrastructure.

This project entails the transformation of bare land to accommodate the facility. The infrastructure and activities proposed includes but is not limited to inter alia:

1.4 WAREHOUSE

The proponent is going to make use of an Industrial erven measuring about 14 788m² in Arandis town. Storage warehouse floor are will cover 7 906m². An office building separate from the warehouse will cover 338.6m², control security infrastructure will cover 60.4 m². It is imperative to note that of the whole erven only 8 305m² will be build, covering about 56% of the erven. This will leave space for parking, green development, etc.

1.4.1 Chemicals

The proposed full chemicals to be stored on site are as follows:

- i. **SULPHUR:** Sulphur is a multivalent non-metal, abundant, tasteless and odorless. In its native form Sulphur is a yellow crystalline solid. In nature it occurs as the pure element or as sulfide and sulfate minerals. Although Sulphur is infamous for its smell, frequently compare to rotten eggs, that odor is actually characteristic of hydrogen Sulphide (H₂S).The crystallography of Sulphur is complex. Depending on the specific conditions, Sulphur allotropes form several distinct crystal structures
- ii. **PYROLUSITE:** Pyrolusite and romanechite are among the most common manganese minerals. Pyrolusite occurs associated with manganite, hollandite, hausmannite, bra unite, chalcophanite, goethite and hematite under oxidizing conditions in hydrothermal deposits. It also occurs in bogs and often results from alteration of manganite
- iii. **FERROUS SULPHATE:** Ferrous sulfate denotes a range of salts with the formula FeSO₄·xH₂O. These compounds exist most commonly as the heptahydrate (x = 7) but are known for several values of x. The hydrated form is used medically to treat iron deficiency, and also for industrial applications. Known since ancient times as copperas and as green vitriol (vitriol is an archaic name for sulfate), the blue-green heptahydrate

(Hydrate with 7 molecules of water) is the most common form of this material. All the iron (II) sulfates dissolve in water to give the same aqua complex $Fe(H_2O)_6]^{2+}$, which has octahedral molecular geometry and is paramagnetic. The name copperas dates from times when the copper (II) sulfate was known as blue copperas, and perhaps in analogy, iron (II) and zinc sulfate were known respectively as green and white copperas. Industrially, ferrous sulfate is mainly used as a precursor to other iron compounds. It is a reducing agent, and as such is useful for the reduction of chromate in cement to less toxic Cr (III) compounds.

- iv. **GRINDING MEDIA (SAG MILL):** Grinding media are the means used to crush or grind material in a mill. It comes in different forms such as alumina oxide balls, ceramic cylinders, or soda lime glass.
- v. **GRINDING MEDIA (BALL MILL):** Grinding media are the means used to crush or grind material in a mill. It comes in different forms such as alumina oxide balls, ceramic cylinders, or soda lime glass.
- vi. **FLOCCULANT:** There is a wide range of commonly used flocculants for the clarification of various types of wastewater. In general, they can be classified into two types: inorganic and organic. The inorganic compounds are usually metal salts, typically Aluminium or iron (with the most widely used being Aluminium sulfate, iron sulfate and iron chloride); while the organic compounds are polymers (polyelectrolytes), and represent a wide variety of water soluble macromolecular compounds of natural or synthetic origin, which have the property of enhancing the flocculation of suspended particles. In the 1980s, coagulants called metal salt prepolymers began to be developed, among which Poly Aluminium Chloride (PAC) is one of the most important and has become a very common compound used in coagulation and flocculation processes. Conventional flocculants and coagulants based on Aluminium salts and polymers have some disadvantages: a large amount of product is required, and they are difficult to store, handle and dispense. There are also some very significant risks associated with their use, as they pollute the environment and are toxic to humans, causing diseases such as cancer or Alzheimer's disease
- vii. **SODIUM CARBONATE:** Sodium carbonate, Na_2CO_3 , (also known as washing soda, soda ash and soda crystals) is the inorganic compound with the formula Na_2CO_3 and its various hydrates. All forms are white, water-soluble salts. All forms have a strongly alkaline taste and give moderately alkaline solutions in water. Historically it was extracted from the ashes of plants growing in sodium-rich soils. Because the ashes of

these sodium-rich plants were noticeably different from ashes of wood (once used to produce potash), sodium carbonate became known as "soda ash". It is produced in large quantities from sodium chloride and limestone by the Solvay process

- viii. **U IX RESIN:** An ion-exchange resin or ion exchange polymer is a resin or polymer that acts as a medium for ion exchange. It is an insoluble matrix (or support structure) normally in the form of small (0.25–0.5 mm radius) microbeads, usually white or yellowish, fabricated from an organic polymer substrate. The beads are typically porous, providing a large surface area on and inside them. The trapping of ions occurs along with the accompanying release of other ions, and thus the process is called ion exchange. There are multiple types of ion-exchange resin. Most commercial resins are made of polystyrene sulfonate. Ion-exchange resins are widely used in different separation, purification, and decontamination processes. The most common examples are water softening and water purification. In many cases ion-exchange resins were introduced in such processes as a more flexible alternative to the use of natural or artificial zeolites.
- ix. **EXTRACTANT:** A solvent used in the extraction of a substance from a liquid. Extractions often use two immiscible phases to separate a solute from one phase into the other. Typical lab extractions are of organic compounds out of an aqueous phase and into an organic phase. Common extractants are arranged from ethyl acetate to water (ethyl acetate < acetone < ethanol < methanol < acetone: water (7:3) < ethanol: water (8:2) < methanol: water (8:2) < water) in increasing order of polarity according to the Hildebrand solubility parameter. The extract can be put back to dried form using a centrifugal evaporator or a freeze-drier.
- x. **MODIFIER:** An activator chemical, it will activate surface for Uniforms coating. Activator work as modifier it is very necessary used before powder coating and phosphating. It used in application phosphating, cathode electric deposition, blacodizing, painting
- xi. **SODIUM HYDROXIDE:** Sodium hydroxide, also known as lye and caustic soda, is an inorganic compound with the formula NaOH. It is a white solid ionic compound consisting of sodium cations Na⁺ and hydroxide anions OH⁻. Sodium hydroxide is a highly caustic base and alkali that decomposes proteins at ordinary ambient temperatures and may cause severe chemical burns. It is highly soluble in water, and readily absorbs moisture and carbon dioxide from the air. Sodium hydroxide is used in many industries: in the manufacture of pulp and paper, textiles, drinking water, soaps

and detergents, and as a drain cleaner. Worldwide production in 2004 was approximately 60 million tonnes, while demand was 51 million tonnes

- xii. **DIATOMACEOUS EARTH:** Diatomaceous earth – is a naturally occurring, soft, siliceous sedimentary rock that is ground into a fine white to off-white powder. It has a particle size ranging from less than 3 µm to more than 1 mm, but typically 10 to 200 µm. Used as a filtration aid in products including metal polish, toothpaste, mechanical insecticide, absorbent for liquids, matting agent for coatings, reinforcing filler in plastics, rubber, anti-block in plastic films, porous support for chemical catalysts, cat litter, activator in blood clotting studies and as a stabilizing component of dynamite.
- xiii. **LIME:** Lime is a calcium-containing inorganic mineral composed primarily of oxides, and hydroxide, usually calcium oxide and/ or calcium hydroxide. It is also the name for calcium oxide, which occurs as a product of coal seam fires and in altered limestone xenoliths in volcanic ejecta. It is used in the manufacturing of cement and other industrial applications.
- xiv. **ACTIVATED CARBON:** Activated carbon is used to purify liquids and gases in a variety of applications, including industrial, mining, municipal drinking water, food and beverage processing, odor removal, industrial pollution control. Activated carbon is produced from carbonaceous source materials, such as coconuts, nutshells, coal, peat and wood.

1.5 ACCESSIBILITY

There is an existing access road to the proposed site is accessible through the main road from the D2 road connecting to Arandis town.

1.6 INFRASTRUCTURE AND SERVICES

1. Water: There will be a water supply line from Arandis town Council.
2. Ablution: The area is connected to Arandis Town sewerage reticulation syst

1.7 NEED AND DESIRABILITY

The economic and social development goals of Namibia are embodied in (i) Vision 2030 and (ii) the National Development Plan 5 (NDP 5) 2017/2018 – 2021/2022 as well as NDPs 1, 2, 3, and 4. In addition, the Government has developed the Harambee Prosperity Plan (HPP) 2016/2017 – 2019/2020, which complements the Vision 2030 and NDP 5. All of the three plans set the goals, targets, and strategy for Namibia to move on a path to economic prosperity through a concerted strategy for the development of Namibia's economic growth. These Plans also include specific growth targets milestones and strategies for the sustainable deployment of Namibia's resources to achieve the stated economic and social development goals. Through this project, this will be done through easing procurement of necessary and important needs in the extractive industry.

1.8 PROJECT ALTERNATIVES

1.8.1 Site Location Alternatives

An integrated site selection study was done in order to identify a suitable site for the proposed warehouse. The proposed site is considered highly desirable due to the following considerations:

- Proximity: The site is within reach to most large mining entities in the Erongo and Kunene Regions.
- Site extent: Sufficient land was secured from the town council to enable developments in the town. .
- Land suitability:
 - Sites that facilitate easy construction conditions (relatively flat land with few rock outcrops or waterbodies) were favored during site selection.
 - The site is already allocated within an industrial area.
 - Avoidance of obvious environmentally sensitive areas.

It is thus, the consideration of the above criteria resulted in the selection of the preferred site. No further site location alternatives are considered in the EIA process.

1.9 SITE LAYOUT ALTERNATIVES

The warehouse and project component design underwent a number of iterations based on technical aspects and the environmental and social considerations assessed during the EIA process. From a layout perspective, the position of the proposed site infrastructure was determined by the consideration of the:

- Local topographical conditions.
- Local surface and ground water drainage systems

1.9.1 NO-GO ALTERNATIVE

The current low environmental impact associated with current land use will be maintained and no change in land use or zoning would be required. The status quo needs to be measured against the proposed facility to determine whether the environmental and socio-economic benefits warrant the approval thereof or whether the status quo should be maintained.

This development alternative entails that the proposed warehouse developments are not constructed on the project site, thus result in the site being left as is. With Namibia's new focus on propelling the extractive industry, value addition and the targets set the NO-GO option will result in a zero contribution to these targets and no alleviation about the current demand pressures on electricity. The non-development of the proposed warehouse plant will furthermore impede economic development and socio-economic progress for Arandis Town.

Due to the numerous socio economic and economic benefits, the environmental advancement and the fact that the identified environmental impacts can be suitably mitigated it has been determined that the No Go option can be eliminated. Should the Competent Authorities (CA) refuse the authorization of the proposed chemical storage warehouse, the 'No Go' option will be "implemented" and the status quo of the site will remain intact - leaving the site in its present state.

1.10 CONCLUSION

The project will go ahead and will ensure maximum environmental and safety performance systems are in place.

2 CHAPTER TWO: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 INTRODUCTION

An important part of the EIA is identifying and reviewing the administrative, policy and legislative situation concerning the proposed activity, to inform the proponent about the requirements to be fulfilled in undertaking the construction and land servicing activities. This section looks at the legislative framework within which the proposed project will operate under. The focus is on the compliance with the legislation during the planning, construction and operational phases. All relevant legislations, policies and international statutes applying to the project are highlighted in below as specified in the Environmental Management Act, 2007 (Act No.7 of 2007) and the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

The pursuit of sustainability is guide by a sound legislative framework, in this section; relevant legal instruments as well as their relevant provisions are under survey. An implication to the project for each piece of legislation is provided regarding how these provisions apply to this project.

Table 2-1: Legal Compliance Framework

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>The Constitution of the Republic of Namibia (1990)</p>	<p>The articles 91(c) and 95(i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalizing policies to accomplish the sustainable objectives which include:</p> <ul style="list-style-type: none"> - Guarding against overutilization of biological natural resources, - Limiting over-exploitation of non-renewable resources, - Ensuring ecosystem functionality, - Maintain biological diversity. 	<p>-Through implementation of the environmental management plan, the proposed development will be in conformant to the constitution in terms of environmental management and sustainability, through bringing development in an environmentally sensitive way.</p>
<p>Vision 2030 and National Development Plans</p>	<p>Namibia’s overall Development ambitions are articulated in the Nations Vision 2030. At the operational level, five-yearly national development plans (NDP’s) are prepared in extensive consultations led by the National Planning Commission in the Office of the President. Currently the Government has so far launched a 4th NDP which pursues three overarching goals for the Namibian nation: high</p>	<p>-The proposed project is an important element in the propelling and smooth running of the extractive industry in the country.</p>

	<p>and sustained economic growth; increased income equality; and employment creation.</p>	
<p>Environmental Assessment Policy of Namibia 1994</p>	<p>The Environmental Assessment Policy of Namibia requires that all projects, policies, Programs, and plans that have detrimental effect on the environment must be accompanied by an EIA. The policy provides a definition to the term “Environment” broadly interpreted to include biophysical, social, economic, cultural, historical and political components and provides reference to the inclusion of alternatives in all projects, Policies, programs and plans.</p>	<p>-The construction and operation of the chemical storage warehouse will only commence after being awarded an environmental clearance certificate, thus by abiding to the requirements of the Environmental Assessment Policy of Namibia. The EIA and EMP will cater for the sustainable management of biophysical environment.</p>

<p>Environmental Management Act No. 07 of 2007</p>	<p>The Act aims at</p> <ul style="list-style-type: none"> - Promoting the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; - To provide for a process of assessment and control of projects which may have significant effects on the environment; - The Act gives legislative effect to the Environmental Impact Assessment Policy. Moreover, the act also provides procedure for adequate public participation during the Environmental assessment process. 	<p>-This document is compiled in a nature that project implementation is in line with the objectives of the EMA. EIA guiding procedures developed by MET were also used in the course of this project.</p>
<p>Electricity Act 4 of 2007</p>	<ul style="list-style-type: none"> - Requires that any generation and or distribution complies with laws relating to health, safety and environmental standards (s 18(4)(b)) - In the event that exemption from acquiring a license is granted, the Minister may impose conditions relating to public health safety or the protection of the environment. 	<p>-Obliges Coleman Transport to comply with all relevant provisions of the EMA and its regulations.</p>

<p>The Atomic Energy and Radiation Protection Act, Act 5 of 2005:</p>	<p>Provides for the adequate protection of the environment and of people against the harmful effects of radiation by controlling and regulating the production, processing, handling, use, holding, storage, transport and disposal of radiation sources and radioactive materials, and controlling and regulating prescribed non-ionizing radiation sources according to the standards set out by the ICNIRP.</p>	<p>-Justifies the need for assessing the impact of electromagnetic radiation from the power line, on the nearby residents.</p>
<p>Hazardous Substances Ordinance 14 of 1974 Regulations Made In Terms Of Hazardous Substances Ordinance 14 of 1974 sections 3 and 27</p>	<p>- To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances; to provide for the division of such substances into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances; and to provide for matters connected therewith.</p>	<p>- Colman Transport will have to conform to this Act and its regulations through application for relevant licenses with the relevant bodies highlighted thereto.</p>
<p>“Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to</p>	<p>Provides international standards and guidelines for limiting the adverse effects of non-ionizing radiation on human health and well-being, and,</p>	<p>-Justifies the need for assessing the impact of ionizing and non-ionizing radiation from the stored chemicals and substances.</p>

<p>300GHz)” (April 1998 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP))</p>	<p>where appropriate, provides scientifically based advice on non-ionizing radiation protection including the provision of guidelines on limiting exposure.</p>	
<p>Public Health Act (No. 36 of 1919)</p>	<p>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.”</p>	<p>-The project proponent will ensure that all legal requirements of the project in relation to protection of the health of their employees and surrounding residents is protected. -Personal protective equipment shall be provided for employees in construction. -The development shall follow requirements and specification in relation to water supply and sewerage handling so as not to threaten public health of future residents on this piece of land.</p>
<p>Soil Conservation Act 76 of 1969</p>	<p>The objectives of this Act are to:</p> <ul style="list-style-type: none"> - Make provisions for the combating and prevention of soil erosion, - Promote the conservation, protection and improvement of the soil, vegetation, sources and resources of the Republic. 	<p>-The project will have a rather localized impact on soils and on the soil through clearance for PV panel stands and powerline poles. Soil protection measures will be employed and preservation of trees as much as possible.</p>
<p>Nature Conservation Ordinance 1996</p>	<p>To consolidate and amend the laws relating to the conservation of nature; the establishment of game parks and nature reserves; the control of problem</p>	<p>The proposed project implementation is not located in any known or demarcated conservation area, national park or unique environments. The</p>

	animals; and to provide for matters incidental thereto.	project site was selected with this ordinance in mind to ensure that Namibian nature is conserved.
Protected Areas and Wildlife Management Bill	This bill, when it comes into force, will replace the Nature Conservation Ordinance 4 of 1975. The bill recognizes that biological diversity must be maintained, and where necessary, rehabilitated and that essential ecological processes and life support systems be maintained. It protects all indigenous species and control the exploitation of all plants and wildlife.	Environmental recommendations and considerations on this project has ensured that the proposed activities will not fall within the boundaries of any protected area and that the project will not affect heavily endangered vegetation and animals on its site.
Forest Act, 2001 (Act No. 12 of 2001)	The Act gives provision for the protection of various plant species through the Ministry of Agriculture, Water and Forestry (MAWF), Directorate of Forestry).	<ul style="list-style-type: none"> -Land clearing of an extensive piece of land will be done upon approval from the Directorate of Forestry. -The proponent will also have to ensure that there is no indiscriminate cutting down of trees during construction and operation -The proposed site is sparsely vegetated with white shrubs and grasses, which are not threatened or protected.
National Rangeland Policy and Strategy, 2012	The policy aims at enabling resource users (farmers and managers) to manage their rangeland resources in a sustainable manner and sustainable in that they are economically viable,	-This proposed project will ensure that the local community benefits both economically and socially from the project, this in line with the recently declared Harambee Prosperity Plan and NDP 4&5.

	socially acceptable, environmentally friendly and politically conducive.	
National Biodiversity Strategy and Action Plan (NBSAP2)	The action plan was operationalized in a bid to make aware the critical importance of biodiversity conservation in Namibia putting together management of matters to do with ecosystems protection, biosafety, biosystematics protection on both terrestrial and aquatic systems.	<p>-The project proponent has been advised by JBIC and recognizes the need for ecosystems protection to manage the changing climatic environment.</p> <p>-This project is one of the drivers to reduce the rate of global environmental change given its contribution, to decreased use of burning fossil fuels for energy generation.</p>
National Policy on Climate Change for Namibia, 2010	In harmony with the findings of the IPCC over time and the Earth Summits held annually, the policy seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda, legal framework, and in recognition of environmental constraints and vulnerability. Furthermore, the policy pursues the strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks.	-Chemical storage, transportation and usage have considerable negative impacts on release of GHGs. There is need to ensure appropriate handling and storage is done on GHGs contributing chemicals.

<p>Wetland Policy, 2004</p>	<p>The policy provides a platform for the conservation and wise use of wetlands, thus promoting inter-generational equity regarding wetland resource utilization. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's).</p>	<p>-In compliance to this Policy, the development will ensure a standard environmental planning such that it does not affect any wetlands within its locale through recognition of wetlands to promote the conservation and wise utilization of wetlands resources.</p> <p>-There are no existing wetlands/peatlands within 2km radius of the proposed project site.</p>
<p>Water Resources Management Act, 2013 (Act No. 11 of 2013)</p>	<p>This Act provides for the management, protection, development, use and conservation of water resources. This also forms the regulation and Monitoring of water resources.</p>	<p>-Water supply will be handled by Arandis Town council, which already has a steady and sustainable supply of water.</p>
<p>National Heritage Act 27 of 2004</p>	<p>Heritage resources to be conserved in development.</p>	<p>-During the project implementation as soon as objects of cultural and heritage interests are observed such as graves, artefacts and any other object believed to be older than 50 years, all measures will be taken to protect these objects until the National Heritage Council of Namibia have been informed, and approval to proceed with the Operations granted accordingly by the Council.</p>
<p>National Monuments Act of Namibia (No. 28 of 1969) as amended until 1979</p>	<p>"No person shall destroy, damage, excavate, alter, remove from its original site or export from Namibia:</p>	<p>-The proposed site of development is not within any known monument site both movable or immovable as specified in the Act, however in such</p>

	<p>(a) any meteorite or fossil; or</p> <p>(b) any drawing or painting on stone or a petroglyph known or commonly believed to have been executed by any people who inhabited or visited Namibia before the year 1900 AD; or</p> <p>(c) any implement, ornament or structure known or commonly believed to have been used as a mace, used or erected by people referred to in paragraph (b); or</p> <p>(d) the anthropological or archaeological contents of graves, caves, rock shelters, maddens, shell mounds or other sites used by such people; or</p> <p>(e) any other archaeological or paleontological finds, material or object; except under the authority of and in accordance with a permit Issued under this section.</p>	<p>an instance that any material or sites or archeologic importance are identified, it will be the responsibility of the developer to take the required route and notify the relevant commission.</p>
<p>Pollution Control and Waste Management Bill</p>	<p>-This bill has not come into force. Amongst others, the bill aims to “prevent and regulate the discharge of pollutants to the air, water and land” Of particular reference to the Project is: Section 21 “(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of</p>	<p>-To control air, water and land pollution as agitated by the Act the project proponent will ensure that even will have approved drainage on site as well as standard conservancy tanks that do not threaten public health, adding on an integrated pollution management strategy following the EMP Provided herein.</p>

	<p>Pollutants or waste into any water or watercourse.”</p> <p>Section 55 “(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human Health or the environment.”</p>	
<p>Convention on Biological Diversity (CBD)</p>	<p>Namibia is a signatory of the Convention on Biological Diversity and thus is obliged to Conserve its biodiversity.</p>	<p>The project will preserve tree species on as part of their plans for greed and sustainable development.</p>
<p>United Nations Convection to combat Desertification</p>	<p>Namibia is bound to prevent excessive land degradation that may threaten livelihoods.</p>	<p>It will be the responsibility of the proponent to conserve vegetation on and around the area, to avoid encroachment of the desert environs in the Area.</p>

3 CHAPTER THREE: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The chemical Storage warehouse and transmission line development will have environmental impacts as indicated in the previous chapter. This section describes the Environmental Management Plan (EMP) for impacts associated with the proposed development. The EMP stipulates the management of environmental programs in a systematic, planned and documented manner. The EMP below includes the organizational structure, planning and monitoring for environmental protection at the proposed farm area development and other areas of its influence. The aim is to ensure that the proponent maintains adequate control over the project operations to:

- To prevent negative impacts where possible;
- Reduce or minimize the extent of impact during project life cycle;
- Prevent long-term environmental degradation.
- Ensure public safety and health is protected.

3.1 EMP ADMINISTRATION

There is a strong need to clearly outline the roles and responsibilities of all stakeholders to ensure that the EMP is fully implemented. There is also a need for the proponent to appoint an overall responsible person (project manager) to ensure the successful implementation of the EMP as highlighted below:

Table 3-1: Roles and Responsibilities in EMP Implementation

ROLE	ENVIRONMENTAL RESPONSIBILITIES
Project Manager	Responsible to enforce EMP implementation to contractors
Environmental Control Officer (ECO)	Implement, review and update the EMP. <ul style="list-style-type: none"> • Ensure all reporting and monitoring required under EMP is undertaken, documented and distributed as needed • Conduct environmental site training (tool box talks) and inductions • Conducts environmental audit at work site with the support of environmental consultant. • Close out all non-conformances. • Ensure materials being used on site are environmental friendly and safe.
The Department of Environmental Affairs	Approve the EMP and any amendments to the EMP. <ul style="list-style-type: none"> • Approve reports of environmental issues and non-conformances as issued. • Review and approve environmental reports submitted as part of EMP implementation
Site Engineers/ Warehouse Manager	Control and monitor actions required by the EMP. <ul style="list-style-type: none"> • Report all environmental issues to HSE Manager. • Ensure documented procedures are followed and records kept on site. • Ensure any complaints are passed onto the management within 24 hours of receiving the complaint.
Workers	Follow requirements as directed by site engineers. <ul style="list-style-type: none"> • Report any potential environmental issues to site engineer/project manager, indicating spilt oil, excess waste, excessive dust generation, dirty water running off the site and other possible non-conformances

Table 3-2: Construction and Operation EMP (CO & O EMP)

Impact	Description	Effects	Class	Time frame	Responsible	Action	Phase
Noise pollution	Noise will be generated through: -Construction of drainage services and water reticulation systems. -Construction of buildings -Moving vehicles.	- The health of working personnel could be disturbed. - Community residents could be disturbed by the noise. - General annoyance -Driving away of local animals species near the project site	Environmental	6-8 months	-Environmental Control Officer -Site Manger	- A construction interval will be established, used and adhered to. - Workers will be issued earplugs to protect them from excessive noise. - Public will be notified through printed timetable stating planned operational activities. - Construction activities will be conducted during daytime. -Site notices will be erected on, around the site-notifying visitors, and nearby residents of different hazards on site. -No go areas marked as sensitive environments, especially for birds needs to be avoided during Construction and operation.	Construction & Operation
Dust Generation	Dust will accumulate because of the land preparation, onsite movements of vehicles and machines, wind blowing on loose material during construction and tipping.	- Can lead to respiratory illnesses especially to those working in the area. - General air pollution. -Nuisance to nearby residents -The process can also drive away wild animals	Environmental	6-8 months	-Environmental Control Officer -Project Manger	- Dust suppression will be done through watering dust sources surfaces. -Watering down dusty surfaces, -Ensure that protective equipment such as respirators are distributed to employees, and ensure their use. -Site notices to be erected on and around the site to inform visitors and Surrounding residents.	Construction & Operation

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		within the project area surroundings					
Loss of Biodiversity	-Vegetative plants on site will be removed -Habitat destruction for both ground dwelling species and tree dwelling species. -Soil disturbance on and around the site.	-The clearing of vegetation will result in the breaking of the ecosystem processes in the area. -Loss of aesthetic value of the proposed project area. -The few small animals still habiting the place such as small rodents and birds will be forced away.	Environmental	Construction phase	-Environmental Control Officer -Site Manager	- The proposed project area is already disturbed, hence there is little vegetation to be affected by the development. - Ground disturbance will only be limited to the boundary area to avoid affecting a large area. -Upon completion of construction activities more trees and lawn will be planted on and around the site to restore the site into a status that is environmentally friendly.	Construction
Greenhouse gas emissions	Green House Gasses (GHGs) emissions will be produced from the following activities: <ul style="list-style-type: none"> Fuels combustion for transport (construction vehicles and equipment) Ground excavation releases phosphorus found underground and releases 	-Global climate change - Air pollution	Environmental	Construction phase	-Environmental Control Officer -Project Manager -Department of Environmental Affairs.	-Adopt the use of ethanol blended fuels wherever necessary. -Design an operation system that cuts on fuel consumption. - Use of solar energy system during construction for lighting and other minor energy needs.	Construction &Operation

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
	particulate matter into the atmosphere.						
Waste Generation	<p>-Construction and operation is associated with a lot of raw material and activities that results in pollution</p> <p>-The warehouse will potentially have hazardous chemicals waste and hazardous chemicals container waste.</p>	<p>-Chemical pollution from oil spills resulting from the handling of various machineries used during the construction phase</p> <p>-Construction rubble, empty packaging containers/bags and materials remnants.</p> <p>-Lack of adequate management guidelines, there may be accidental release of chemicals into the environment, whether hazardous or non-hazardous they may react differently with the natural environment.</p>	Environmental	Construction phase	<p>-Environmental Control Officer</p> <p>-Project Manger</p>	<p>- Ensure that all waste from construction activities is stored and contained in designated containers and transported to Arandis waste disposal site.</p> <p>-Bulky waste such as building rubbles must be collected and disposed of for landfilling.</p> <p>-Hazardous waste storage bin will be on site and an independent hazardous waste transporting company will be contracted to collected hazardous waste storage bin whenever it is full.</p> <p>-Visual inspections monitoring</p> <p>-All waste will be managed by proponent and the developer will ensure that domestic waste handling facilities such as labelled dustbins will be available.</p> <p>-Hazardous chemical will be stored separate from non-hazardous chemicals in banded floor spaces.</p> <p>-Appropriate containers that will not react with chemicals should be used, such that during loading/unloading no leaks or spillages are experienced.</p>	

Impact	Description	Effects	Class	Time frame	Responsible	Action	Phase
<p>Chemicals Release into the environment</p>	<p>There will be storage of different types of chemicals in the warehouse, hence the need to minimize release into the environment.</p>	<ul style="list-style-type: none"> -Washing away of contaminated soils by rains into nearby rivers -Pollution of soil and affecting small living organisms habituating the soil -Result in possible groundwater pollution. -Possible fire risk on and around the site 	<p>Environmental</p>	<p>Operational</p>	<ul style="list-style-type: none"> -Environmental Control Officer -Project Manager -Department of Environmental Affairs. 	<ul style="list-style-type: none"> -Implement a chemical handling programme. -The chemical loading and unpacking area should be banded, with spill proof floors and a spill collection sump. -Storage of chemicals should be in accordance to Material Safety Data Sheets (MSDs) issued by the supplier. That is, chemicals that need to be stored in relation to temperatures, proximity to other types of chemicals, ventilation and hazardousness. - Any chemical spillages to the soils or into the spill collection sump, they area to be removed from site by a specialist waste removal contractor such a rent a drum. -Appropriate chemical Spill kits will be easily accessible and workers will be trained in the use thereof. -Staff and contractors will be trained in the handling and storage of different types of hazardous substances -No chemicals or chemical containers will be stored in refuse bins, unless they Are classified thereof. 	

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
Safety and Health risks	Construction related Safety and Health hazards	-Injuries to workers such as Occupational dermatitis, slips and fall of humans and objects, musculoskeletal disorders, etc.	Health and safety	Construction phase	ECO	<ul style="list-style-type: none"> - Equip workers with Personal Protective Equipment (PPE), provide trainings on how to effectively use the PPE. -Provide platforms for briefings and meetings about possible safety and health hazards in the work place -Provide site signs warning and informing about different hazards on site. 	Construction and operation
	Electrical hazards	-Fatalities and fires	Health and safety	Construction and operation	ECO	<ul style="list-style-type: none"> -Employees should be trained on electrical safety before working on site. -Safety representative with training on electrical hazards emergency management should be station on site always during construction -Safety signs during construction and operation should be put on site, no go areas should be labelled, PPE specifications should be clear to Maintenance personnel. 	Construction and Operation
	Chemical hazards	-Occupational dermatitis, intoxication, fumes, ignition and or body contact.	Health and safety	Operation	ECO	-Employees should be equipped with appropriate and effective personal protective equipment, i.e. gloves, spill proof overalls, PPE for nose and mouth to prevent intoxication and inhalation of Fumes.	

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						-According Regulations regarding Health and Safety of Employees at work, chemical labelling must be done in accordance to SABS guidelines, this allows easy identification of the containers containing chemicals and how they should be handled. -Employees should be trained on different MSDs of the chemicals on site that is handling reaction, accidental spillage, and appropriate storage amongst other pertinent issues regarding chemical handling from suppliers and or manufacturers. -The chemical handling guidelines given on section 3.3 of chapter 3 in the document should be religiously complied to, as well as other Health and safety management policies and operating procedures that must be developed in satisfaction of the Labour Act.	
Population Influx	The project will bring in skilled and unskilled workforce into Arandis area from other places increasing population density in the area.	-There is potential for cultural systems conflict between locals and new people in the area -Potential for rife prostitution and spread	Socio-economic	Construction phase	-Environmental Control Officer -Project Manger	-Train and brief employees to respect local cultures and leaders, -Engage on massive sexual health training and awareness and providing contraceptives such as condoms, as well as provide means counselling for	Construction

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		of HIV/AIDS and other STDs				those that are affected by HIV/AIDS and other STDs,	
Land use change	-The existing environment will drastically change from a dormant piece of land to warehouse area.	-The area will no longer be suitable for agriculture. -Sudden change in landscape appearances may be unfavorable to The conservatives.	-Social -Terrestrial environment	Permanent	-Environmental Control Officer -Project Manger	-The development should blend into the existing area through designing and colour coding. -Green designing will bring life to the site and blend with surrounding areas.	Construction and operation
Resources consumption	The construction industry can be resource intensive, i.e. water resources.	-The project can result in a strain on available water resources, however also generating Clean energy/electricity.	-Socio-economic	Construction phase.	-Environmental Control Officer -Project Manger	-Water saving should be ensured by the site manager i.e. repairing leakages, opening taps only when water is required and recycling of water on site.	
Positive Impacts							
Employment creation	The development provides an opportunity of outsourcing work	- Improves disposable income to those employed and their Immediate families.	Socio-economic	Project life time	-Project Manger	- Work with local leadership (councilor) on acquiring non-skilled labour from the residents.	Construction and operation
Business linkages	-Raw materials acquiring and contracting companies provide an opportunity for businesses.	-Local suppliers will be presented with an opportunity to empower their businesses. -Construction workers can be provided with accommodation, food and services from the	-Socio-economic	Construction phase	-Project Manger	-The proponent will outsource most of its materials and services from Arandis.	Construction and operation

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		local community Increasing business activities.					
Infrastructure development	The development presents a unique opportunity for infrastructure development in Northern Namibia area.	-Existing roads will be upgraded which will benefit the local community. -Development of the facilities will also pave way for future developers to grow interests in the area and result in ripple effects and quick growing of the Area.	-Socio-economic	Construction phase	-Project manager	-Development such as road upgrading will not only be limited up until the project site, but it will be extended to service other the connecting roads when there is need.	Construction and operation

3.2 ENVIRONMENTAL MONITORING PLAN

Monitoring component is very important for identifying successfulness of mitigation measures formulated for the significant impacts identified. The monitoring works will identify impacts that have not been foreseen and give enough time to analyse the situation and formulate measures to minimise impact. Survey records and results must be maintained for these monitoring and inspections, highlighting any problems and the measures taken to address it.

Prior to site preparation and construction activities, the main contractor should present an environmental management plan (including, *inter alia*, location of construction camp and toilet facilities, location of material storage areas, solid waste management plan, dust control measures, activity schedule, etc.) for review and approval by the DEA, the environmental monitor and the project manager. The entity selected to carry out environmental monitoring of the construction works should then prepare an environmental monitoring programme based on the above, the requirements of the EIA, and conditions of the development permit. The major elements of the environmental impact monitoring programme to be implemented during the construction phase of the project are as follows:

- Site drainage and surface runoff, especially during and shortly after major rainfall events, to ensure there is no flooding, ponding and runoff of surface water
Compliance of construction works with site management and landscape plans.
- Ensure transportation of earth materials is done by covered trucks and from approved sites.
- The contractor must immediately and completely clean up spills of materials in public areas.
- Waste disposal practices to ensure appropriate on-site management and final disposal at approved dump.
- Chemicals safety handling training and signage is highly recommended and important for this development, thus high priority should be placed on chemical handling safety.
- **An ECO should be contracted to conduct quarterly reports before the triennial renewal period.**

3.3 CHEMICAL HANDLING GUIDELINES

3.3.1 Identification of Hazardous Chemicals

Coleman Transport will ensure that identification of hazardous chemicals will be made at the time of purchase/procurement. Items meeting the criteria will be entered into the Inventory/Labelling System. For purposes of this EMP, chemicals to be inventoried and labelled include all chemicals listed under:

3.4 REGULATION REGARDING HAZARDOUS SUBSTANCES ORDINANCE (RHSO) 14 OF 1974 REGULATION 176 OF THE REGULATIONS RELATING TO THE HEALTH AND SAFETY OF EMPLOYEES AT WORK

These regulations makes it a point that suppliers and handlers of hazardous substances, shall ensure that the containers of all hazardous substances are clearly marked to indicate the contents of such containers in order to enable persons handling the containers or using the substances, to easily recognize the substances when receiving or using them.

The containers of all hazardous substances are labelled in a uniform manner with a legible and durable label, easily understandable by employees and other persons, in a size that is clearly visible, and the label shall contain the following information relating to the substances: trade mark, identity of substance, identification of the batch, the classification of substance, hazard symbol, nature of the special risks associated with the use of the substance, safety precautions, first aid treatment, name, address and telephone number of the supplier, and a statement that a product or chemical safety data sheet, as the case may be, giving additional information, is available from the employer.

Material safety data sheets (MSDs) for all hazardous chemical substances are prepared and provided to every employer using such substances, provided that the chemical safety data sheets shall contain essential health and safety information. Containers of chemicals on the List and heavy metal chemicals will be specially marked and disposed of as hazardous chemicals if there need be by licensed hazardous waste handling contractors. Some categories of chemicals.

Determination of the hazardous nature of a chemical shall be made by the warehouse manager responsible for initiating the request for purchase, according to the protocol outlined in this EMP, and an MSDS shall be retained in the file for that chemical or

Category of chemicals received by the purchaser. In areas served by Central Storage Areas, the Hazardous Materials. Manager will be responsible for placing the data into the Inventory/Labeling System. Chemicals that are identified as hazardous at the time of purchase, and not sold immediately, will be stored at a Central Storage Area until transferred for use by customers.

The Warehouse manager will be responsible for placing the data into the Inventory/Labeling System. Only companies/ individuals with authorization to handle Hazardous Materials may be supplied with chemicals they need.

Table 3-3: Chemical Handling Management Guidelines

ASPECT	MANAGEMENT MEASURE
HAZARDOUS CHEMICALS MANAGEMENT	Hazardous chemicals may be purchased or received under the Managers' authorization, and delivered by licensed transport carriers. Chemicals purchased or received directly by customers by any means other than those under the warehouse authority cannot be retained in the laboratories until they are entered into the Inventory/Labeling System and the required information affixed to the container. In all storage areas, chemicals must be registered with said storage area and the Life Tag must be issued. After registration, the chemicals may be stored in the Central Storage Area or released to customers upon request. Chemicals may not be kept in storage without proper registration
INVENTORY LIFE OF HAZARDOUS CHEMICALS	When a chemical is requested from a Central Storage Area, the Life Tag will be issued for the item and the transfer will be noted on the Hazardous Materials Inventory. The information will indicate the beginning use date for the receiving laboratory and the shelf life or one year, whichever is less. Persons working in the Central Storage Areas will be allowed to issue the Life Tag and record inventory information in the Inventory/Labeling System.
INVENTORY INSPECTION	Designated responsible parties in the chemical storage warehouse and in customers' storage warehouses will review the inventory semi-annually. These inventory inspection records will be maintained for at least two years. As part of this review, a physical inspection of all storage and use areas will be performed and documented. At that time all containers will be inspected for condition, shelf life status, and remaining inventory life. The updated inventories will be provided to the warehouse manager as well as suppliers of chemicals.

ASPECT	MANAGEMENT MEASURE
	Distribution Areas will maintain copies of original packing slips or bills Of lading of distributed chemicals only, for one year, and will not receive updated inventory information.
CONTAINERIZED USED CHEMICALS	Used chemicals, properly containerized and identified for storage, distribution and or disposal. These containers will be labeled with the date, month/day/year, when the chemical is first added to the container and the name of the chemical. If the chemical is a mixture, provide the percentage content of at least two major components. This information is necessary in order to allow waste handlers to classify the chemical for recycling, storage or disposal. All containers must have a secure lid on them at all times unless adding chemicals To the container.
DAMAGED CONTAINERS	Containers of chemicals whose integrity has been compromised must be replaced. If the chemical is still usable and needed, the contents may be transferred to another compatible, UN approved container. A proper label must then be applied and a new Life Tag must be issued (or the required information must be transferred to the new label). The modification would be noted in the Central Storage Area.
EMPTY CONTAINERS	<p>Empty containers, of hazardous chemicals documented in the Inventory/Labeling System may be managed in three ways depending on the nature of the contents. Containers used for chemicals listed in the hazardous List and heavy metal chemicals must be disposed of through licensed hazardous waste handling contractors. These containers will be listed on the Hazardous Chemical Pick Up Form with other chemicals. Containers used for other labeled chemicals may be triple rinsed, the residue placed in a proper waste container and the empty container reused or disposed of as refuse.</p> <p>The method of disposal or reuse should be noted on the Hazardous Materials Inventory Summary Form. Containers used for non-hazardous chemicals, by regulatory definition, may be triple rinsed, the residue disposed into the sanitary sewer system and the empty container reused or disposed of as refuse. Remove the Life Tags and Obliterate the original labels on empty containers prior to disposal.</p>
EXPIRED INVENTORY LIFE	A time period greater than one year or the shelf life of the chemical, whichever is less? If the chemical is in continued use, a new Life Tag may be issued for one year or the shelf life, whichever is less, by a

ASPECT	MANAGEMENT MEASURE
	<p>Central Storage Area upon request. Every effort must be made to obtain a new Life Tag prior to expiration. Continued storage of an item with an expired inventory life constitutes a violation of this EMP. Chemicals may not be maintained past the inventory life unless Extended and so marked.</p>
EXPIRED SHELF LIFE	<p>Chemical whose shelf life (as defined in this plan) is exceeded or within less than one month of ending, may be designated for retrieval by hazardous waste contractor. The disposition would be noted in Both the Central Storage Area inventories.</p>
DISPOSITION OF HAZARDOUS CHEMICALS	<p>A licensed hazardous waste handler such as Kleen Tek or Rent A Drum will be responsible for retrieval and disposal of chemicals from Central Storage Areas (exclusive of items treated and disposed of according to Chemical Management and Treatment Protocols and clean, empty containers of non-hazardous chemicals). A Hazardous Chemical Pick Up Form must be completed and a disposal form Returned to Coleman warehouse for filing.</p>
AUDITS	<p>On a bi-annual basis an Environmental, Health and Safety Audit will audit the chemical storage warehouse in terms of hazardous substances handling, environmental compliance and safety compliance. Coleman transport is encouraged to put in place a Health and Safety Policy that will go to greater depths in chemical Handling.</p>

4 CHAPTER FOUR: CONCLUSION AND RECOMMENDATIONS

Arising from the analysis by the consultants, the proposed project is going to create permanent land cover/use change on the proposed project site. It is a dry shrub savannah environment that is going to be converted into a light industrial area and the document has thus provided adequate mitigation measures for the identified impacts for sustainable land development. Because land must develop, but with land development there should not be environmental degradation, thus the EMP provides for the sustainable land development of the energy generating facility.

To alleviate any negative impacts that may emanate from the construction and operation phases of the chemical storage warehouse, relevant and cost-effective management and mitigation measures have been put in place through this EMP. It is recommended that the proposed Coleman Transport Chemical Storage Warehouse in Arandis, be granted an Environmental Clearance certificate on condition of compliance to this Environmental Management Plan

5 REFERENCES

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ANNEXURES

- 1.Expired Environmental Clearance Certificate
- 2.Engineering drawings
- 3.Proof of commencement of operation
- 4.ECC renewal application - copy