

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

For the construction and operational phase



PROPOSED CIMBEBASIA EXTENSION 5, 6, 8, PORTIONS OF 9, ERF 878 AND ERF 1402 TOWNSHIP ESTABLISHMENT IN WINDHOEK

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TABLE OF CONTENTS

1.	INTRODUCTION AND BACKGROUND	4
2.	LEGISLATIVE FRAMEWORK	5
3.	ENVIRONMENTAL MANAGEMENT PLAN	5
3.1	RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT	13
3.2	TRAINING AND INDUCTION	13
3.3	ENVIRONMENTAL INCIDENT REPORTING	13
3.4	ENVIRONMENTAL MONITORING	14
3.5	EMP ADMINISTRATION.....	14
3.6	EMP AMENDMENTS	14
3.7	NON COMPLIANCE OF THE EMP	14
3.8	ENVIRONMENTAL REGISTER.....	14
3.9	ENVIRONMENTAL CONTROL OFFICER.....	15
3.10	SITE MANAGEMENT.....	15
3.10.1.1	<i>Access routes and work sites.....</i>	<i>15</i>
3.10.1.2	<i>Fire and safety management</i>	<i>16</i>
3.10.1.3	<i>Staff management</i>	<i>17</i>
3.10.1.4	<i>Waste management.....</i>	<i>17</i>
3.10.1.5	<i>Cement and concrete batching</i>	<i>17</i>
3.10.1.6	<i>Hydrocarbons management.....</i>	<i>17</i>
3.10.1.7	<i>Information board.....</i>	<i>17</i>
3.10.1.8	<i>Flood management.....</i>	<i>18</i>
3.10.1.9	<i>Progressive Rehabilitation.....</i>	<i>18</i>
3.10.2	<i>Management of environmental aspects during all phases of the project.....</i>	<i>19</i>
4.	CONCLUSIONS	32

GLOSSARY

ENVIRONMENT	an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.
ENVIRONMENTAL MANAGEMENT	A management process which seeks to ensure, as far as possible, that no avoidable impact is caused to the environment and that when this is unavoidable that the consequences are understood prior to the impact being caused and that the impact is then mitigated as far as possible.
GROUNDWATER	Water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations
HAZARDOUS WASTE	Waste that poses substantial or potential threats to public health or the environment.
MITIGATION	The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts.
NO-GO AREA	Areas where all construction activities and related matters are prohibited.
POLLUTION	Any change in the environment caused by substances, radioactive or other waves; or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
REHABILITATION	Restoring the disturbed area to more or less the natural set up.
SITE	An area of ground where the township is constructed.

1. INTRODUCTION AND BACKGROUND

The aim of an operational Environmental Management Plan (EMP) is to ensure that the proposed township development is conducted in an environmentally acceptable and safe manner. This EMP serves as a managing tool for all construction and operational activities during the development of the Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township, in Windhoek. The EMP is developed to outline measures to be implemented in order to minimise adverse environmental degradation associated with this development.

The EMP serves as a guiding tool for the contractors and workforce on their roles and responsibilities concerning environmental management on site, and also provides an environmental monitoring framework for all project phases of the development. This environmental management plan aims to take a pro-active route by addressing potential problems before they occur. The EMP acts as a stand-alone document, which can be used during the various phases of the development.

In this report, the Contractor refers to CITY OF WINDHOEK and its sub-contractors.

The purpose of the EMP is to:

- ✓ Train employees and contractors with regard to environmental obligations.
- ✓ Promote and encourage good environmental management practices.
- ✓ Outline responsibilities and roles of CITY OF WINDHOEK and its contractors in managing the environment.
- ✓ Describe all monitoring procedures required to identify environmental impacts.
- ✓ Minimise disturbance of the natural environment.
- ✓ Develop waste management practices.
- ✓ Prevent all forms of pollution.
- ✓ Protect the natural environment.
- ✓ Prevent soil and water erosion.
- ✓ Comply with all applicable laws, regulations and standards for environmental protection.

Phases covered by the EMP:
Construction Phase
Operational Phase

The construction phase of the township development entails:

- Land clearance

- Transporting relevant building material and equipment.
- Installation of associated electrical supply cables.
- Installation of associated water pipelines.
- Installation of associated sewer lines.
- Installation of storm water management system; and
- Roads construction

The operational phase will entail:

- Operation and maintenance of the sewer and water reticulation systems, electrical services and roads.

2. LEGISLATIVE FRAMEWORK

2.1 National Legislative Requirements

The EIA process is undertaken in terms of Namibia's Environmental Management act no. 7 of 2007 and the Environmental Assessment Policy of 1995, which stipulates activities that may have significant impacts on the environment. Listed activities require the authorisation from the Ministry of Environment and Tourism (DEA). Section 32 of the Environmental Management Act requires that an application for an environmental clearance certificate be made for the listed activities. The following environmental legislations are relevant to this project:

I. The Namibian Constitution

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

II. Environmental Management Act No.7 of 2007

This Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term “*environment*” as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

- (a) to make sure that people consider the impact of activities on the environment carefully and in good time.
- (b) to make sure that all interested or affected people have a chance to participate in environmental assessments
- (c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment

The rezoning of land from open space to any other land use is a ‘*listed activity*’ as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

Line Ministry: Ministry of Environment and Tourism

(Contact: Timo Mufeti, Tel: 061-284 2715)

III. Atmosphere Pollution Prevention Ordinance (1976)

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

Line Ministry: Ministry of Environment and Tourism

(Contact: Timo Mufeti, Tel: 061-284 2715)

IV. Water Resources Management Act of Namibia (2013)

This act repealed the existing Water Resources Management Act of 2004. This Act provides for the management, protection, development, use and conservation of water resources, to provide for the regulation and monitoring of water services and to provide for incidental matters. Part 12 regulates the control and protection of groundwater resources. Part 13, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal. The Act also stipulates control of activities affecting wetlands, water resources and resource quality in Part 18.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

(Contact: Ms Elizabeth Amagola, Tel: 061-208 7719)

V. Water Resources Management Act of Namibia (2004)

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

(Contact: Ms Elizabeth Amagola, Tel: 061-208 7719)

VI. Water Act No.54 of 1956

This Act provides for Constitutional demands including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State and the EIA process is used as a fundamental management tool.

A water resource includes a watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse means a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam, into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse. Permits are required in terms of the Act for the undertaking of the following activities relevant to the proposed project:

- ✓ Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit in terms of Section 21 (f); and
- ✓ Disposal of waste in a manner that may detrimentally impact on a water resource in terms of Section 21 (g).

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

(Contact: Ms Elizabeth Amagola, Tel: 061-208 7719)

VII. The Draft Wetland Policy (1993)

Requires that any wetlands and its associated hydrological functions form a part, to be managed in such a way that their biodiversity, vital ecological functions and life support systems are protected for the benefit of present and future generations.

Line Ministry: Ministry of Environment and Tourism

(Contact: Timo Mufeti, Tel: 061-284 2715)

VIII. Environmental Assessment Policy of Namibia (1995)

Environmental Assessments (EA's) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure as set out in Figure 2.

Line Ministry: Ministry of Environment and Tourism

(Contact: Timo Mufeti, Tel: 061-284 2715)

IX. Forestry Act (No.12 of 2001)

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

(Contact: Andries Uugwanga, Tel: 062-501925)

X. Townships and Division of Land Amendment Act (No.28 of 1992)

Article (l) of this Act stipulates that "Whenever any area of land constitutes, by reason of its situation, a portion of an approved township, or adjoins an approved township, the Executive Committee may, by proclamation notice in the Gazette and after consultation with the Board, extend the boundaries of the township to include such an area". Thus the new township needs to be approved by the Namibian Planning Advisory Board and the Townships Board.

Line Ministry: Ministry of Urban and Rural Development

XI. Sewerage and Drainage Regulations (amendments) Local authorities act, section 23 (1992).

The regulations make provision for proper construction of pipelines in drainage lines. The regulations also stipulate the prevention of pollution and environmental damage caused by improper construction of sewerage and water pipelines in drainage lines.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

(Contact: Mr. Erastus Negonga, Tel: 061-297 2911)

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

The Act advocates for the Prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

(Contact: Timo Mufeti, Tel: 061-284 2715)

XIII. Draft Pollution Control and Waste Management Bill

The proposed project of Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township Development, only applies to Parts 2 and 7 of the Bill.

Part 2 stipulates 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. It 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.

XIV. 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 Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

XV. Public Health Act 36 of 1919 and Subsequent Amendments

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this EIA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.

Potential impacts associated with the establishment of Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township project are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

XVI. National Heritage Act (No.76 of 1969).

The Act calls for the protection and conservation of heritage resources and artefacts. Should any archaeological material, e.g. old weapons, coins, bones found during the construction, work should stop immediately and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

(Contact: Rev. Salomon April, Tel: 061-244375, National Heritage Council of Namibia)

2.2 International Conventions and Regulations

Article 144 of the Namibian Constitution states that “the general rules of public international law and international agreements binding upon Namibia form part of the law of Namibia.” This means that all the international agreements that Namibia signed become part of the law of our country. These laws and/or agreements are:

- ✓ Convention on Biological Diversity, 1992;
- ✓ United Nations Framework Convention on Climate Change, 1992;
- ✓ Kyoto Protocol on the Framework Convention on Climate Change, 1998;
- ✓ Stockholm Convention of Persistent Organic Pollutants, 2001.

2.3 Municipal By-laws (City of Windhoek)

➤ Groundwater Protection Regulations

The protection of the groundwater resource in a development scenario should be provided for, in a formally documented and legislated EIA process. The EIA process or procedure provides for the institutionalization of decision making regarding the potential impact development activities will have on the receiving natural, social and cultural environment. Further, the process makes provision for the identification and listing of types of activities that would be required to follow the process before any authorisation will be given.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ Environmental Structure Plan and Policy

The Environmental Structural Plan & Policy provides sufficient information for those making decisions regarding a particular development so that proper environmental evaluation can be conducted, which is appropriate to the scale of the proposed project and the risks to the environment which it may pose.

It establishes where there are potential and real problem environmental areas, such as land degradation, pollution, indiscriminate resource use etc. The Environmental Structural Plan is the baseline upon which the policy is established.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ ***Windhoek Town Planning Scheme (2005)***

The Town Planning Scheme enables the comprehensive management of all property and related public sector functions across the city. The guidelines on the Conservation of Natural Resources should be addressed in this project.

(Contact: Mr. Erastus Negonga, Tel: 061-297 2911)

➤ ***Policy for the Distribution and Future Usage of Public Open Spaces in Windhoek (2000)***

The policy provides guidelines for the establishment of open spaces and green corridors along drainage lines and sensitive environmental areas. The policy advocates for the provision of land for the explicit development of open spaces.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ ***City of Windhoek's Noise Control Regulations (2006)***

The policy provides guidelines for noise regulations in the municipal area. The policy outlines permitted activities within municipal areas. article 7 (2) states that a person may at any place in the municipal area broadcast or cause to be broadcast sound, if:

- the sound is emitted as a result of, or relating to, an emergency,
- by the engine powered or motor driven maintenance equipment or agricultural equipment,
- by the engine powered or motor driven equipment used for construction work, drilling work or demolition work in or near a residential area,

subject that the sound broadcasted is reasonable and necessary in the circumstances and the sound is broadcasted at such times which are reasonable in the circumstances. In this case the construction activities will be restricted to periods between 07h00-19h00.

Article 7(3) stresses that Council resolution is not required for the broadcasting of sound in an area zoned "business", "restricted business", "office", "garage", "industrial", private open space" or "special"

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ ***Solid Waste Management Policy for the City of Windhoek (2009)***

The policy provides guidelines and principles of integrated waste management of waste within the municipal area. The policy advocates for the polluter pay principle, where by the polluters are liable for cleaning up of waste produced. The City of Windhoek manages the priority waste in the City e.g. Health care risk waste,

hazardous waste, tyres, building rubble, and electronic waste. It is advised that all industries or businesses dispose their waste at the appropriate land fill in Windhoek.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ ***City of Windhoek Health Regulations (1969)***

The policy provides guidelines for an acceptable health standard in the City of Windhoek. The policy advocates for the provision convenient latrine accommodation for contractors (11). The policy also prohibits the disposal of any kind of waste in or near streets, common land or public space.

The Policy stipulates the no person shall construct a septic or sewage works in a town area or for the purpose of a business or occupation except with the written consent of the local authority (16). Part III of the policy states that no person shall deposit in or cause or allow to be deposited in the cause or allow to entre or to discharge into any water supply (e.g. Goreangab dam) or underground water (17). Meat processing facilities or abattoirs requires approval from the local authority, and condemned meat should be disposed appropriately at a registered hazardous waste cell. The policy stipulates other industry requirements for specific industries which could be relevant to future uses of land within the Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

➤ ***Fire Prevention***

The Fire Protection Section is responsible for all fire service activities that decrease incidences of uncontrolled fir in the City of Windhoek. Usually fire prevention methods utilised by the Windhoek Emergency Management Division focuses on fire safety inspections, fire engineering on building plan designs, the code law enforcement, public fire safety education and fire investigations. SANS 10400 standards is the best practical standards that can be used for buildings in Windhoek.

3. ENVIRONMENTAL MANAGEMENT PLAN

3.1 Responsibilities for environmental management

City of Windhoek will be responsible for environmental control on site during the construction and operational phase. The CoW will appoint a Project or Residence Engineer who is responsible to appoint various contractors for construction of various sections eg, roads, water reticulation etc. therefore the road contractor should appoint and Environment Control Officer (ECO), who will implement the EMP and also undertake the required training for all contractors and subcontractors on site. 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.

3.2 Training and induction

City of Windhoek is bound to be responsible for ensuring that environmental awareness education of all employees and contractors is done satisfactorily. City of Windhoek should ensure that employees and contractors are made aware of the environmental requirements of the project. It is also suggested that before any work is commenced on site, the entire contractor's staff shall attend an environmental education talk, presented by the ECO with the assistance of the contractor and the residence or project engineer.

The EMP should 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 understood the EMP and that they will comply. All senior staff should familiarise 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.

3.3 Environmental incident reporting

All environmental incidents occurring at the proposed site will be recorded. The incident report will have to include time, date, location, and nature of the incident, extent of the incident, actions taken, and personnel involved.

All complaints received from the neighbouring community should be directed to the Project Engineer/ Environmental Management Officers at the City of Windhoek and channelled to the appointed ECO officer. All the complaints will also be reported on a monthly meetings where the City's Environmental Management Department (EMD) official is invited to attend. City of Windhoek Management should be able to respond to the complainant within a week (even if pending further investigation). It is important that the issues raised are considered and that 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.

3.4 Environmental monitoring

The EMD is to oversee that the EMP is implemented by regularly undertaking inspection for auditing and also to inspect and review the audit report done by the ECO.

3.5 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.

3.6 EMP amendments

The EMP amendments can only be made with the approval of the ECO officer and ultimately the DEA. Amendments to the EMP should be liaised to all employees and contractors.

3.7 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.

City of Windhoek is responsible for reporting non-conformance with the EMP, to the ECO officer. The Contractor, in consultation with the ECO officer must, thereafter, undertake the following activities:

- ✓ Investigate and identify the cause of non-conformance.
- ✓ Report matters of non-conformance to City of Windhoek Environmental Department (depending on the severity of the incident).
- ✓ 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 causes of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered.

3.8 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 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 Project Engineer, the contractor and the ECO officer will be the main contributors, and who will also be the main parties involved in suggesting mitigation measures.

3.9 Environmental Control Officer

The Environmental Control Officer for the site is an independent environmental consultant appointed by the Residence or Project Engineer to monitor and review the on-site environmental management and implementation of this EMP.

Duties of the ECO officer:

- ✓ The identification of potential environmental impacts, prior to the onset of decommissioning. A site visit may also be required prior to site development. This would be carried out in consultation with the Technical Manager.
- ✓ 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.
- ✓ Reviewing and approving method statements in consultation with the Technical Manager.
- ✓ Reporting to City of Windhoek and the Project Engineer 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 program in conjunction with the Technical Manager.
- ✓ Requesting the removal of people and/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.
- ✓ The ECO officer will submit all written instructions and verbal requests to City of Windhoek via the Technical Manager and Project Engineer.

3.10 Site Management

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.

3.10.1 Access routes and work sites

During the construction phase, road transport trucks will access the project location via Michelle McClean and Mataman Streets. No new tracks/roads shall be established and only existing roads may be used. Work sites shall be clearly

demarcated and road signs erected were 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, 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 township 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.

3.10.2 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, condemned meat products, ink, colours, 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.

3.10.3 Staff management

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

3.10.4 Waste management

Waste will be generated in the form of rubble, cement bags, pipe and electrical wire 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 off at the hazardous waste cell at Kupferberg Landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and housekeeping 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 off at Kupferberg Landfill by Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.

The City of Windhoek will have waste skips around the proposed township development like the rest of the suburbs in Windhoek.

3.10.5 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.

3.10.6 Hydrocarbons management

If any spillage occurs, contaminated soil shall be collected in a holding tray or drum and which will then disposed 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.

3.10.7 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 Technical 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 township development.

3.10.8 Flood management

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

3.10.9 Progressive Rehabilitation

Rehabilitation must commence as soon as possible on areas where construction has taken place or no further development is to take place, i.e. on completed excavations, soil/rock cutting hips, slopes etc.

3.10.10 Management of environmental aspects during all phases of the project

Groundwater

Construction phase	
Description	<p>Possible Groundwater quality could be impacted through leachate of oil leakages, diesel, lubricants and grease from the heavy-duty equipment and machinery utilised during construction phase. Care must be taken to avoid contamination of soil and groundwater. Drip trays must be used when removing oil from machinery.</p> <p>Run-off from overflowing onsite sewage systems might transport the effluent to areas where geological structures are present. Inflow into these structures would cause a pollution thread. The presence of a north-south striking faults on the project area and groundwater basin should be noted and protected at all cost.</p> <p>There is a slight potential health impact on groundwater users in the area. Potential impacts on the natural environment from the polluted groundwater also exists. In general, impact on groundwater due to the construction of the township development is considered to be minimal through proper management practices.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Prevent spillages of any chemicals and petroleum products (i.e. oils, lubricants, petrol and diesel). Use drip trays and linings when evidence of leaks are observed on vehicles or equipment. ✚ No major servicing and maintenance of vehicles and/or equipment should be conducted at the project sites. ✚ All fuelling, storage and chemical handling should be conducted on surfaces provided for this purpose. Drip trays, linings or concrete floors must be used when removing oil from machinery. ✚ Spillage control procedures must be in place according to relevant SANS standards or better. Waste water collection systems should be connected to these systems. ✚ Should portable toilet facilities be necessary, adequate containment systems should be erected at the project site for use during the construction phase. ✚ Waste should be contained properly to avoid any leakages and/or spillages; and should be regularly disposed off at a suitable sewage disposal site. Avoid run-off from these toilets due to overflows at all cost. ✚ Proper environmental awareness and remedial response training of operators must be conducted on a regular basis.
Proposed Monitoring	Regular visual inspection.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	<p>Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water. Groundwater pollution from industrial activities within the township.</p> <p>Potential impact on the natural environment from possible polluted groundwater also exists. The area is subjected to north-south structures, which might act as preferential pathways for any contaminants entering the saturated zone.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ The risk can be lowered further through the use of suitable and adequate SANS approved piping material; and installation should be done by certified installers/technicians. ✚ All surface spillages and leakages must be cleaned up immediately. ✚ Proper containment structures should be constructed to avoid any possible leakages. ✚ Only light/dry industries that do not produce liquid toxic waste may be approved and erected on the business erven in this township. ✚ The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently.
Proposed Monitoring	Groundwater monitoring sampling for pollution.
Responsible Party	City of Windhoek

Surface Water

Construction phase	
Description	<p>Contamination of surface water might occur through oil leakages, diesel, lubricants and grease from the heavy-duty equipment and machinery during the construction phase.</p> <p>Surface runoff emanating from overflowing and/or leakages from chemical and sewage storage and reticulation pipeline systems, and cement contaminated water might reach surface water bodies like the nearby Arebbusch River and its tributaries, and eventually the Goreangab dam. Potential Health problems caused by viruses, bacteria and parasites found in the effluent would be the main concern from this pathway.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Use drip trays and linings when evidence of leaks are observed on construction vehicles or equipment. ✚ Remove leaking vehicles from project location immediately. ✚ No servicing and maintenance of vehicles and/or equipment should be conducted at the project site. ✚ Any spillage of hazardous substances including fuel, oil, paint or cleaning solvent must be cleaned up immediately and disposed off at a designated disposal facility. ✚ Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and hydrocarbons into waterways or any surface water bodies. ✚ Prevent illegal washing out of containers in nearby waterways or any surface water bodies. ✚ Properly secure all portable toilets (if any) to the ground to prevent them toppling due to wind or any other cause. ✚ Maintain toilets in a hygienic state and remove waste to a licensed disposal facility. ✚ Ensure that no spillages occur when the toilets are cleaned or emptied. Prohibit urination on site, other than at designated facilities. ✚ Contain contaminated water from batching operations and allow sediments to settle before being disposed of as waste water. ✚ Stabilise cleared areas as soon as possible to prevent and control surface erosion. ✚ Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. ✚ An emergency plan should be in place on how to deal with spillages and leakages during this phase
Proposed Monitoring	Regular visual inspection. Surface water quality monitoring in cases of evident pollution.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	<p>Spillages and/or leakages of various possible contaminants might occur due to failure of reticulation pipelines or storage tanks. Contaminated soil might pose a risk to surface water. All spills should be cleaned up as soon as possible. An emergency plan should be in place on how to deal with spillages and leakages during this phase.</p> <p>Potential health impact on surface water users and on the natural environment associated with the river channels in the area do exist. This may result in socio-economic impacts on surface and groundwater users.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Proper design of bulk installations and containment mechanisms installed should be able to contain any leakages that might occur during the operation and maintenance of the township developments. ✚ Maintaining the installation in good operating order is of paramount importance in preventing failure of bulk services. ✚ Proper containment response and readiness should be available during operations and maintenance. ✚ During maintenance operations, remove leaking vehicles and/or equipment from project location immediately. ✚ The presence of an emergency response plan and suitable equipment is advised, so as to react to any spillage or leakages properly and efficiently. ✚ Ensure all stormwater drains or channels are clear of litter or obstructing material. ✚ Remove all excess sedimentation, rubble and any other waste material present in waterways and dispose of in a suitable manner to ensure proper drainage runoff. ✚ Ensure that stormwater management systems are regularly maintained and tested, and are in good working order. ✚ Only light/dry industries that do not produce liquid toxic waste may be approved and erected on business ervens in this township.
Proposed Monitoring	Regular visual inspection.
Responsible Party	City of Windhoek

Air Quality (Dust Pollution)

Construction phase	
Description	Dust will be generated during the construction and installation of bulk services, and problems thereof are expected to be site specific. Dust is expected to be worse during the winter months when strong winds occur. Release of various particulates from the site during the construction phase and exhaust fumes from vehicles and machinery related to the construction of bulk services are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure measures are in place to minimise dust generated during the construction phase. ✚ Use appropriate dust suppression measures when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather. ✚ Ensure excavations, handling and transport of materials which may generate dust under high wind conditions are short lived and well contained. ✚ Locate stockpiles of construction materials in sheltered areas where they are not exposed to erosive effects of the wind. ✚ Ensure all vehicle, plant and equipment are in good condition. ✚ Encourage reduction of engine idling.
Proposed Monitoring	Regular visual inspection.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	Vehicles that will be accessing township development will contribute to the release of hydrocarbon vapours, carbon monoxide and sulphur oxides into the air. Possible release of sewer odour, due to sewer system failure or maintenance might also occur.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Excessive vehicle idling shall be minimised by putting up educative signs. ✚ All maintenance of bulk services of the township have to be designed to enable environmental protection. ✚ Regular air quality monitoring should be conducted at the project site. ✚ Keep a complaints register regarding bad odour / smells at the project sites; and act on it if becomes a regular complaint.
Proposed Monitoring	Regular visual inspection.
Responsible Body	City of Windhoek

Health and Safety

Construction phase	
Description	<p>Safety issues could arise from the earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The presence of equipment lying around on site may also encourage criminal activities (theft).</p> <p>No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises.</p> <p>HIV/AIDS and communicable diseases could become prevalent on this construction site and aits surrounding.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Equipment and machinery operators should be equipped with ear protection equipment. ✚ Operations should be strictly between 07H00 to 19H00. First aid and safety awareness training for contractors. ✚ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises. ✚ The staff must be properly trained on safety and health issues of the project including HIV/AIDS and provided condoms at the site office. ✚ Workers should be fully equipped with personal protective equipment gear. ✚ Excavations and trenches at the site must cordoned off to avoid injuries, and the excavations must be closed of as soon as the utilities are installed. ✚ Construction workers must be transported in acceptable transport modes acceptable to the national traffic regulations. ✚ Workers may not be transported in construction vehicles. ✚ Dedicated offloading and lay-down areas must be clearly demarcated, and such areas must be controlled and marked with visible signage to avoid incidents as a result of falling objects.
Proposed Monitoring	Safety procedures evaluation. Health and safety incident monitoring.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	A number of health and safety threats exist during operational activities of proposed township establishment. Individuals in the community can suffer from noise from maintenance activities and industrial activities around township. Accidents on roads as a result of increased traffic and deteriorated.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Operators and maintenance contractors must be properly trained on safety and health issues. ✚ The contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. ✚ Workers should also be properly trained in first aid and safety awareness.
Proposed Monitoring	Regular inspection and incident monitoring report evaluation.
Responsible Body	City of Windhoek

Noise Impact

Construction phase	
Description	An increase of ambient noise levels at the construction site is expected due to construction activities. Noise pollution due to construction vehicles, heavy-duty equipment and machinery will be generated. It is not expected that the noise generated during construction will impact any nearby land or properties.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure the use of construction vehicles and equipment that emit reduced noise levels. Where necessary, use mufflers on vehicles. ✚ Ensure proper maintenance is conducted on vehicles to ensure the reduction of noise emission. ✚ The construction staff should be equipped with ear protection equipment. ✚ Audio equipment (if any) should not be played at levels considered intrusive by others. ✚ Construction activities will be limited to a period between 07h00 and 19h00.
Proposed Monitoring	Strict operational times. Regular inspection.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	Noise pollution already exists around the site in the form of noise generated from vehicles frequenting the existing Michelle McClean and Mataman Streets. Noise pollution due to this projecting the operational phase is expected to be mainly from generators or pumps, road maintenance machinery during maintenance.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure that generator engines are fitted with mufflers. ✚ Operators working in close proximity to the generators should be equipped with ear protection equipment, when noise becomes an issue. ✚ Observation of on-site noise levels by the Manager or Supervisor of Bulk Services Maintenance Department. ✚ Noise-generating industries must not to work beyond 19h00.
Proposed Monitoring	Observation of on-site noise levels.
Responsible Body	City of Windhoek

Waste Generation

Construction phase	
Description	This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, waste water from ablution facilities, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Ensure that sufficient weather- and vermin- proof bins / containers are present on site for the disposal of solid waste. Waste and litter generated during this phase must be placed in these disposal bins. ✚ Empty bins regularly as required. Contractor shall institute a waste control and removal system for the site. ✚ All waste shall be disposed off site at an approved landfill site. ✚ No burning, disposal of /or burying of waste on site should be conducted. ✚ All hazardous waste storage are to be clearly marked to indicate the presence of hazardous substances, and the protocols associated with handling of such hazardous wastes shall be known by all relevant staff members. ✚ Regular inspection and housekeeping procedures should be maintained at all times.
Proposed Monitoring	Regular inspection and housekeeping procedure monitoring. Observation of site appearance by the manager.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	Waste in the form of contaminated soil, rubble and domestic waste. Littering along access roads may also be produced during the operational phase.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Waste must be removed and disposed off at Kupferberg Landfill by Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.
Proposed Monitoring	Regular visual inspection.
Responsible Body	City of Windhoek

Traffic

Construction phase	
Description	<p>Construction related activities are expected to have a minimal impact on the movement of traffic along the Michelle McClean and Mataman Streets (and other surrounding streets), as construction vehicles will frequent the project site periodically.</p> <p>A slight nuisance might be experienced by motorists in the area. This will most likely be caused by slow moving vehicles frequenting the construction sites.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Install and maintain official traffic signalling (where necessary) along the access roads / intersection in conjunction with local or national traffic regulations. ✚ Should diversion of traffic or closure of any road be necessary, the City of Windhoek; and Traffic Department should be consulted in this regard. ✚ Speed limit warning signs must be erected to minimise accidents. ✚ Construction vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents. ✚ Where feasible, Construction vehicles should not travel to and from the site during peak times (07h00 to 09h00 and 16h00 to 18h00), to minimise impacts on traffic. ✚ Construction vehicles should not be allowed to obstruct the road, hence no stopping in the road, wholly or partially, but rather pull off the road or park on the roadside.
Proposed Monitoring	Observations of the traffic flow on Michelle McClean and Mataman streets.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	Traffic around the township development should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by City of Windhoek Traffic Department should be adhered to in order to minimise accidents.
Proposed Mitigation Measures	✚ It is advisable that traffic lights be erected at the junction of Michelle McClean and Mataman Streets to ease traffic flow around the new township.
Proposed Monitoring	Observations of the traffic flow on Michelle McClean and Mataman streets.
Responsible Body	City of Windhoek

Ecological impacts

Construction phase	
Description	The proposed project site is already disturbed area, which has little conservation worthy vegetation (<i>Boscia albitrunca</i> , <i>Catophractes alexandrii</i> , <i>Acacia reficiens</i> , <i>Albizia anthelmintica</i> and <i>Ziziphus mucronata</i>). Alien invasive plants (<i>Nicotiana Glauca</i> , <i>Opuntia sp.</i>) are present at the site. Impacts on fauna and flora are expected to be minimal.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Limit clearing of vegetation to those areas within the footprint of construction sites. ✚ Alien invasive plants (<i>Nicotiana Glauca</i>, <i>Opuntia sp.</i>) should be cleared during the construction phase. ✚ Big trees should be incorporated into the development in order to maintain the vegetation within proposed township. ✚ Disturbance of areas outside the designated working zone is not allowed. ✚ No vegetation should be removed outside the designated project area.
Proposed Monitoring	✚ Regular site inspection by the Site Manager or Supervisor.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Operational phase	
Description	No impacts are expected as the proposed Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township project in the operational phase. Vegetation in open spaces should not be disturbed or removed during the operational phase.
Proposed Mitigation Measures	✚ Minimise the area of disturbance by restricting movement to the designated working areas during maintenance.
Proposed Monitoring	Regular site inspection by the Site Manager or Supervisor.
Responsible Body	City of Windhoek

Erosion and sedimentation

Construction phase	
Description	<p>Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across township development. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff. The particles in suspension will be transported towards the north and could increase the sedimentation in the nearby Arebbusch river flowing in the northern direction towards the Goreangab Dam.</p> <p>The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of storm water during rainfall events could increase.</p>
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Avoid unnecessary removal of topsoil cover during construction. ✚ Surfaces that are susceptible to erosion should be covered with a suitable vegetation cover as soon as construction is completed. ✚ Ensure stockpiles are located within the boundary of the project sites; and are protected from erosion. ✚ Stabilise cleared areas as soon as possible to prevent and control surface erosion. ✚ Limit clearing of vegetation to those areas within the footprint of project sites. ✚ Minimise open areas and reduce the frequency of disturbance.
Proposed Monitoring	Regular visual site inspection.
Responsible Party	City of Windhoek/ Contractor's ECO officer

Failure of reticulation pipelines

Operational phase	
Description	Potential release of sewage, storm-water, water, into the environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ Proper reticulation pipelines and drainage systems should be installed. ✚ Regular bulk services infrastructure and system inspection should be conducted.
Proposed Monitoring	Regular visual site inspection.
Responsible Body	City of Windhoek

Nuisance Pollution

Construction phase	
Description	Aesthetics and inconvenience caused to persons using Michelle McClean and Mataman Street, and surrounding areas. The construction activities would be visible from the two roads.
Proposed Mitigation Measures	<ul style="list-style-type: none"> ✚ The Technical Manager or Supervisor should maintain tidiness on site at all times. ✚ Take cognition when parking vehicles and placing equipment.
Proposed Monitoring	Regular visual inspection.

Human -Wildlife Conflict

Construction phase	
Description	Human-wildlife interactions, including human-wildlife conflict, are increasingly common in the southern part of Windhoek (i.e. Prosperita, Cimbebasia and Kleine Kuppe areas).
Proposed Mitigation Measures	<p>Ensure natural and built structures that are coalesce to form heterogeneous fitness landscapes in the project area. Deploying green infrastructure at the project site during construction, including green roofs, wetlands, and wildlife corridors, provides valuable passages, stepping stones, and refuges for wildlife to avoid several types of conflicts with people.</p> <p>Careful design of development and location of infrastructure to avoid loss or damage of reptile habitat and maintaining connectivity between blocks of habitat; Timing works to avoid the period when reptiles may be hibernating (October-March); Use of fencing to prevent reptiles moving into areas where they could be killed or injured; Altering habitat to displace reptiles from areas where they could be killed or injured (eg. careful strimming of grassland in open spaces) - provided there is a suitable safe area nearby that they can easily move to; Where necessary, reptiles can be caught and translocated to suitable habitat that won't be affected by the development. Translocation is a difficult and time consuming operation and should be treated as a last resort. Translocations should be to sites nearby - small numbers of individuals may be added to habitat with existing populations of a species, but if large numbers of individuals are involved they should be released into new, or improved habitat where they won't be competing with an existing population.</p>
Proposed Monitoring	Regular visual inspection.
Responsible Party	City of Windhoek/ Contractor's ECO officer/ Ministry of Environment, Forestry and Tourism

4. CONCLUSIONS

If the above-mentioned management recommendations are properly implemented, it is anticipated that most of the adverse impacts on the environment can be mitigated. The Cimbebasia Extension 5, 6, 8, Portions of 9, Erf 878 and Erf 1402 Township must only be reserved for light/dry industries that do not generate liquid pollutants, in order to protect the Groundwater Basin, Goreangab Dam catchment, faults, Arebbusch River and its tributaries. An appointed environmental officer/consultant will need to monitor or audit the site throughout construction and operation phase to ensure that the EMP is fully implemented and complied with. The EMP caters for all project phases, but will need to be reviewed during all phases of project, especially when revisions are made to the project development plans.

The Environmental Management Plan should be used as an on-site tool during all phases of the proposed project. Parties responsible for contravention of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Clearance certificates issued on EIA/EMPs are only valid for 3 years and will need to be reviewed and submitted to the Department of Environmental Affairs again for approval.

Matrix Consulting Services

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