**PROJECT STATUS**

| | | | |
|---|---|---|---|
| **Title** | Environmental Management Plan for the:<br>▪ Township Establishment of Khorixas Extension 9, 10, 11 and 12, Khorixas, Kunene Region. | | |
| **Report Status** | Final | | |
| **SPC Reference** | KHO35 | | |
| **Proponent** | Khorixas Town Council<br>Private Bag 2005, Khorixas<br>Contact Person: Mr. Xoagub<br>Contact Number: +264 67 331 119<br>Email: ebenxoagub@gmail.com | | |
| **Environmental Assessment Practitioner** | Stubenrauch Planning Consultants<br>P.O. Box 41404, Windhoek<br>Contact Person: Bronwynn Basson<br>Contact Number: +264 (61) 25 11 89<br>Fax Number: +264 (61) 25 21 57<br>Email: bronwynn@spc.com.na | | |
| **Report date** | May 2025 | | |
| | **Name** | **Signature** | **Date** |
| **Author** | Zanthea Wantenaar | | May 2025 |
| **Reviewer** | Bronwynn Basson | | May 2025 |

**LEGAL NOTICE**

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## ABBREVIATIONS

| | |
|---|---|
| AIDS | Acquired Immuno-Deficiency Syndrome |
| EA | Environmental Assessment |
| ECC | Environmental Clearance Certificate |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EMA | Environmental Management Act |
| EMP | Environmental Management Plan |
| GG | Government Gazette |
| GIS | Geographic Information System |
| GN | Government Notice |
| GPS | Global Positioning System |
| HIV | Human Immuno-deficiency Virus |
| I&APs | Interested and Affected Parties |
| PR | Proponent's Representative |
| NHCN | National Heritage Council of Namibia |
| Reg. | Regulation |
| S | Section |
| SPC | Stubenrauch Planning Consultants |
| TB | Tuberculosis |

# 1 INTRODUCTION

Khorixas is located close to the Petrified Forest and the Twyfelfontein valley, known for its rock art in the Kunene region. Khorixas is the institutional centre for the southern part of the Kunene Region, providing social services for the mainly rural population such as health and education. As the gateway to the highest number of communal conservancies that practice community-based natural resource management as well as community-based tourism, Khorixas fulfils an important logistical function by providing the most essential services to the predominantly self-drive, all-terrain vehicle tourism market. The town also caters for the needs of the surrounding community of communal farmers. As with many towns in Namibia growth of the urban areas is inevitable and as such urban infill of previously underutilised spaces and areas are often seen as the ideal manner of establishing new business as well as other institutional structures in the town. Additionally the demand for residential properties increases with increased urbanisation of the town. The Khorixas Town Council (KTC) is receptive of the concept of partnering with private investors to facilitate further development of the town.

The Khorixas Town Council hereinafter referred to as the proponent intends to carry out the following activity:

Township Establishment of Khorixas Extension 9, 10, 11 and 12, creation of street and installation of associated infrastructure.

The objective of the intended development is to address the need for residential and business property in the town and also the need for the formalisation of certain informal areas within the town of Khorixas.

The above development triggers listed activities in terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012).

An Environmental Management Plan (EMP) is one of the most important outputs of the EIA process as it synthesises all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. This EMP details the mitigation and monitoring actions to be implemented during the following phases of these developments:

- Planning and Design – the period, prior to construction, during which preliminary legislative and administrative arrangements, necessary for the preparation of erven, are made and engineering designs are carried out. The preparation of construction tender documents forms part of this phase;

- Construction – the period during which the proponent, having dealt with the necessary legislative and administrative arrangements, appoints a contractor for the development of services infrastructure and construction of the road to service the development as well as any other construction process(s) within the development areas;
- Operation and Maintenance – the period during which the services infrastructure will be fully functional and maintained.

It should be noted that to date, no engineering designs have been carried out for the development of the infrastructure associated with this development.

The decommissioning of these developments is not envisaged; however in the event that this should be considered some recommendations have been outlined in **Table 4-5**.

# 2 PROPOSED DEVELOPMENT

## 2.1 Locality

The proposed Khorixas Extension 9 is located on the northern side of the Khorixas-Outjo (C39) Road and to the north of the existing Khorixas Proper Township. The proposed Khorixas Extension 10 is located south of the Khorixas-Outjo (C39) Road on the eastern side of the existing Khorixas Extension 1 and 7. The proposed Khorixas Extensions 11 and 12 are located adjacent to one another on the far southern side of the town of Khorixas. Both extensions 11 and 12 are located adjacent to the existing Khorixas Extension 4 as depicted in **Figure 2-1** below.

## 2.2 LAND USE

Erf 5491, Ondangwa Extension is zoned “Public Open Space” in accordance with the Ondangwa Zoning Scheme. The subject erf is located in an area with erven zoned for different uses including “Single Residential”, “Business”, “General Residential”, “Local Authority” and “Government”.

Erf 5491, Ondangwa Extension 25, which is to be subdivided, closed and subsequently rezoned, currently features a water body which is connected to a local drainage channel, as well as an array of shrubs and trees. The erf is located on a relatively flat terrain as indicated by the contours on the maps.

The portion of Erf 5491 to be subdivided is situated on higher land and will according to Council, be filled up to avoid any possible flooding in the future.

## 2.3 OWNERSHIP

Ownership of Erf 5491, Ondangwa Extension 25 vests with the Ondangwa Town Council.

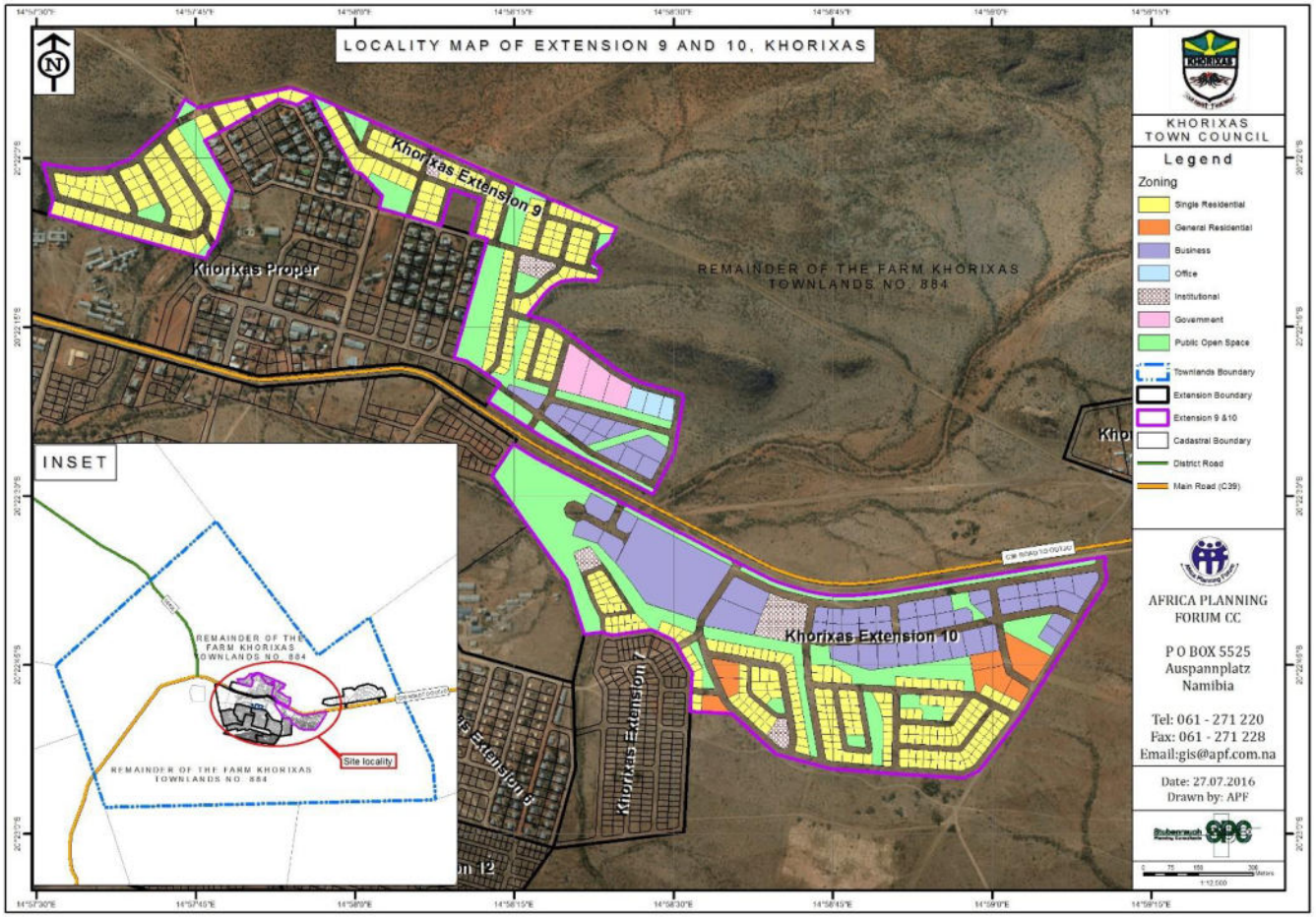



**Figure 1:** Locality map of Extension 9 & 10 Khorixas

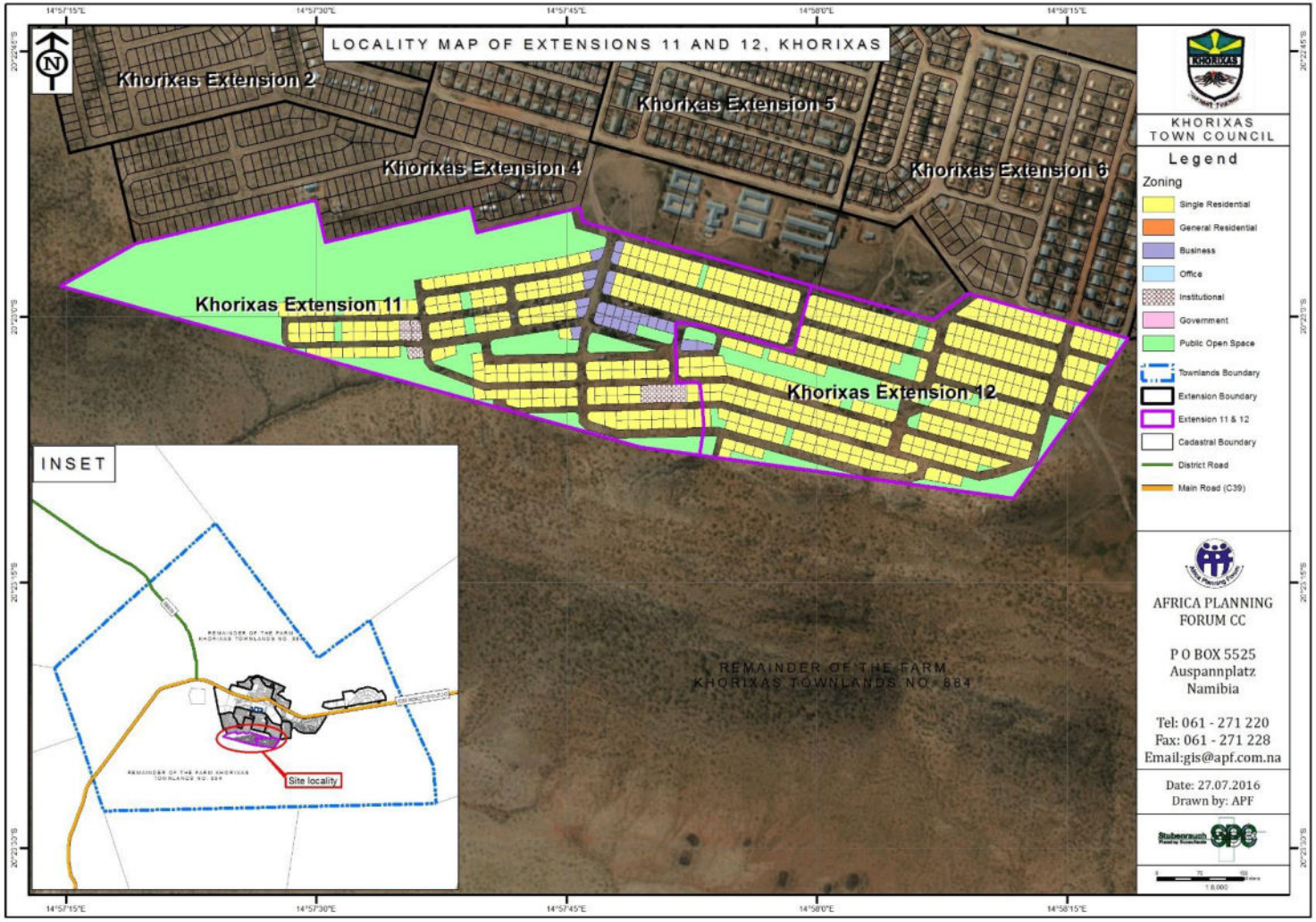



**Figure 2:** Locality Map of Extensions 11 and 12, Khorixas

## 2.4 Development Description

Khorixas is located close to the Petrified Forest and the Twyfelfontein valley, known for its rock art in the Kunene region. Khorixas is the institutional centre for the southern part of the Kunene Region, providing social services for the mainly rural population such as health and education. As the gateway to the highest number of communal conservancies that practice community-based natural resource management as well as community-based tourism, Khorixas fulfils an important logistical function by providing the most essential services to the predominantly self-drive, all-terrain vehicle tourism market. The town also caters for the needs of the surrounding community of communal farmers.

As with many towns in Namibia growth of the urban areas is inevitable and as such urban infill of previously underutilised spaces and areas are often seen as the ideal manner of establishing new business as well as other institutional structures in the town. Additionally, the demand for residential properties increases with increased urbanisation of the town. The Khorixas Town Council (KTC) is receptive of the concept of partnering with private investors to facilitate further development of the town.

It is recommended that this project be authorised as the development is necessary in order to provide for residential and business erven within the town as well as formalise existing informal areas within the town. The intended development is expected to contribute positively towards the livelihood of the residents of the town and may provide job opportunities for the local community members especially during the construction phase.

The Khorixas Town Council hereinafter referred to as the proponent intends to carry out the following activity:

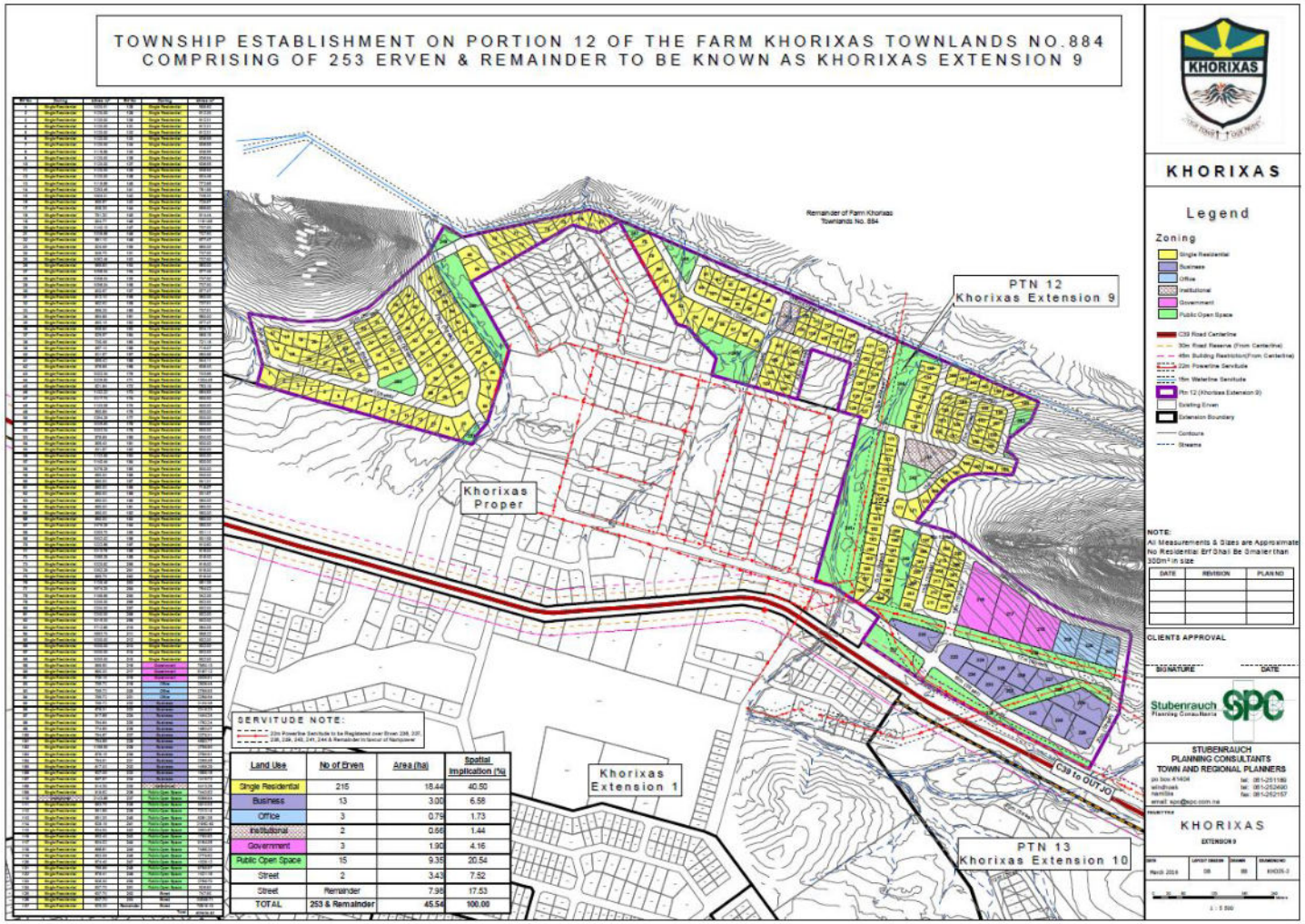
- **Township Establishment of Khorixas Extension 9, 10, 11 and 12, creation of street and installation of associated infrastructure.**

### 2.4.1 Khorixas Extension 9 Development:

The following table provides an overview of the land uses provided for in proposed Extension 9.

**Table 1:** Land use provision for Khorixas Extension 9

| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 215 | 18.44 | 40.50 |
| Business | 13 | 3.00 | 6.58 |
| Office | 3 | 0.79 | 1.73 |
| Institutional | 2 | 0.66 | 1.44 |
| Government | 3 | 1.90 | 4.16 |
| Public Open Space | 15 | 9.35 | 20.54 |
| Street | 2 | 3.43 | 7.52 |
| Street | Remainder | 7.98 | 17.53 |
| **TOTAL** | **253 & Remainder** | **45.54** | **100.00** |




| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 215 | 18.44 | 40.50 |
| Business | 13 | 3.00 | 6.58 |
| Office | 3 | 0.79 | 1.73 |
| Institutional | 2 | 0.66 | 1.44 |
| Government | 3 | 1.90 | 4.16 |
| Public Open Space | 15 | 9.35 | 20.54 |
| Street | 2 | 3.43 | 7.52 |
| Street | Remainder | 7.96 | 17.53 |
| TOTAL | 253 & Remainder | 45.54 | 100.00 |

**Figure 3:** Zoning map for proposed Khorixas Extension 9

### 2.4.2 Khorixas Extension 10 Development:

The following table provides an overview of the land uses provided for in proposed Extension 10.

**Table 2:** Land use provision for Khorixas Extension 10

| Land Use | No of Erven | Area (m²) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 216 | 12.42 | 19.38 |
| General Residential | 7 | 2.87 | 4.48 |
| Business | 46 | 17.14 | 26.73 |
| Institutional | 3 | 2.09 | 3.27 |
| Public Open Space | 12 | 15.32 | 23.90 |
| Street | 2 | 1.23 | 1.91 |
| Street | Remainder | 13.03 | 20.32 |
| **TOTAL** | **286 & Remainder** | **64.11** | **100.00** |

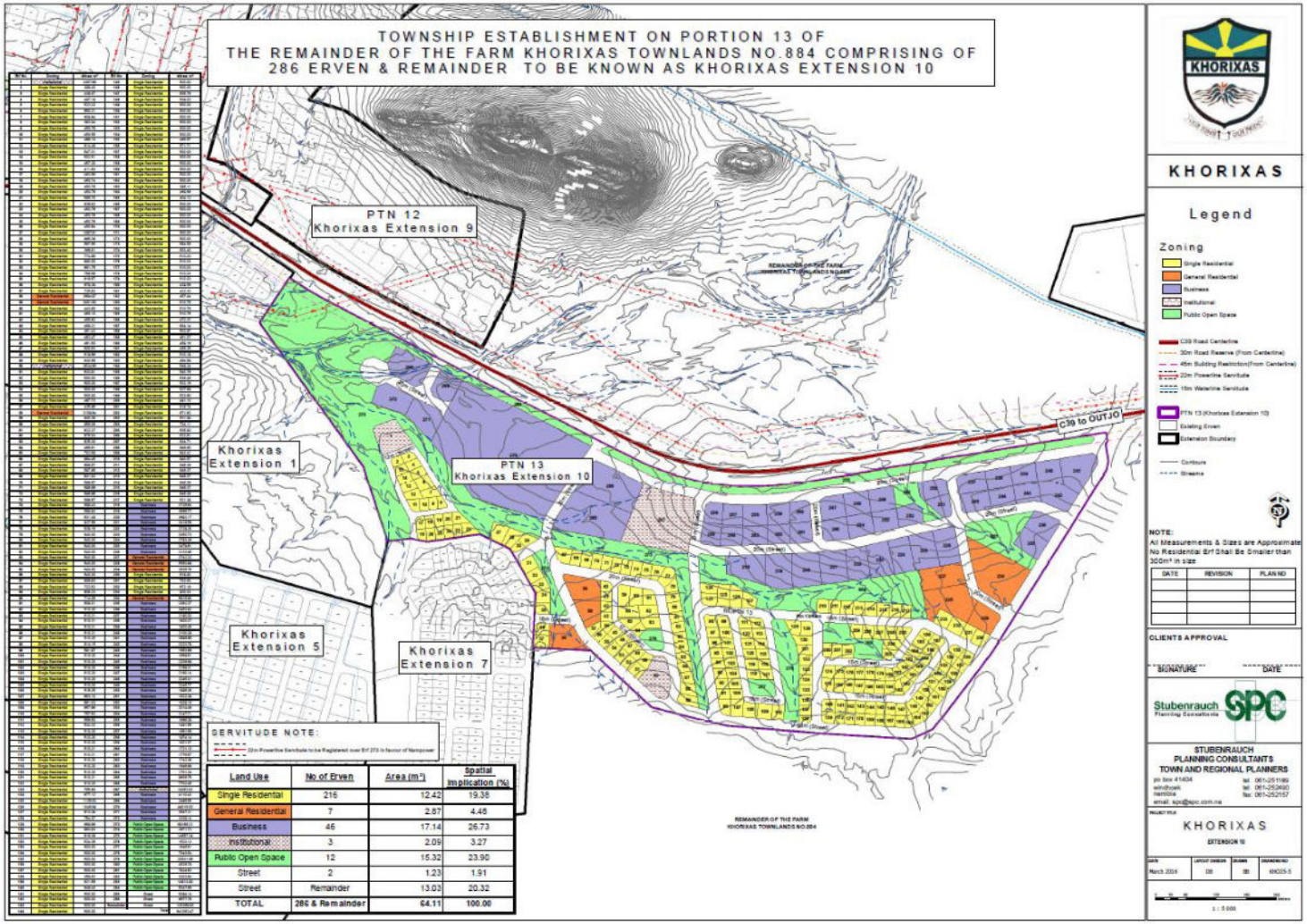


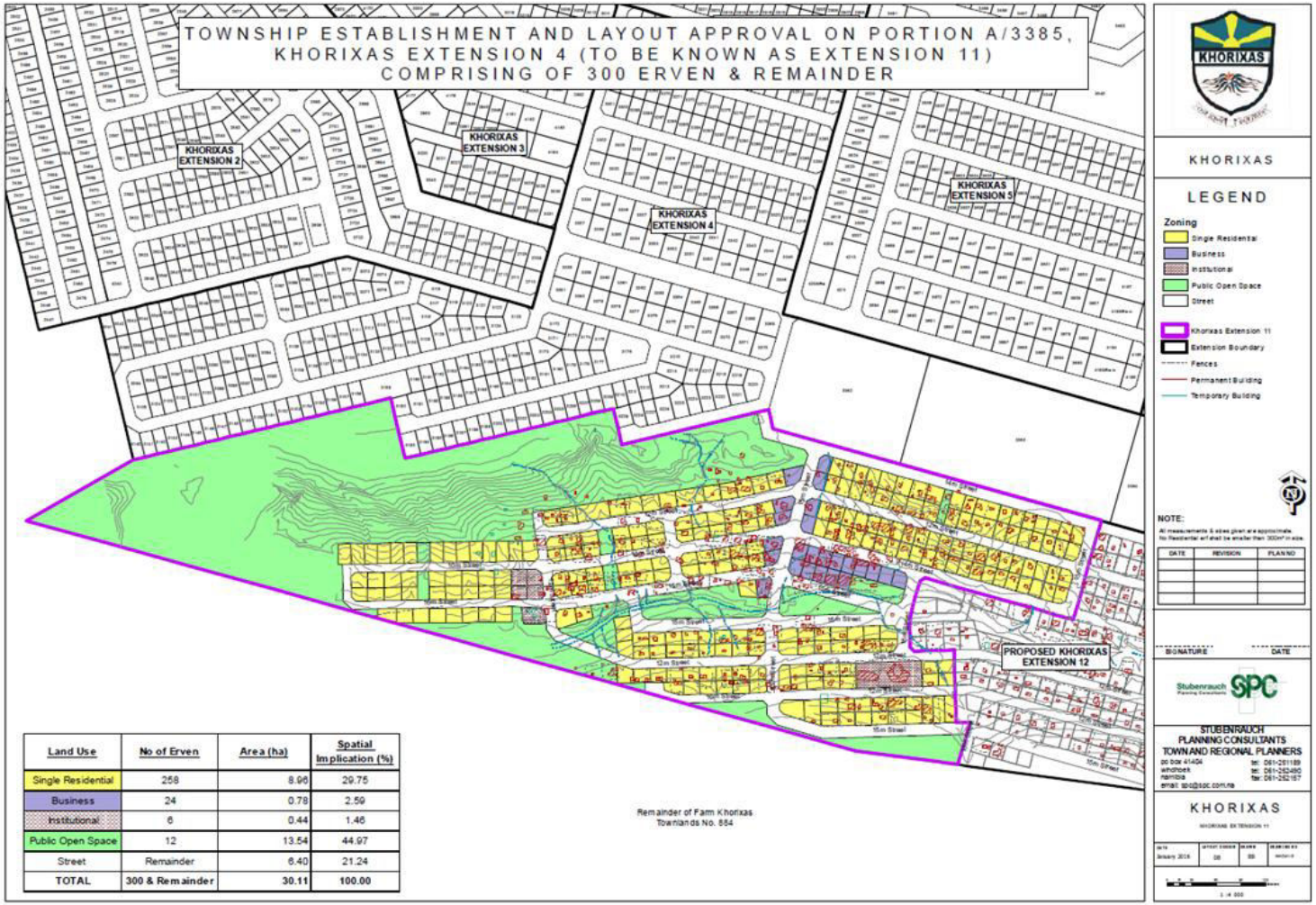

**Figure 4:** Zoning map for proposed Khorixas Extension 10

### 2.4.3 Khorixas Extension 11 Development:

The following table provides an overview of the land use provided for in proposed Extension 11.

**Table 3:** Land use provision for Khorixas Extension 11

| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 258 | 8.96 | 29.75 |
| Business | 24 | 0.78 | 2.59 |
| Institutional | 6 | 0.44 | 1.46 |
| Public Open Space | 12 | 13.54 | 44.97 |
| Street | Remainder | 6.40 | 21.24 |
| **TOTAL** | **300 & Remainder** | **30.11** | **100.00** |




| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 258 | 8.96 | 29.75 |
| Business | 24 | 0.78 | 2.59 |
| Institutional | 6 | 0.44 | 1.46 |
| Public Open Space | 12 | 13.54 | 44.97 |
| Street | Remainder | 6.40 | 21.24 |
| TOTAL | 300 & Remainder | 30.11 | 100.00 |

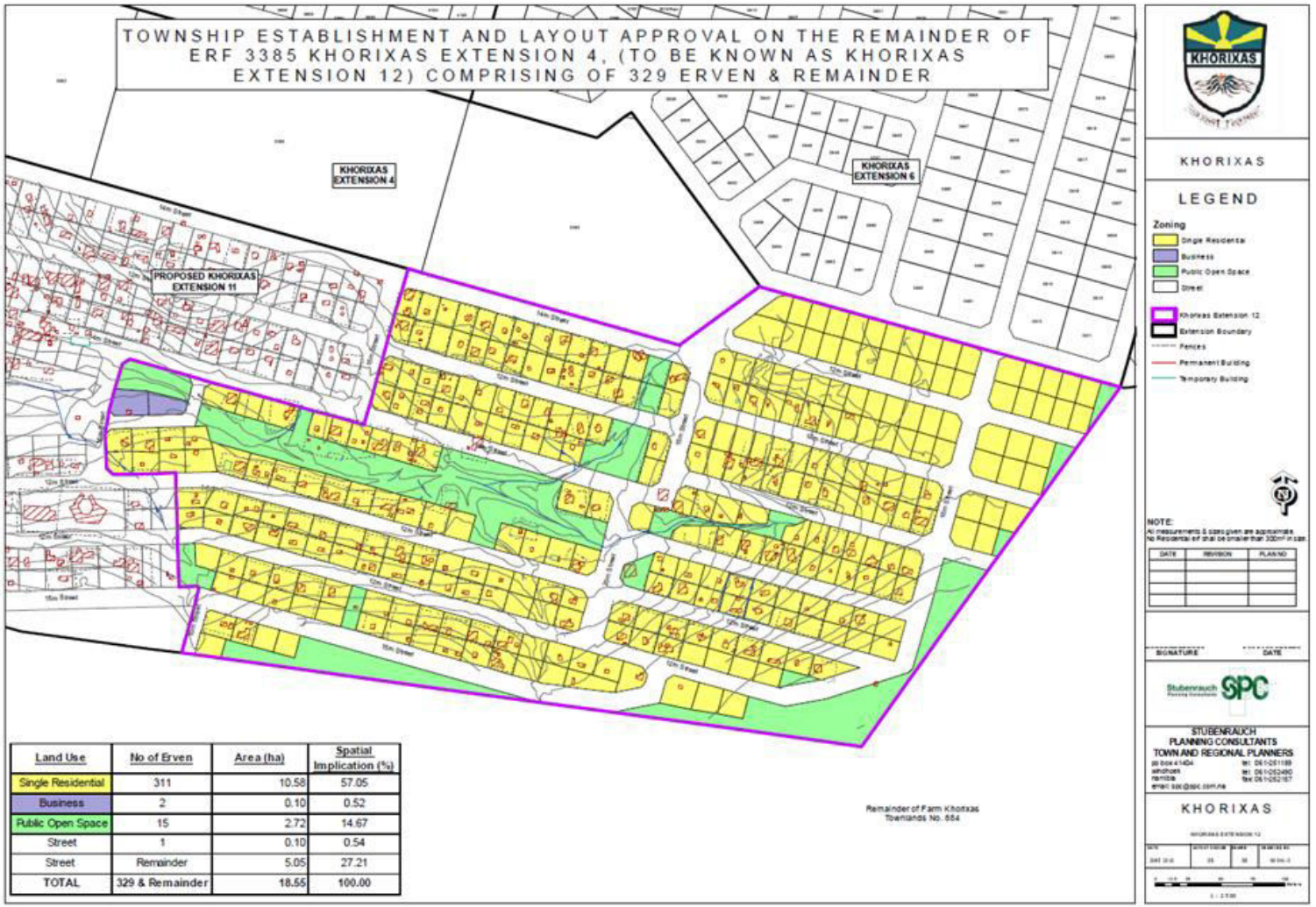
**Figure 5:** Zoning Map for the proposed Khorixas Extension 11

### **2.4.4** Khorixas Extension 12 Development:

The following table provides an overview of the land use provided for in proposed Extension 12.

**Table 4:** Land use provision for Khorixas Extension 12

| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 311 | 10.58 | 57.05 |
| Business | 2 | 0.10 | 0.52 |
| Public Open Space | 15 | 2.72 | 14.67 |
| Street | 1 | 0.10 | 0.54 |
| Street | Remainder | 5.05 | 27.21 |
| **TOTAL** | **329 & Remainder** | **18.55** | **100.00** |




| Land Use | No of Erven | Area (ha) | Spatial Implication (%) |
|---|---|---|---|
| Single Residential | 311 | 10.58 | 57.05 |
| Business | 2 | 0.10 | 0.52 |
| Public Open Space | 15 | 2.72 | 14.67 |
| Street | 1 | 0.10 | 0.54 |
| Street | Remainder | 5.05 | 27.21 |
| TOTAL | 329 & Remainder | 18.55 | 100.00 |

**Figure 6:** Zoning Map for the proposed Khorixas Extension 12

## 2.5 ENGINEERING SERVICES

### 2.5.1 Water, sewer, electricity

Khorixas Extension 9, 10, 11 and 12 will be linked to the existing services network of the town. The sewer line running over Extension 10 will be accommodated within a "Public Open Space" system. A 7m servitude line will be registered over Portion 13 (on which Extension 10 is located) in favour of the Khorixas Town Council.

The powerline running over Extension 9 and 10 have been accommodated within "Public Open Space" systems and a 22m powerline servitude will be registered over Portion 12 (on which Extension 9 is located) and 13 (on which Extension 10 is located) in favour of CENORED.

### 2.5.2 Access

Access to Extension 9 and 10 was approved by the Roads Authority via three access points to Extension 10 and one access point to Extension 9. All 4 access points will be obtained from Main Road 0065 as approved from the Roads Authority.

Access to extension 11 and 12 will be obtained from the internal street network of the existing Khorixas Extension 4 and 6.

# 3 ROLES AND RESPONSIBILITIES

The proponent (Khorixas Town Council) is ultimately responsible for the implementation of the EMP, from the planning and design phase to the decommissioning phase (if these developments are in future decommissioned) of these developments. The proponent will delegate this responsibility as the project progresses through its life cycle. The delegated responsibility for the effective implementation of this EMP will rest on the following key individuals:

- Proponent's Representative.
- Environmental Control Officer; and
- Contractor (Construction and Operations and Maintenance).

### 3.1 COUNCILOR'S REPRESENTATIVE

The Khorixas Town Council should assign the responsibility of managing all aspects of these developments for all development phases (including all contracts for work outsourced) to a designated member of staff, referred to in this EMP as the Proponent's Representative (CR). The Ondangwa Town Council may decide to assign this role to one person for the full duration of these developments or may assign a different PR to each of the development phases – i.e. one for the planning and design phase, one for the construction phase and one for the operation and maintenance phase. The CR's responsibilities are as follows:

**Table 3-1** Responsibilities of CR

| Responsibility | Project Phase |
|---|---|
| Making sure that the necessary approvals and permissions laid out in **Table 4-1** are obtained/adhered to. | • Throughout the lifecycle of these developments |
| Making sure that the relevant provisions detailed in **Table 4-2** are addressed during planning and design phase. | • Planning and design phase |
| Monitoring the implementation of the EMP monthly. | • Construction<br>• Operation and maintenance |
| Suspending/evicting individuals and/or equipment not complying with the EMP | • Construction<br>• Operation and maintenance |
| Issuing fines for contravening EMP provisions | • Construction<br>• Operation and maintenance |

### 3.2 ENVIRONMENTAL CONTROL OFFICER

The CR should assign the responsibility of overseeing the implementation of the whole EMP on the ground during the construction and operation and maintenance phases to an independent external consultant, referred to in this EMP as the Environmental Control Officer (ECO). The CR/ Khorixas Town Council may decide to assign this role to one person for both phases and may assign a different ECO for each phase. The ECO will have the following responsibilities during the construction and operation and maintenance phases of these developments:

- Management and facilitation of communication between the CR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;
- Conducting site inspections (recommended minimum frequency is weekly) of all construction and/or infrastructure maintenance areas with respect to the implementation of this EMP (audit the implementation of the EMP);

- Assisting the Contractor in finding solutions with respect to matters pertaining to the implementation of this EMP;
- Advising the PR on the removal of person(s) and/or equipment not complying with the provisions of this EMP;
- Making recommendations to the PR with respect to the issuing of fines for contraventions of the EMP; and
- Undertaking an annual review and bi-annual audit of the EMP and recommending additions and/or changes to this document.

### 3.3 CONTRACTOR

Contractors appointed by the Khorixas Town Council are automatically responsible for implementing all provisions contained within the relevant chapters of this EMP. Contractors will be responsible for the implementation of this EMP applicable to any work outsourced to subcontractors. **Table 4-3** applies to contractors appointed during the construction phase and **Table 4-4** to those appointed during the operation and maintenance phase. To ensure effective environmental management, the afore-mentioned chapters should be included in the applicable contracts for outsourced construction, operation, and maintenance work.

The tables in the following chapter (**Chapter 4**) detail the management measures associated with the roles and responsibilities that have been laid out in this chapter.

# 4 MANAGEMENT ACTIONS

The aim of the management actions in this chapter of the EMP is to avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts.

The following tables provide the management actions recommended to manage the potential impacts rated in the scoping-level EA conducted for these developments. These management actions have been organised temporally according to project phase:

- Applicable legislation (**Table 4-1**);
- Planning and design phase management actions (**Table 4-2**);
- Construction phase management actions (**Table 4-3**);
- Operation and maintenance phase management actions (**Table 4-4**); and
- Decommissioning phase management actions (**Table 4-5**).
- The proponent should assess these **commitments** in detail and should acknowledge their commitment to the specific management actions detailed in the tables below.

## 4.1 ASSUMPTIONS AND LIMITATIONS

This EMP has been drafted with the acknowledgment of the following assumptions and limitations:

- This EMP has been drafted based on the scoping-level Environmental Assessment (EA) conducted for the proposed development. SPC will not be held responsible for the potential consequences that may result from any alterations to the above-mentioned layout.
- It is assumed that construction labourers will be sourced mostly from the Ondangwa Town Council townlands area and that migrant labourers (if applicable) will be housed in established accommodation facilities within Ondangwa.
- No engineering designs have been carried out for the development of the associated services infrastructure (roads, potable water, storm water, sewerage, and electrical reticulations).

### 4.2 APPLICABLE LEGISLATION

Legal provisions that have relevance to various aspects of these developments are listed in **Table 4-1** below.

**Table 4-1:** Legislation applicable to proposed development

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| The Constitution of the Republic of Namibia as Amended | Article 91 (c) provides for duty to guard against "the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia."<br><br>Article 95(l) deals with the "maintenance of ecosystems, essential ecological processes and biological diversity" and sustainable use of the country's natural resources. | Sustainable development should be at the forefront of this development. |
| Environmental Management Act No. 7 of 2007 (EMA) | Section 2 outlines the objective of the Act and the means to achieve that.<br>Section 3 details the principle of Environmental Management | The development should be informed by the EMA. |
| EIA Regulations GN 28, 29, and 30 of EMA (2012) | GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.<br>GN 30 provides the regulations governing the environmental assessment (EA) process. | The following listed activities are triggered by the proposed development:<br>**Activity 10.1 (a)** The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines.<br>**Activity 10.1 (b)** The construction of public roads.<br>**Activity 10.2 (a)** The route determination of roads and design of associated physical infrastructure where it is a public road. |
| Convention on Biological Diversity (1992) | Article 1 lists the conservation of biological diversity amongst the objectives of the convention. | The project should consider the impact it will have on the biodiversity of the area. |
| Draft Procedures and Guidelines for conducting | Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines | The EA process should incorporate the aspects outlined in the guidelines. |

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| EIAs and compiling EMPs (2008) | should be considered by the proponent in the scoping process. | |
| Namibia Vision 2030 | Vision 2030 states that the solitude, silence, and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets. | Care should be taken that the development does not lead to the degradation of the natural beauty of the area. |
| Water Act No. 54 of 1956 | Section 23(1) deals with the prohibition of pollution of underground and surface water bodies. | The pollution of water resources should be avoided during construction and operation of the development. |
| The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS | MEFT has recently developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments. | The proponent and its contractor must adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when migrant construction workers interact with local communities. |
| Township and Division of Land Ordinance 11 of 1963 | The Townships and Division of Land Ordinance regulates subdivisions of portions of land falling within a Local Authority area | In terms of Section 19 such applications are to be submitted to NAMPAB and Townships Board respectively. |
| Local Authorities Act No. 23 of 1992 | The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. | The development must comply with provisions of the Local Authorities Act. |
| Labour Act no. 11 of 2007 | Chapter 2 details the fundamental rights and protections.<br>Chapter 3 deals with the basic conditions of employment. | Given the employment opportunities presented by the development, compliance with the labour law is essential. |
| National Heritage Act No. 27 of 2004 | The Act is aimed at protecting, conserving and registering places and objects of heritage significance. | All protected heritage resources (e.g. human remains etc.) discovered, need to be reported immediately to the National Heritage Council (NHC) and require a permit from the NHC before they may be relocated. |

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| Roads Ordinance 17 of 1972 | • Section 3.1 deals with width of proclaimed roads and road reserve boundaries<br>• Section 27.1 is concerned with the control of traffic on urban trunk and main roads<br>• Section 36.1 regulates rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads<br>• Section 37.1 deals with Infringements and obstructions on and interference with proclaimed roads. | Adhere to all applicable provisions of the Roads Ordinance. |
| Public and Environmental Health Act of 2015 | This Act (GG 5740) provides a framework for a structured uniform public and environmental health system in Namibia. It covers notification, prevention and control of diseases and sexually transmitted infections; maternal, ante-natal and neo-natal care; water and food supplies; infant nutrition; waste management; health nuisances; public and environmental health planning and reporting. It repeals the Public Health Act 36 of 1919 (SA GG 979). | Contractors and users of the proposed development are to comply with these legal requirements. |
| Nature Conservation Ordinance no. 4 of 1975 | Chapter 6 provides for legislation regarding the protection of indigenous plants | Indigenous and protected plants must be managed within the legal confines. |
| Water Quality Guidelines for Drinking Water and Wastewater Treatment | Details specific quantities in terms of water quality determinants, which wastewater should be treated to before being discharged into the environment | These guidelines are to be applied when dealing with water and waste treatment |
| Environmental Assessment Policy of Namibia (1995) | The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term | This EIA considers this term of Environment. |

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| | ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components. | |
| Water Resources Management Act No. 11 of 2013 | Part 12 deals with the control and protection of groundwater<br>Part 13 deals with water pollution control | The pollution of water resources should be avoided during construction and operation of the development. Should water need to be abstracted, a water abstraction permit will be required from the Ministry of Water, Agriculture and Forestry. |
| Forest Act 12 of 2001 and Forest Regulations of 2015 | To provide for the establishment of a Forestry Council and the appointment of certain officials; to consolidate the laws relating to the management and use of forests and forest produce; to provide for the protection of the environment and the control and management of forest fires; to repeal the Preservation of Bees and Honey Proclamation, 1923 (Proclamation No. 1of 1923), Preservation of Trees and Forests Ordinance, 1952 (Ordinance No. 37 of 1952) and the Forest Act, 1968 (Act No. 72 of 1968); and to deal with incidental matters. | Protected tree and plant species as per the Forest Act No 12 of 2001 and Forest Regulations of 2015 may not be removed without a permit from the Department of Forestry. |
| Atmospheric Pollution Prevention Ordinance No 45 of 1965 | Part II - control of noxious or offensive gases,<br>Part III - atmospheric pollution by smoke,<br>Part IV - dust control, and<br>Part V - air pollution by fumes emitted by vehicles. | The development should consider the provisions outlined in the act. The proponent should apply for an Air Emissions permit from the Ministry of Health and Social Services (if needed). |

| LEGISLATION/POLICIES | RELEVANT PROVISIONS | RELEVANCE TO PROJECT |
|---|---|---|
| Hazardous Substance Ordinance 14 of 1974 | 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. | The handling, usage and storage of hazardous substances on site should be carefully controlled according to this Ordinance. |
| Soil Conservation Act No 76 of 1969 | Act to consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources. | The proposed activity should ensure that soil erosion and soil pollution is avoided during construction and operation. |

### 4.3 PLANNING AND DESIGN PHASE

The CR should ensure that the management actions detailed below should be adhered to during the period before the construction of the development starts.

**Table 4-2:** Planning and design management actions

| Aspect | Management Actions |
|---|---|
| Visual Impacts | • It is recommended that more 'green' technologies be implemented within the architectural designs and building materials of the development where possible to minimise the visual prominence of such a development within the more natural surrounding landscape.<br>• Natural colours and building materials such as wood and stone should be incorporated as well as the use of indigenous vegetation to help beautify the development.<br>  ○ Visual pollutants can further be prevented through mitigations (i.e. keep existing trees, introduce tall indigenous trees; keep structures unpainted and minimising large advertising billboards). |
| Stormwater | • Stormwater runoff should be accommodated within the street creation to ensure that the natural flow of water is not disturbed. |
| Existing Service Infrastructure | • It is recommended that the subject area should be connected to the existing services.<br>• An investigation by an engineer is to be done to determine whether the existing services would be sufficient for the additional number of portions. |
| Flora and Fauna (Biodiversity) | • Do not clear cut the entire development site, but rather keep the few individual trees/shrubs not directly affecting the developments as part of the landscaping.<br>• Protected trees are not to be removed without a valid permit from the Department of Forestry. |

### 4.4 CONSTRUCTION PHASE

The management actions listed in **Table 4-3** apply during the construction phase. This table may be used as a guide when developing EMPs for other construction activities within these development areas.

**Table 4-3:** Construction phase management actions

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| EMP training | Lack of EMP awareness and the implications thereof. | All construction workers are to undergo EMP training that should include as a minimum the following:<br>• Explanation of the importance of complying with the EMP.<br>• Discussion of the potential environmental impacts of construction activities.<br>• Employees' roles and responsibilities, including emergency preparedness.<br>• Explanation of the mitigation measures that must be implemented when work groups carry out their respective activities. | Contractor, CR |
| Conservation of vegetation | Loss of biodiversity | • The layout and development design should incorporate existing trees[1].<br>• The Contractor should compile a Plant Management Plan which should include the following as a minimum:<br>  ○ Trees to be preserved should be marked with paint (or other means to be readily visible) and protected. | Contractor |

[1]a "tree" is defined as an indigenous woody perennial plant with a trunk diameter ≥150 mm.

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | ○ Prevent the destruction of protected and endemic plant species. If trees with stem diameter > 20mm be found within the development site, it should be conserved and be made part of the development.<br>○ Trees, which are impossible to conserve, need to be identified and.<br>○ The Contractor should apply to the local authority for a permit to remove these trees (prior to removing them).<br>○ Special protection should be accorded to the protected endemic species, which are to be found within the development area (As per the Forest Act 12 of 2001 and Forest Regulations of 2015).<br>○ Each tree that is removed needs to be replaced with an indigenous tree species after construction.<br>○ Some of these trees can be obtained at the National Botanical Research Institute (NBRI) or at a commercial nursery.<br>• Only a limited width +/- 5 m on the side of roads may be partially cleared of vegetation.<br>• Workers are prohibited from collecting wood or other plant products on or near work sites.<br>• No alien species may be planted on or near work areas. | |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| Lay-down areas and materials camp | Loss of biodiversity | Suitable locations for the contractors lay-down areas and materials camp should be identified with the assistance of the PR and the following should be considered in selecting these sites:<br>• The areas designated for the services infrastructure should be used as far possible.<br>• Second option should be degraded land.<br>• Avoid sensitive areas (e.g. rivers/drainage lines). | Contractor and PR |
| Hazardous waste | Contamination of surface and groundwater sources. | • All heavy construction vehicles and equipment on site should be provided with a drip tray.<br>• All heavy construction vehicles should be maintained regularly to prevent oil leakages.<br>• Maintenance and washing of construction vehicles should take place only at a designated workshop area and should not take place on open soil. | Contractor |
| Water, Sewage, and grey water | Contamination of surface and groundwater sources and water wasting | • The wash water (grey water) collected from the cleaning of equipment on-site should not be left standing for long periods of time as this promotes parasite and bacterial proliferation.<br>• Grey water should be recycled:<br>○ Used for dust suppression.<br>○ Used to water a vegetable garden, or to support a small nursery.<br>○ Used (reused) to clean equipment. | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | • Grey water that is not recycled should be removed on a regular basis.<br>• No dumping of waste products of any kind in or near water bodies.<br>• Heavy construction vehicles should be kept out of any water bodies and the movement of construction vehicles should be limited where possible to the existing roads and tracks.<br>• Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with.<br>• Drip trays must be placed underneath construction vehicles when not in use to contain all oil that might be leaking from these vehicles.<br>• Contaminated runoff from the construction sites should be prevented from entering the surface and ground water bodies.<br>• All materials on the construction site should be properly stored.<br>• Disposal of waste from the sites should be properly managed and taken to the designated landfill site in Ondangwa.<br>• Construction workers should be given ablution facilities at the construction sites that are located at least 30 m away from any surface water and ground water resources and should be regularly serviced.<br>• Washing of personnel or any equipment should not be allowed | |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | on site. Should it be necessary to wash construction equipment these should be done at an area properly suited and prepared to receive and contain polluted waters. | |
| General waste | Visual impact and soil contamination | • The construction site should be always kept tidy.<br>• All domestic and general construction waste produced daily should be cleaned and contained daily.<br>• No waste may be buried or burned.<br>• Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site.<br>• All recyclable waste needs to be taken to the nearest recycling depot where practical.<br>• Enough separate bins for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such.<br>• Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.<br>• No waste may remain on site after the completion of the project.<br>• Strictly, no burning of waste on the site or at the disposal site is allowed as it possess environmental and public health impacts; | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| Topsoil | Loss of topsoil and associated opportunity costs | • When excavations are carried out, topsoil[2] should be stockpiled in a demarcated area.<br>• Stockpiled topsoil should be used to rehabilitate post-construction degraded areas and/or other nearby degraded areas if such an area is located a reasonable distance from the stockpile. | Contractor |
| Rehabilitation | Visual impact | • Upon completion of the construction phase consultations should be held with the local community/property owner(s) regarding the post-construction use of remaining excavated areas (if applicable).<br>• If no post-construction uses are requested, all excavated/degraded areas need to be rehabilitated as follows:<br>○ Excavated areas may only be backfilled with clean or inert fill. No material of hazardous nature (e.g. sand removed with an oil spill) may be dumped as backfill.<br>○ Rehabilitated excavated areas need to match the contours of the existing landscape.<br>○ The rehabilitated area should not be higher (or lower) than nearby drainage channels. This ensures the efficiency of revegetation and reduces the chances of potential erosion.<br>○ Topsoil is to be spread across excavated areas evenly. | Contractor, CR |

[2] Topsoil is defined here as the top 150mm of surface material, which accounts for the seedbank.

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | ○ Deep ripping of areas to be rehabilitated is required, not just simple scarification, to enable rip lines to hold water after heavy rainfall.<br>○ Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion. | |
| Road safety | Injury or loss of life | • Demarcate roads to be used by construction vehicles clearly.<br>• Off-road driving should not be allowed.<br>• All vehicles that transport materials to and from the site must be roadworthy.<br>• Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules.<br>• Loads upon vehicles should be properly secured to avoid items falling off the vehicle. | Contractor |
| Safety around work sites | Injury or loss of life | • Excavations should be left open for the shortest time possible.<br>• Excavate short lengths of trenches and box areas for services or foundations in a manner that will not leave the trench unattended for more than 24 hours.<br>• Demarcate excavated areas and topsoil stockpiles with danger tape.<br>• All building materials and equipment are to be stored only within set out and demarcated work areas.<br>• Comply with all waste related management actions stated above in this table. | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| Ablutions | Non-compliance with Health and Safety Regulations | • Separate toilets should be available for men and women and should clearly be indicated as such.<br>• Portable toilets (i.e. easily transportable) should be available at every construction site:<br>○ 1 toilet for every 15 females.<br>○ 1 toilet for every 30 males.<br>○ Sewage needs to be removed on a regular basis to an approved (municipal) sewage disposal site in Ondangwa.<br>○ Alternatively, sewage may be pumped into sealable containers and stored until it can be removed.<br>○ Workers responsible for cleaning the toilets should be provided with environmentally friendly detergents, latex gloves, and masks. | Contractor |
| Open fires | Injury or loss of life | • No open fires may be made anywhere on site. | Contractor |
| General health and safety | Injury or loss of life | • A fully stocked first aid kit should permanently be available on-site as well as an adequately trained member of staff capable of administering first aid.<br>• All workers should have access to the relevant personal protective equipment (PPE).<br>• Sufficient potable water reserves should be always available to workers. | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable).<br>• No workers should be allowed to drink alcohol during work hours.<br>• No workers should be allowed on site if under the influence of alcohol.<br>• Building rubble and domestic waste should be stored in skips.<br>• Condoms should be accessible/ available to all construction workers.<br>• Access to Antiretroviral medication should be facilitated. | |
| Dust | Nuisance and health impacts | • A watering truck should be used on gravel roads with the heaviest vehicle movement especially during dry and windy conditions. However, due consideration should be given to water restrictions during times of drought.<br>• The use of waterless dust suppression means (e.g. lignosulphonate products such as Dustex) should be considered.<br>• Cover any stockpiles with plastic to minimise windblown dust.<br>• Dust protection masks should be provided to workers if they complain about dust.<br>• Vehicles travelling to and from the construction site must adhere to the speed limits to avoid producing excessive dust. A speed limit of 40 km/hr should be set for all vehicles travelling over exposed areas. | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| Noise | Nuisance impacts | Work hours should be restricted to between 08h00 and 17h00 and 7:30 – 13:00 on Saturdays where construction involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. If an exception to this provision is required, all residents within the 500 m radius should be given 1 week's written notice.<br>• Provide ear plugs and earmuffs to staff undertaking the noisy activity or working within proximity thereof or alternatively, all construction workers should be equipped with ear protection equipment. | Contractor |
| Recruitment of labourers | Negative conflict regarding recruitment | The Contractor should adhere to the below provision as a minimum for the recruitment of labour:<br>• Adhere to the legal provisions in the Labour Act for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.).<br>• Recruitment should not take place at construction sites.<br>• Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside these agreed upon procedures.<br>• Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the Ondangwa project area and only then look to surrounding towns. | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | • Clearly explain to all jobseekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary. | |
| Communication plan | Negative conflict with I&APs | The Contractor or proponent should draft a Communication Plan, which should outline as a minimum the following:<br>• How Interested and Affected Parties (I&APs), who require ongoing communication for the duration of the construction period, will be identified and recorded and who will manage and update these records.<br>• How these I&APs will be consulted on an ongoing basis.<br>• Make provision for grievance mechanisms – i.e. how concerns can be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the event that feedback is deemed unsatisfactory. | Contractor |
| General communication | Negative conflict with I&APs | • The PR must appoint an ECO to liaise between the Contractor, I&APs, Developer.<br>• The Contractor shall at every monthly site meeting report on the status of the implementation of all provisions of the EMP.<br>• The Contractor should implement the EMP awareness training as stipulated above in this table. | Contractor, ECO, CR |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | • The Contractor must list the I&APs of the project and their contact details with whom ongoing communication would be required for the duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the PR before construction commences.<br>• The Communication Plan, once agreed upon by the Developer, shall be legally binding.<br>• All communication with the I&APs must take place through the ECO.<br>• A copy of the EMP must be available at the site office and should be accessible to all I&APs.<br>• Key representatives from the above-mentioned list need to be invited to attend monthly site meetings to raise any concerns and issues regarding project progress.<br>• The Contractor should liaise with the Developer regarding all issues related to community consultation and negotiation before construction commences.<br>• A procedure should be put in place to ensure that concerns raised have been followed-up and addressed.<br>• All people on the I&APs list should be informed about the availability of the complaints register and associated grievance mechanisms in writing by the PR prior to the commencement of construction activities. | |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| Archaeology | Loss of heritage resources | • Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a "chance find" procedure should be applied in the order they appear below:<br>○ If operating machinery or equipment, stop work;<br>○ Demarcate the site with danger tape;<br>○ Determine GPS position if possible;<br>○ Report findings to the construction foreman;<br>○ Report findings, site location and actions taken to superintendent;<br>○ Cease any works in immediate vicinity;<br>○ Visit site and determine whether work can proceed without damage to findings;<br>○ Determine and demarcate exclusion boundary;<br>○ Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist;<br>○ Inspect site and confirm addition to project GIS;<br>○ Advise the National Heritage Council of Namibia (NHCN) and request written permission to remove findings from work area; and | Contractor |

| Environmental Feature | Impact | Management Actions | Responsible Person |
|---|---|---|---|
| | | ○ Recovery, packaging and labelling of findings for transfer to National Museum.<br>• Should human remains be found, the following actions will be required:<br>○ Apply the chance find procedure as described above;<br>○ Schedule a field inspection with an archaeologist to confirm that remains are human;<br>○ Advise and liaise with the NHCN and Police; and<br>○ Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory. | |

### 4.5 OPERATION AND MAINTENANCE PHASE

The management actions included in **Table 4-4** below apply during the operation and maintenance phase of these developments.

**Table 4-4: Operation and maintenance management actions**

| Environmental Feature | Impact | Management Actions | Person Responsible |
|---|---|---|---|
| EMP training | Lack of EMP awareness and the implications thereof | All contractors appointed for maintenance work on the respective streets must ensure that all personnel are aware of necessary health, safety and environmental considerations applicable to their respective work. | Contractor |
| Water | Surface and groundwater contamination | Ensure that surface run-off water accumulating on-site are channeled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment. | Proponent, Contractor, |
| Aesthetics | Visual impacts | The proponent should consult with a view to incorporate the relevant local/national/international development guidelines which addresses the following:<br>• The incorporation of indigenous vegetation into the development.<br>• To mark the area with appropriate road warning signs (e.g. the road curves to the left/right)<br>• 'green' technologies should be implemented within the architectural designs and building materials of the development where possible to minimize the visual prominence of such a development within the more natural surrounding landscape. | Proponent |

| Environmental Feature | Impact | Management Actions | Person Responsible |
|---|---|---|---|
| | | • keep existing trees, introduce tall indigenous trees; keep structures unpainted and minimizing large advertising billboards.<br>• No illegal dumping of waste should be allowed. | |
| Noise | Nuisance impacts | No activity having a potential noise impact should be allowed after 18:00 hours if possible.<br>• Do not allow commercial activities that generate excessive noise levels.<br>• Continuous monitoring of noise levels should be conducted to make sure the noise levels does not exceed acceptable limits. | Proponent |
| Socio-Economic | Social Impacts | The local community be consulted in terms of possible job creation opportunities and must be given priority if unspecialised job vacancies are available. | Proponent |

### 4.6 DECOMMISSIONING PHASE

The decommissioning of these developments is not foreseen as the intended development is envisaged to be permanent. If this infrastructure development is decommissioned the following management actions should apply.

**Table 4-5: Decommissioning phase management actions**

| Environmental Feature | Management Actions |
|---|---|
| Decommissioning activity | Many of the mitigation measures prescribed for construction activity for these developments **(Table 4-3** above**)** would be applicable to some of the decommissioning activities. These should be adhered to where applicable. |

## 5 CONCLUSION

The management actions included in this report aim to assist in the avoidance, management and/or mitigation of potential impacts on the environment that may result from the proposed activities.

Should the measures recommended in this EMP be implemented and monitored, SPC is confident that the risks identified in the FESR can be reduced to acceptable levels.

## Appendix A – Water Quality Guidelines

**THE WATER ACT, 1956 (ACT 54 OF 1956) AND ITS REQUIREMENTS IN TERMS OF WATER SUPPLIES FOR DRINKING WATER AND FOR WASTE WATER TREATMENT AND DISCHARGE INTO THE ENVIRONMENT**

### 1. INTRODUCTION

The provisions of the Water Act are intended, amongst other things, to promote the maximum beneficial use of the country's water supplies and to safeguard water supplies from avoidable pollution.

The drinking water guidelines are not standards as no publication in the Government Gazette of Namibia exists to that effect. However, the Cabinet of the Transitional Government for National Unity adopted the existing South African Guidelines (461/85) and the guidelines took effect from 1April 1988 under the signature of the then Secretary for Water Affairs.

The sections of the Water Act that relate to the discharge of industrial effluents are: - Section 21(1) which states that

-- The purification of waste water shall form an integral part of water usage and

-- that purified effluents shall comply with the General Standard Quality restrictions as laid out in Government Gazette R553 of 5 April 1962 and

- Section 21(2) which further stipulate that this purified effluent be returned as close as possible to the point of abstraction of the original water.

Where a local authority has undertaken the duty of disposing of all effluents from an industrial process the provisions of Section 21(1) and 21(2) apply to the local authority and not the producer of the effluents. If there is difficulty in complying with these provisions then the applicant may apply for an exemption from the conditions in terms of Section 21(5) and 22(2) of the Water Act. The Permanent Secretary after consultation with the Minister may grant the issuance of a Waste Water Discharge Permit under Sections 21(5) and 22(2) subject to such conditions as he may deem fit to impose.

After independence, the Government of the Republic of Namibia decided that for the interim the existing guidelines will continue to be valid and to remain in use until a proper study has been conducted and new standards have been formulated (Article 140 of Act 1 of 1990).

## 2. GUIDELINES FOR THE EVALUATION OF DRINKING-WATER QUALITY FOR HUMAN CONSUMPTION WITH REGARD TO CHEMICAL, PHYSICAL AND BACTERIOLOGICAL QUALITY

Water supplied for human consumption must comply with the officially approved guidelines for drinking-water quality. For practical reasons the approved guidelines have been divided into three basic groups of determinants, namely:

- Determinants with aesthetic / physical implications: TABLE 1.
- Inorganic determinants: TABLE 2.
- Bacteriological determinants: TABLE 3.

### 2.1 CLASSIFICATION OF WATER QUALITY

The concentration of and limits for the aesthetic, physical and inorganic determinants define the group into which water will be classified. See TABLES 1 and 2 for these limits. The water quality has been grouped into 4 quality classes:

- Group A: Water with an excellent quality
- Group B: Water with acceptable quality
- Group C: Water with low health risk
- Group D: Water with a high health risk, or water unsuitable for human consumption.

Water should ideally be of excellent quality (Group A) or acceptable quality (Group B), however in practice many of the determinants may fall outside the limits for these groups.

If water is classified as having a low health risk (Group C), attention should be given to this problem, although the situation is often not critical as yet.

If water is classified as having a higher health risk (Group D), urgent and immediate attention should be given to this matter.

Since the limits are defined on the basis of average lifelong consumption, short-term exposure to determinants exceeding their limits is not necessarily critical, but in the case of toxic substances, such as cyanide, remedial measures should immediately be taken.

The overall quality group, into which water is classified, is determined by the determinant that complies the least with the guidelines for the quality of drinking water.

**TABLE 1: DETERMINANTS WITH AESTHETIC / PHYSICAL IMPLICATIONS**

| DETERMINANTS | UNITS* | LIMITS FOR GROUPS | | | |
|---|---|---|---|---|---|
| | | A | B | C | D** |
| Colour | mg/l Pt*** | 20 | | | |
| Conductivity | mS/m !at 25 °C | 150 | 300 | 400 | 400 |
| Total hardness | mg/l $CaCO_3$ | 300 | 650 | 1300 | 1300 |
| Turbidity | N.T.U**** | 1 | 5 | 10 | 10 |
| Chloride | mg/l Cl | 250 | 600 | 1200 | 1200 |
| Chlorine (free) | mg/l Cl | 0,1- 5,0 | 0,1 – 5,0 | 0,1 – 5,0 | 5,0 |
| Fluoride | mg/l F | 1,5 | 2,0 | 3,0 | 3,0 |
| Sulphate | mg/l $SO_4$ | 200 | 600 | 1200 | 1200 |
| Copper | µg/l Cu | 500 | 1000 | 2000 | 2000 |
| Nitrate | mg/l N | 10 | 20 | 40 | 40 |
| Hydrogen Sulphide | µg/l $H_2S$ | 100 | 300 | 600 | 600 |
| Iron | µg/l Fe | 100 | 1000 | 2000 | 2000 |
| Manganese | µg/l Mn | 50 | 1000 | 2000 | 2000 |
| Zink | mg/l Zn | 1 | 5 | 10 | 10 |
| pH**** | pH-unit | 6,0 – 9,0 | 5,5 – 9,5 | 4,0 – 11,0 | 4,0 – 11,0 |

* In this and all following tables “l” (lower case L in ARIAL) is used to denote $dm^3$ or litre

** All values greater than the figure indicated.

*** Pt = Platinum Units

**** Nephelometric Turbidity Units

***** The pH limits of each group exclude the limits of the previous group

**TABLE 2: INORGANIC DETERMINANTS**

| DETERMINANTS | UNITS | LIMITS FOR GROUPS | | | |
|---|---|---|---|---|---|
| | | A | B | C | D* |
| Aluminium | µg/l Al | 150 | 500 | 1000 | 1000 |
| Ammonia | mg/l N | 1 | 2 | 4 | 4 |
| Antimonia | µg/l Sb | 50 | 100 | 200 | 200 |
| Arsenic | µg/l As | 100 | 300 | 600 | 600 |
| Barium | µg/l Ba | 500 | 1000 | 2000 | 2000 |
| Beryllium | µg/l Be | 2 | 5 | 10 | 10 |
| Bismuth | µg/l Bi | 250 | 500 | 1000 | 1000 |
| Boron | µg/l B | 500 | 2000 | 4000 | 4000 |
| Bromine | µg/l Br | 1000 | 3000 | 6000 | 6000 |
| Cadmium | µg/l Cd | 10 | 20 | 40 | 40 |
| Calcium | mg/l Ca | 150 | 200 | 400 | 400 |
| Calcium | mg/l $CaCO_3$ | 375 | 500 | 1000 | 1000 |
| Cerium | µg/l Ce | 1000 | 2000 | 4000 | 4000 |
| Chromium | µg/l Cr | 100 | 200 | 400 | 400 |
| Cobalt | µg/l Co | 250 | 500 | 1000 | 1000 |
| Cyanide (free) | µg/l CN | 200 | 300 | 600 | 600 |
| Gold | µg/l Au | 2 | 5 | 10 | 10 |
| Iodine | µg/l I | 500 | 1000 | 2000 | 2000 |
| Lead | µg/l Pb | 50 | 100 | 200 | 200 |
| Lithium | µg/l Li | 2500 | 5000 | 10000 | 10000 |
| Magnesium | mg/l Mg | 70 | 100 | 200 | 200 |
| Magnesium | mg/l $CaCO_3$ | 290 | 420 | 840 | 840 |
| Mercury | µg/l Hg | 5 | 10 | 20 | 20 |
| Molybdenum | µg/l Mo | 50 | 100 | 200 | 200 |
| Nickel | µg/l Ni | 250 | 500 | 1000 | 1000 |
| Phosphate | mg/l P | 1 | See note below | See note below | See note below |
| Potassium | mg/l K | 200 | 400 | 800 | 800 |
| Selenium | µg/l Se | 20 | 50 | 100 | 100 |
| Silver | µg/l Ag | 20 | 50 | 100 | 100 |
| Sodium | mg/l Na | 100 | 400 | 800 | 800 |
| Tellurium | µg/l Te | 2 | 5 | 10 | 10 |
| Thallium | µg/l Tl | 5 | 10 | 20 | 20 |
| Tin | µg/l Sn | 100 | 200 | 400 | 400 |
| Titanium | µg/l Ti | 100 | 500 | 1000 | 1000 |
| Tungsten | µg/l W | 100 | 500 | 1000 | 1000 |
| Uranium | µg/l U | 1000 | 4000 | 8000 | 8000 |
| Vanadium | µg/l V | 250 | 500 | 1000 | 1000 |

* All values greater than the figure indicated.

Note FOR Table 2 on phosphate: Phospates are not toxic and essential for all life-forms. Natural water will, however, seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. The general guideline for a concentration level to be aimed at is 1 mg/l as P. But in many cases this may be difficult to achieve technically. For this reason the Department will allow a phosphate concentration level of up to 5 mg/l as P in water intended for human consumption. Please refer also to the "Note on Phosphate" under Section 3: General Standards for Waste/Effluent.

**2.2 BACTERIOLOGICAL DETERMINANTS**

The bacteriological quality of drinking water is also divided into four groups, namely:

- Group A: Water which is bacteriological very safe;
- Group B: Water which is bacteriological still suitable for human consumption;
- Group C: Water which is bacteriological risk for human consumption, which requires immediate action for rectification;
- Group D: Water, which is bacteriological unsuitable for human consumption.

**TABLE 3: BACTERIOLOGICAL DETERMINANTS**

| **DETERMINANTS** | **LIMITS FOR GROUPS** | | | |
|---|---|---|---|---|
| | A** | B** | C | D* |
| Standard plate counts per 1 ml | 100 | 1000 | 10000 | 10000 |
| Total coliform counts per 100 ml | 0 | 10 | 100 | 100 |
| Faecal coliform counts per 100 ml | 0 | 5 | 50 | 50 |
| E. coli counts per 100 ml | 0 | 0 | 10 | 10 |

* All values greater than the figure indicated.

** In 95% of the samples.

NB If the guidelines in group A are exceeded, a follow-up sample should be analysed as soon as possible.

**2.3 FREQUENCY FOR BACTERIOLOGICAL ANALYSIS OF DRINKING-WATER**
SUPPLIES

The recommended frequency for bacteriological analysis of drinking water is given in Table 4.

**TABLE 4: FREQUENCY FOR BACTERIOLOGICAL ANALYSIS**

| **POPULATION SERVED** | **MINIMUM FREQUENCY OF SAMPLING** |
|---|---|
| More than 100 000 | Twice a week |
| 50 000 – 100 000 | Once a week |
| 10 000 – 50 000 | Once a month |
| Minimum analysis | Once every three months |

## 3 GENERAL STANDARDS FOR WASTE / EFFLUENT WATER DISCHARGE INTO THE ENVIRONMENT

All applications in terms of Section 21(5) and 22(2), for compliance with the requirements of Section 21(1) and 21(2) of the Water Act (Act 54 of 1956) that purified water shall comply with the General Standard as laid out in Government Gazette Regulation R553 of 5 April 1962.

**TABLE 5 GENERAL STANDARDS FOR ARTICLE 21 PERMITS (EFFLUENTS)**

| DETERMINANTS | MAXIMUM ALLOWABLE LEVELS |
|---|---|
| Arsenic | 0,5 mg/l as As |
| Biological Oxygen Demand (BOD) | no value given |
| Boron | 1,0 mg/l as B |
| Chemical Oxygen Demand (COD) | 75 mg / l as O |
| Chlorine, residual | 0,1 mg/l as $Cl_2$ |
| Chromium, hexavalent | 50 Ng/l as Cr(VI) |
| Chromium, total | 500 Ng/l as Cr |
| Copper | 1,0 mg/l as Cu |
| Cyanide | 500 Ng/l as CN |
| Oxygen, Dissolved (DO) | at least 75% saturation** |
| Detergents, Surfactants, Tensides | 0,5 mg/l as MBAS – See also Note 2 |
| Fats, Oil & Grease (FOG) | 2,5 mg/l (!gravimetric method) |
| Fluoride | 1,0 mg/l as F |
| Free & Saline Ammonia | 10 mg/l as N |
| Lead | 1,0 mg/l as Pb |
| Oxygen, Absorbed (OA) | 10 mg / l as O* |
| pH | 5,5 – 9,5 |
| Phenolic Compounds | 100 Ng/l as phenol |
| Phosphate | 1,0 mg/l as P - See also Note 1 |
| Sodium | not more than 90 mg/l Na more than influent |
| Sulphide | 1,0 mg/l as S |
| Temperature | 35°C |
| Total Dissolved Solids (TDS) | not more than 500 mg /l more than influent |
| Total Suspended Solids (TSS) | 25 mg/l |
| Typical faecal Coli. | no typical coli should be counted per 100 ml |
| Zinc | 5,0 mg/l as Zn |

* Also known as Permanganate Value (or PV).
** In Windhoek the saturation level is at approx. 9 mg/l $O_2$.

Note (1) on phosphate: Phosphates are not toxic and essential for all life forms. Natural water will seldom contain phosphate; it is generally seen as an indicator of pollution and is usually accompanied by other pollutants. Wherever drinking water is combined with or consists wholly of reclaimed or recycled water, it may be expected to contain phosphate. There is no general guideline for phosphate contained in the Regulation 553. But generally it is assumed that eutrophication or algal bloom in dams is promoted by nutrient concentrations as low as 0,01 mg/l as P; generally a phosphate concentration limit for dams of 0,1 mg/l is recommended. All water that is consumed and subsequently discharged, will eventually end up in rivers, dams or

groundwater – that is why for potable water, a concentration level of 1 mg/l as P is aimed at.

But, again, in many cases of waste and effluent treatment, this may be difficult to achieve technically, or the required waste and effluent treatment infrastructure is not available; as the required infrastructure is sophisticated and expensive. The current situation calls for a compromise and for this reason, this Department will judge each application individually on its merits and allow, in certain cases, a phosphate concentration level of up to 15 mg/l as P in any effluent or waste stream to be discharged into the environment. This regulation is subject to be reviewed every two years, calculated from the date of approval of this document.

Note (2) on detergents, surfactants and ten sides: The MBAS (or methylene blue active substances) – test does not encompass all surface active compounds currently, commercially available. The limit given is therefore only a guideline. Many of the cleaning agents are toxic to biological life-forms in rivers and dams.

It should be taken into consideration that some commercial products interfere with the effective removal of oil, fat and grease by grease and fat traps, by breaking up such long-chain molecules into shorter ones. These cleaning agents thus effectively allow such components to pass through the traps and land into sections of a treatment plant further down the line and interfere with the process there.

Many cleaning agents contain very powerful disinfectants, and/or biocides. Such substances may interact with biological treatment processes. They may reduce the effectiveness of such treatment or 'kill' it completely, if they land in septic tanks, biofilters or even activate-sludge plants. Their activity may be attenuated by dilution.

## 4. AUTHORIZATION

Herewith, the Guidelines for the Evaluation of Drinking Water for Human Consumption with regard to Chemical, Physical and Bacteriological Quality, as well as the General Standards for Article 21* Permits, amended for detergents, surfactants, ten sides, as well as phosphates, are confirmed and remain in force until further notice.

Issued under my hand with the authority vested in my office, within the Ministry for Agriculture, Water and Rural Development,

PERMANENT SECRETARY
Dr V Shivute

WINDHOEK, DATE STAMP

## Appendix B: EMP Compliance checklist

### CONSTRUCTION PHASE

| Issues/Aspects | EMP Conditions | Compliance Rating | Comments |
|---|---|---|---|
| General | • A copy of the EMP available on site at all times<br>• Contractors provided with suitable lay-down and materials camp areas<br>• Construction site to be kept tidy at all times<br>• Ablution facilities provided to construction workers (30 m from any surface or groundwater) separate for men (1 toilet for every 30 men) and women (1 toilet for every 15 females)<br>• Recruitment to be done in accordance with Labour Act | | |
| Vegetation Management | • Compilation of Tree Management Plan<br>• Removal of trees should be limited and not to include protected species<br>• Approval to be obtained from the Directorate of Forestry for removal of trees<br>• Clearing of vegetation to be limited to the subject site only | | |
| Waste Management | • Waste from construction vehicles – construction vehicles provided with drip trays, regular inspection and maintenance of vehicles<br>• Waste containers/bins regularly removed from site<br>• Waste regularly taken to nearest landfill<br>• Separate bins for hazardous and domestic/general waste | | |

| Issues/Aspects | EMP Conditions | Compliance Rating | Comments |
|---|---|---|---|
| | | | |
| Water Management | • Recycling of grey water | | |
| Borrow pit Management | • During excavations – topsoil stockpiled in demarcated area<br>• Topsoil used to rehabilitate post-construction degraded areas | | |
| General Health and Safety | • HIV/AIDS and TB education programmes provided to contract workers<br>• Road safety ensured – driving on demarcated roads only, all vehicles on site roadworthy, drivers to have valid driver's licence, loads upon vehicles properly secured<br>• Excavated areas- demarcated, not left open for long periods | | |
| Dust | • Dust suppression means utilised<br>• Stockpiles covered with plastic<br>• Dust protection masks provided to workers (if complain about dust) | | |
| Noise | • Work hours 08h00 to 17h00 | | |
| Communication | • Communication Plan drafted | | |
| Archaeology | • Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a "chance find" procedure to be applied | | |

**Table 5-1:** Compliance rating checklist

| Rating (1-5) | Compliance Rating | Description |
|---|---|---|
| 1 | No compliance | 0% conditions met |
| 2 | Partial compliance | 25% conditions met |
| 3 | Broad compliance | 50% conditions met |
| 4 | Substantial compliance | 70% conditions met |
| 5 | Full compliance | 100% All activities conditions met |

**…….** **……**

**Environmental Control Officer (ECO)** **Date**

**……..** **……**

**Contractor** **Date**

**……..** **……**

**Developer's Representative (DR)** **Date**

## Appendix C: Environmental Clearance Certificate