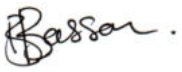
PROJECT STATUS

Title	Environmental Scoping Report for the: ▪ Formalisation and establishment of the following townships in Otjiwarongo: ○ Otjiwarongo Extensions 19, 20 and 21; ○ Eie Risiko Proper, Extensions 1 and 2; ○ Orwetoveni Extensions 16 to 23; ○ Formalisation of DRC Extension 4 and 5 ○ Formalisation of Ombili; ○ Formalisation of Tsaraxa-Aibes.		
Report Status	Final		
SPC Reference	W/18024		
Proponent	Otjiwarongo Municipality Contact Number: +264 67 302233 Contact Person: Rene De Wet Email: rene@Otjimun.org.na		
Environmental Assessment Practitioner	Stubenrauch Planning Consultants P.O. Box 41404, Windhoek Contact Person: Bronwynn Basson Contact Number: +264 (61) 25 11 89 Fax Number: +264 (61) 25 11 89 Email: bronwynn@spc.com.na		
Report date	September 2025		
	Name	**Signature**	**Date**
Authors	Bronwynn Basson		September 2025

LEGAL NOTICE

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ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
DR	Developer's Representative
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
NHCN	National Heritage Council of Namibia
Reg.	Regulation
S	Section
SPC	Stubenrauch Planning Consultants
TB	Tuberculosis

1 BACKGROUND

In the year 2020, the proponent intended to establish new townships and formalize existing informal townships in Otjiwarongo. The new township establishments aim to primarily provide residential properties, which are to be supported by commercial, institutional, business, government, public open spaces, cemetery, private open spaces and recreational land uses. The proposed activity is thus inclusive of the creation of street and installation of bulk services.

The Municipality of Otjiwarongo was in no financial position to establish township establishment within the 3 year validity period of the ECC. However, the Municipality of Otjiwarongo has now indicated that the funds will be made available for the next financial year 2025/2026.

Take note that the circumstances in the area have not changed since the original application and township establishment is still the same as initially approved by the Urban and Regional Planning Board and the Ministry of Environment and Tourism.

2 INTRODUCTION

The Otjiwarongo Municipality is desirous to proactively plan and formalise new townships to the north and east of the town and thus proposed to undertake the below activity. The proposed development aims to:

- Rectify existing building encroachments within the DRC and Tsaraxa-Aibes informal areas;
- Provide approximately 4000 erven (14 townships) to the northeast of the DRC and Orwetoveni areas for new township development purposes;
- Plan the Eie Risiko informal area as a green field planning exercise;
- Provide approximately 500 erven for the development of a lower income urban area between the NDF base and the Eie Risiko area where Council can allocate residential erven to lower income households.

The Otjiwarongo Municipality hereinafter referred to as the proponent resultantly intends to carry out the following activity:

- **Establishment of the following new townships:**
  - **Otjiwarongo Extensions 19, 20 and 21;**
  - **Eie Risiko Proper, Extensions 1 and 2;**
  - **Orwetoveni Extensions 16 to 23.**
- **Formalisation of the following informal townships:**
  - **DRC Extension 4 and 5;**
  - **Ombili;**
  - **Tsaraxa-Aibes.**

The above are 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 5-5**.

3 PROPOSED DEVELOPMENT

Otjiwarongo is located approximately 250 km north of the capital city Windhoek. The proposed townships are located on the eastern edge of Otjiwarongo in the Otjozondjupa Region. Please refer to **Figure 1** for the intended development in relation to the town of Otjiwarongo.

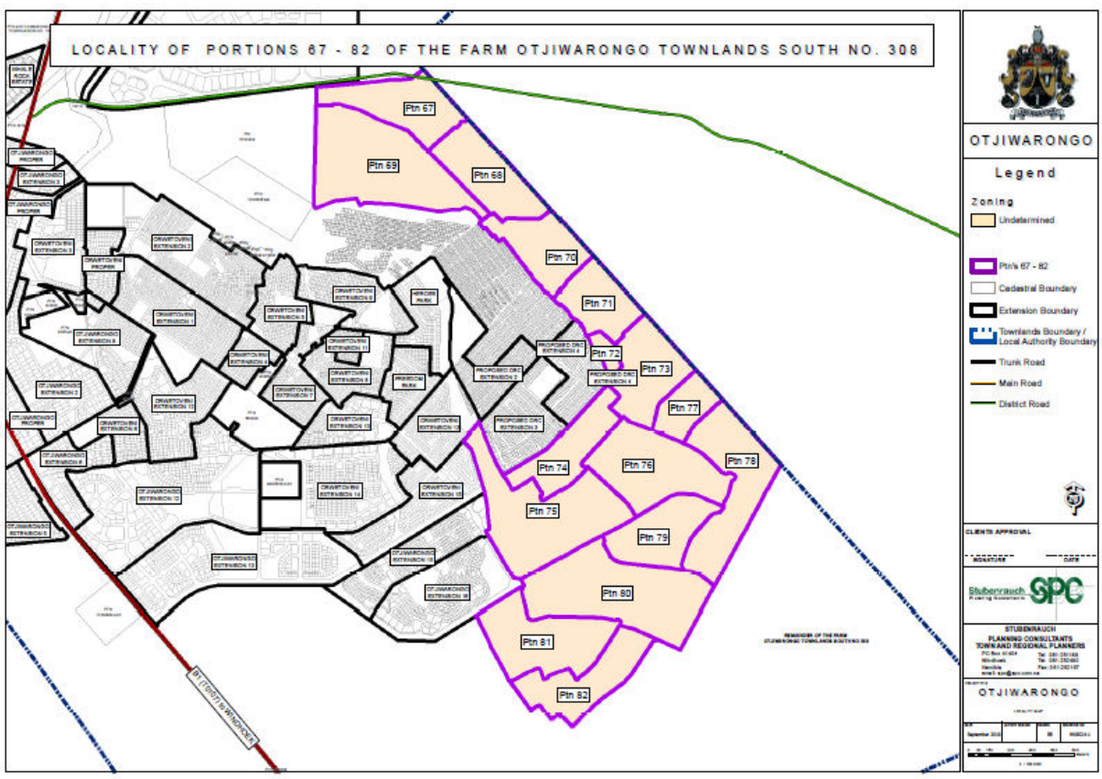

Figure 1: Locality map proposed development in Otjiwarongo

The Otjiwarongo Municipality identified the need to pro-actively plan and formalise new township extensions to the north and east of the existing town of Otjiwarongo in order to address the housing shortage experienced within the town. As such the proposed development consists of the creation of new townships as well as the formalisation of existing townships.

The proposed development aims to provide approximately 4000 (14 townships) of the newly created erven to the north east of the DRC and Orwetoveni areas. The existing Eie Risiko informal area is proposed to be planned as a greenfield planning exercise. The proposed development further aims to provide approximately 500 erven to allow for the development of a lower income urban area between the NDF base and the Eie Risiko area where the Municipality would be able to allocate residential erven to the lower income households.

The formalisation exercise will include the formalisation of the existing DRC Extension 4 and 5, Ombili and Tsaraxa-Aibes informal areas. The formalisation process aims to rectify encroachments on the ground and enable the creation of formal erven within these areas which can then eventually be acquired by the residents of the town.

The map below depicts the intended new townships and proposed formalisations to be carried as part of the development.

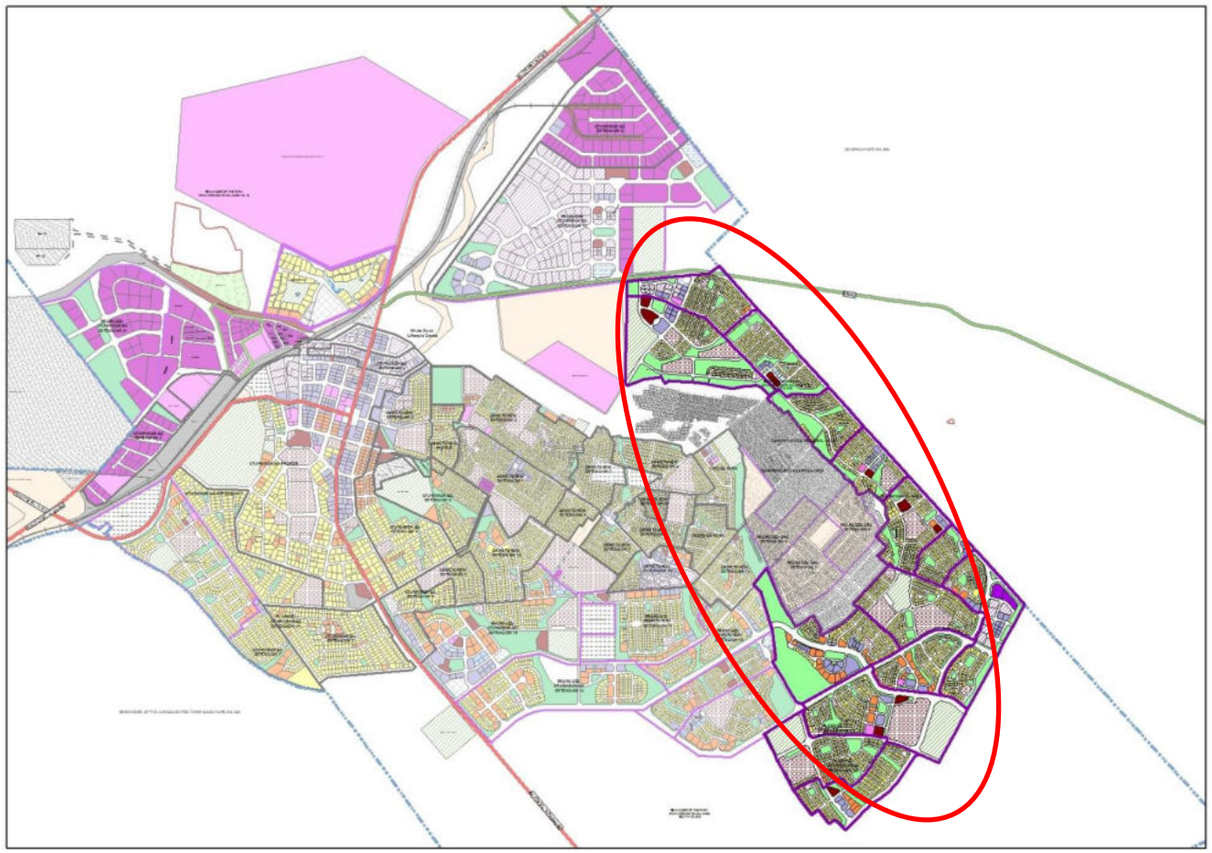

Figure 2: The intended township establishment and formalisation within Otjiwarongo

3.1 Otjiwarongo Extensions 19, 20 and 21 (Informal area)

The area to the east of the extended NDF army base up to the Eie Risiko informal area was identified to be most suitable for the planning and development of a low income area as this area can easily and cost effectively be linked to the municipal bulk service network while good linkages with the Orwetoveni and Northern Industrial areas can be created. As such residents of this area will reside within close proximity of areas of employment and as such will not be burdened by long travel distances to and from work.

The topography of the site however poses some challenges as the river dividing the new area from the existing town needs to be respected. By initially developing low water crossings the area can be cost effectively linked with the existing urban area to the south of the river. During major flood events residents can make use of the existing gravel road to the north of the development to reach the town via the railway bridge and the B1.

To introduce a buffer between the extended NDF area and the proposed residential development a green belt (Public Open Space) as well as an activity node is introduced. This node will over time develop into an activity centre which will also connect the existing (eastern) commercial heart of Otjiwarongo with the northern industrial area. Here provision is made for commercial (business), service station, light industrial, municipal (refuse truck storage and community support facilities) as well a GRN site for the development of a clinic or health centre. Central to this node is a park area which should be developed as a central design feature and space making element of the activity node. An institutional property for the development of a health clinic or hospital in support of the larger area is provided for.

To the east of the mixed use activity node the residential area is located. The average residential property ranges between 320m² to 330m². Use has been made of a relatively simple grid layout which is not only cost efficient but which can also cater for storm water run-off. The tertiary river courses are accommodated within linear green belts which are widened at places to encourage the community to develop informal sport field and recreation zones.

Some business and local authority properties (for markets) are provided for along the main west to east internal mobility street. These facilities are within easy walking distance from the residential pockets and as such are to cater for the day to day needs of the local community while also providing for trading opportunities to passing trade. Neighbourhood parks and institutional properties for the development of churches and kindergartens are provided for central to the residential pockets as these are not to be placed along major traffic routes.

Two school sites are strategically positioned in the southern part of the new area as these schools are also to cater for the need of the residential areas located to the south of the river course. As such these schools are within easy walking distance for a large part of the Orwetoveni, Tsaraxa-Aibes and DRC communities as well.

As the layout design was driven by available space and municipal design requirement 975 erven (inclusive of streets) could be provided within the area. This exceeds the 500 erven requirement as put forward by Council. It is thus necessary to divide the larger design area into three township extensions comprising of Otjiwarongo Extensions 19, 20 and 21.

The following three tables provide a summary of the land use allocation within the respective extensions.

Land Use Summary Table 1: Otjiwarongo Extension 19 (Informal area)

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	301	11.20	35.07
Residential 2	2	0.30	0.92
Business	5	1.17	3.66
Local Business	3	0.41	1.29
Light Industrial	9	2.11	6.60
Service Station	1	0.91	2.86
Institutional	1	0.39	1.22
Government	1	0.50	1.56
Public Open Space	5	3.37	10.55
Street	Remainder	11.57	36.25
TOTAL	**328 & Remainder**	**31.92**	**100.00**

Land Use Summary Table 2: Otjiwarongo Extension 20 (Informal area)

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	307	11.07	34.73
Business	5	0.56	1.76
Local Business	6	0.90	2.83
Local Authority	2	0.79	2.46
Institutional	1	0.27	0.83
Public Open Space	7	7.51	23.57
Street	Remainder	10.78	33.81
TOTAL	**328 & Remainder**	**31.87**	**100.00**

Land Use Summary Table 3: Otjiwarongo Extension 21 (Informal area)

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	292	10.48	15.95
Business	7	2.37	3.61
Local Authority	2	1.99	3.02
Institutional	5	8.44	12.84
Private Open Space	1	11.78	17.93
Public Open Space	9	18.15	27.62
Street	Remainder	12.50	19.02
TOTAL	**316 & Remainder**	**65.70**	**100.00**

3.2 Eie Risiko Proper, Extension 1 and Extension 2

The Eie Risiko informal area was established by community initiative without the guidance of the local authority. As such the area is not planned and it will not be cost efficient to formalise the area in its current form. As the name “Eie Risiko” given to the area by the local community spells out, the households having established themselves within the Eie Risiko area are well aware that the will have to accept relocating their structures once the area has been planned and formalised. As such it was decided that the layout to be provided should be a ‘green field’ planning exercise rather than adopting a formalisation planning approach.

The Eie Risiko area largely provides residential erven. These erven ranges between 300m² and 320m² in size. Use is made of the simple grid block system as this layout form enables the local authority to install cost effective municipal services to the area while also catering for storm water management and gravity flow sewage system.

A number of business erven as well as a local authority and a GRN site are provided for in support of the urban area to be created. Neighbourhood parks are centrally provided within the residential pockets while larger open spaces are provided on flat and developable areas for the provision of informal sport fields and recreation areas. These areas are linked to the linear public open spaces as these are to form part of the larger urban open space system to be provided for within the eastern areas of Otjiwarongo.

In total 737 erven are provided for within the Eie Risiko Area. This requires that the area is divided into three township extensions.

The following three tables provide a summary of the land use allocation within the respective extensions.

Land Use Summary Table 4: Eie Risiko Proper

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	244	10.50	40.14
Institutional	1	0.20	0.75
Public Open Space	4	8.11	30.98
Street	Remainder	7.36	28.13
TOTAL	**249 & Remainder**	**26.16**	**100.00**

Land Use Summary Table 5: Eie Risiko Extension 1

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	187	7.97	34.57
Business	10	1.28	5.57
Government	1	0.39	1.70
Local Authority	1	0.42	1.83
Institutional	2	2.40	10.41
Public Open Space	7	3.04	13.20
Street	Remainder	7.54	32.71
TOTAL	**208 & Remainder**	**23.06**	**100.00**

Land Use Summary Table 6: Eie Risiko Extension 2

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	266	11.95	38.19
Residential 2	1	0.31	1.00
Business	2	0.55	1.77
Local Authority	2	1.29	4.13
Institutional	1	3.70	11.82
Public Open Space	5	3.44	10.98
Street	Remainder	10.04	32.11
TOTAL	**277 & Remainder**	**31.28**	**100.00**

3.3 Orwetoveni Extensions 16 to 23

The new extensions of Orwetoveni are positions to the east of Orwetoveni and the DRC urban areas.

The existing informal DRC development, which is to be formalised as part of the larger planning exercise, blocks the major link road which was planned to pass through Orwetoveni Extension

15 and the DRC area. As such the road link had to be re-aligned from Extension 15 and now follows a more easterly direction.

To maintain the mobility ring road which will enable traffic to easily move from either the B1 leading to Okahandja or then the B1 road section leading to Otavi to the fast expanding eastern areas of Otjiwarongo a new ring road has been provided for. This high mobility road is not to permit direct access onto residential erven (for traffic safety reasons) connects up with a light industrial and commercial cone to be provided for within the north eastern corner of the new urban development while also passing the proposed University site and Recreation Park areas.

Care was taken in the layout design to create effective road linkages into the existing urban areas while also permitting the town to expand further to the east. The natural topography, inclusive of the mountain ridge and drainage lines largely informed the layout design.

Central to the new urban area a mixed use node has been placed on a higher lying area. The development on higher commercial, institutional or mixed-use buildings within this area will largely contribute to the creation of a focal development area, the skyline of which will become a sense of space and identification of the eastern area of Otjiwarongo.

The average residential erf size increases from about 350m² in the northern area to 550m² in the south-eastern area. This is in line with the Otjiwarongo Structure Plan.

Schools, sport fields, neighbourhood parks and local authority sites for the development of markets are strategically positioned through the new area.

The natural drainage lines are accommodated within a linear network of interconnected open spaces. These areas are to be used for the provision of municipal services and to accommodate stormwater run-off during seasonal thunderstorm occurrences.

A well-defined road hierarchy network is used in support of the layout design. As such the streets widths within the residential pockets are generally 15 metres wide and to increase in width as more traffic is generated and channelled onto the major road connectors. The major roads are then to form activity spines along which public transport and private car movement as well as pedestrian traffic can take place within well designed (dual) roads supported street furniture and street liner buildings.

A larger institutional note has been designed on the higher lying grounds within the eastern urban edge. Here a university / VTC development and student village is to be provided which is supported by commercial activities normally required in support of students and higher education developments.

In total 2099 erven are provided for within the new Orwetoveni extension area. This requires that the area is divided into eight (8) township extensions.

The following three tables provide a summary of the land use allocation within the respective extensions.

Land Use Summary Table 7: Orwetoveni Extension 16

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	223	10.45	17.28
Residential 2	18	4.75	7.86
Business	16	4.36	7.20
Institutional	1	0.62	1.03
Public Open Space	14	26.52	43.87
Street	Remainder	13.76	22.75
TOTAL	**273 & Remainder**	**60.47**	**100.00**

Land Use Summary Table 8: Orwetoveni Extension 17

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	308	14.26	31.54
Institutional	3	9.42	20.84
Private Open Space	1	4.84	10.72
Public Open Space	6	2.30	5.09
Parking	1	0.66	1.46
Street	Remainder	13.72	30.35
TOTAL	**319 & Remainder**	**45.19**	**100.00**

Land Use Summary Table 9: Orwetoveni Extension 18

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	186	7.96	53.41
Residential 2	2	0.20	1.34
Business	4	0.60	4.02
Public Open Space	3	1.95	13.06
Street	Remainder	4.20	28.17
TOTAL	**195 & Remainder**	**14.90**	**100.00**

Land Use Summary Table 10: Orwetoveni Extension 19

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	237	12.33	26.46
Residential 2	2	0.80	1.71
Business	13	2.43	5.22
Industrial	3	2.19	4.70
Light Industrial	7	4.31	9.24
Institutional	2	1.09	2.33
Public Open Space	14	9.57	20.53
Street	Remainder	13.89	29.81
TOTAL	**278 & Remainder**	**46.61**	**100.00**

Land Use Summary Table 11: Orwetoveni Extension 20

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	191	4.97	16.93
Residential 2	15	3.22	10.97
Business	3	1.30	4.42
Government	1	0.31	1.06
Public Open Space	9	2.63	8.97
Street	Remainder	16.92	57.66
TOTAL	**219 & Remainder**	**29.34**	**100.00**

Land Use Summary Table 12: Orwetoveni Extension 21

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	249	12.39	19.10
Residential 2	3	1.29	1.99
Business	2	1.28	1.97
Local Authority	2	1.39	2.13
Government	1	0.71	1.10
Institutional	3	11.79	18.16
Private Open Space	1	11.28	17.37
Public Open Space	11	5.67	8.74
Street	Remainder	19.10	29.44
TOTAL	**272 & Remainder**	**64.90**	**100.00**

Land Use Summary Table 13: Orwetoveni Extension 22

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	244	10.67	26.22
Residential 2	3	0.42	1.04
Institutional	1	6.07	14.92
Private Open Space	1	7.25	17.81
Public Open Space	9	4.01	9.86
Street	Remainder	12.26	30.15
TOTAL	**258 & Remainder**	**40.68**	**100.00**

Land Use Summary Table 14: Orwetoveni Extension 23

Land Use	No of Erven	Area (ha)	Spatial Implication (%)
Residential 1	262	13.21	41.82
Residential 2	4	1.18	3.74
Business	4	1.16	3.68
Institutional	2	0.92	2.90
Local Authority	1	0.57	1.80
Public Open Space	7	4.02	12.72
Street	Remainder	10.53	33.35
TOTAL	**280 & Remainder**	**31.59**	**100.00**

3.4 DRC Extensions 4 and 5

The development of the DRC informal area did not follow and respect the initial lay-out plan prepared for the area as result of which a number of shelters and houses do encroach onto street reserves or straddle over two properties. The Council is however desirous to formalize the DRC development and as such an on-site layout rectification exercise will be undertaken; this will have the aim to formalize DRC Extensions 4 and 5.

3.5 Engineering services and Access Provision

The municipality of Otjiwarongo is responsible for the provision of water, sewage and electricity services to the residents. Water in the town is sourced from boreholes and is supplied by Namwater. Electricity is supplied by CENORED.

Access to the proposed new townships can be obtained via the internal street network of Otjiwarongo.

4 ROLES AND RESPONSIBILITIES

The proponent (Otjiwarongo Municipality) 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:

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

4.1 COUNCIL'S REPRESENTATIVE

The Otjiwarongo Municipality 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 Council's representative (CR). The Otjiwarongo Municipality may decide to assign this role to one person for the full duration of these developments, or may assign a different CR 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 4-1 Responsibilities of CR

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in **Table 5-1** are obtained/adhered to.	• Throughout the lifecycle of these developments
Making sure that the relevant provisions detailed in **Table 5-2** are addressed during planning and design phase.	• Planning and design phase
Monitoring the implementation of the EMP monthly.	• Construction • Operation and maintenance
Suspending/evicting individuals and/or equipment not complying with the EMP	• Construction • Operation and maintenance
Issuing fines for contravening EMP provisions	• Construction • Operation and maintenance

4.2 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/Otjiwarongo Municipality may decide to assign this role to one person for both phases, or 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 Otjiwarongo Municipality, CR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;
- Conducting site inspections (recommended minimum frequency is bi-annually) 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 CR on the removal of person(s) and/or equipment not complying with the provisions of this EMP;
- Making recommendations to the CR 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.

4.3 CONTRACTOR

Contractors appointed by the Otjiwarongo Municipality 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 5-3** applies to contractors appointed during the construction phase and **Table 5-4** to those appointed during the operation and maintenance phase. In order to ensure effective environmental management, the aforementioned chapters should be included in the applicable contracts for outsourced construction, operation and maintenance work.

The tables in the following chapter (**Chapter 5**) detail the management measures associated with the roles and responsibilities that have been laid out in this chapter.

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

5.1 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 township establishment and formalisation of various townships within Otjiwarongo, creation of street and installation of bulk services as outlined in **Section 4** of the Draft Environmental Scoping Report. 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 Otjiwarongo townlands area and that migrant labourers (if applicable) will be housed in established accommodation facilities within Otjiwarongo.
- No engineering designs have been carried out for the development of the associated services infrastructure (roads, potable water, storm water, sewerage and electrical reticulations).

5.2 APPLICABLE LEGISLATION

Legal provisions that have relevance to various aspects of these developments are listed in **Table 5-1** below. The legal instrument, applicable corresponding provisions and project relevance details are provided.

Table 5-1: 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.” Article 95(l) deals with the “maintenance of ecosystems,	Sustainable development should be at the forefront of this development.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	essential ecological processes and biological diversity" and sustainable use of the country's natural resources.	
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. 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. GN 30 provides the regulations governing the environmental assessment (EA) process.	**Activity 10.1 (a) (Infrastructure)** The construction of – Oil, water, gas and petrochemical and other bulk supply pipelines. **Activity 10.1 (b)** The construction of public roads. **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 EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
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 and Tourism (MET) Policy on HIV & AIDS	MET 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 have to 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.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
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 has to comply with provisions of the Local Authorities Act.
Labour Act no. 11 of 2007	Chapter 2 details the fundamental rights and protections. 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.
Roads Ordinance 17 of 1972	• Section 3.1 deals with width of proclaimed roads and road reserve boundaries • Section 27.1 is concerned with the control of traffic on urban trunk and main roads • Section 36.1 regulates rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads • 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 have to be managed within the legal confines.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Water Quality Guidelines for Drinking Water and Waste Water Treatment	Details specific quantities in terms of water quality determinants, which wastewater should be treated to before being discharged into the environment (see Appendix B).	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 ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.	This EIA considers this term of Environment.
Water Resources Management Act No. 11 of 2013	Part 12 deals with the control and protection of groundwater 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 Ministry of Agriculture, Water and Forestry.
Atmospheric Pollution Prevention Ordinance No 45 of 1965	Part II - control of noxious or offensive gases, Part III - atmospheric pollution by smoke, Part IV - dust control, and 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.

5.3 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 services infrastructure starts.

Table 5-2: Planning and design management actions

Aspect	Management Actions
Proposed Service Infrastructure	• It is advised that the proponent engages the services of an engineering professional to design and construct the service connections for the proposed developments. • Re-use of treated wastewater should be considered wherever possible to reduce the consumption of potable water.
Roads	• Make ample provision in road design for pedestrian walkways and speed bumps at crossing and busy nodes. • Ensure that road junctions have good sightlines. • Implement traffic control measures where necessary. • The following should be adhered to near any roads declared by the Roads Authority: o A 45-meter building restriction is to be respected along Trunk Roads; o A 60-meter road reserve is to be respected along roads; o Access which is connected to the Trunk Roads are to be designed and constructed in accordance with the standards and specifications of the Roads Authority.

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 in order to minimise the visual prominence of such a development within the more natural surrounding landscape. • Natural colours and building materials such as wood and stone should be incorporated as well as the use of indigenous vegetation in order to help beautify the development. • 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 management	• A Stormwater Management Plan should be developed by the Otjiwarongo Municipality for the townships and should address the following as a minimum: o Cumulative stormwater issues for the area o Areas which have previously been recognised for having stormwater issues o Areas which do not have formal stormwater drainage o Stormwater channels should be accommodated next to the road reserve as far as possible. o Stormwater run-off which could possibly be contaminated should be captures, drained and treated to sewage effluent standards. • Compilation of a map indicating the flood lines of the affected area to determine which structures are to be relocated.

5.4 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 5-3: 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: • Explanation of the importance of complying with the EMP. • Discussion of the potential environmental impacts of construction activities. • Employees' roles and responsibilities, including emergency preparedness. • Explanation of the mitigation measures that must be implemented when particular 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]. • The Contractor should compile a Plant Management Plan which should include the following as a minimum: ○ Trees if not already accounted for in an existing Geographic Information System (GIS), should be surveyed, co-ordinates/location incorporated into the Contractor's GIS, marked with paint (or other means to be readily visible) and protected; ○ Trees, which are impossible to conserve, need to be identified and their location recorded on a map; ○ The Contractor should apply to the local authority for a permit to remove these trees. ○ Special protection should be accorded to the protected endemic species, which are to be found within the development area.	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
		○ A list should be compiled of all trees to be removed detailing the erf on which they are located, the species as well as which plants will be planted to replace these. The nursery where these plants will be sourced from should also be included; ○ Each tree that is removed needs to be replaced with an indigenous tree species after construction; ○ Some of these trees can be obtained at the National Botanical Research Institute (NBRI) or at a commercial nursery. • Only a limited width +/- 5 m on the side of roads may be partially cleared of vegetation. • Workers are prohibited from collecting wood or other plant products on or near work sites. • No alien species may be planted on or near work areas.	
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 CR and the following should be considered in selecting these sites: • The areas designated for the services infrastructure should be used as far possible. • Second option should be degraded land. • Avoid sensitive areas (e.g. rivers/drainage lines).	Contractor and CR
Hazardous waste	Contamination of surface and groundwater sources.	• All heavy construction vehicles and equipment on site should be provided with a drip tray. • All heavy construction vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of construction vehicles should take place only at a designated workshop area.	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
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. Grey water should be recycled: ○ Used for dust suppression; ○ Used to water a vegetable garden, or to support a small nursery; ○ Used (reused) to clean equipment. • Grey water that is not recycled should be removed on a regular basis. • No dumping of waste products of any kind in or in close proximity to water bodies. • 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. • Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. • Drip trays must be placed underneath construction vehicles when not in use to contain all oil that might be leaking from these vehicles. • Contaminated runoff from the construction sites should be prevented from entering the surface and ground water bodies. • All materials on the construction site should be properly stored. • Disposal of waste from the sites should be properly managed and taken to the designated landfill site in Otjiwarongo. • 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. • Washing of personnel or any equipment should not be allowed on site. Should it be necessary to wash construction equipment these should be done at an	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
		area properly suited and prepared to receive and contain polluted waters.	
General waste	Visual impact and soil contamination	• The construction site should be kept tidy at all times. • All domestic and general construction waste produced on a daily basis should be cleaned and contained daily. • No waste may be buried or burned. • Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site. • All recyclable waste needs to be taken to the nearest recycling depot where practical. • A sufficient number of separate bins for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such. • Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter. • No waste may remain on site after the completion of the project.	Contractor
Topsoil	Loss of topsoil and associated opportunity costs	• When excavations are carried out, topsoil[2] should be stockpiled in a demarcated area. • 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). • In the event that no post-construction uses are requested, all excavated/degraded areas need to be rehabilitated as follows:	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
		○ 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. ○ Rehabilitated excavated areas need to match the contours of the existing landscape. ○ 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. ○ Topsoil is to be spread across excavated areas evenly. ○ Deep ripping of areas to be rehabilitated is required, not just simple scarification, so as to enable rip lines to hold water after heavy rainfall. ○ Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion.	
HIV/AIDS and TB training	Lack of awareness regarding implications of risky behaviour	The Contractor should approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS and TB education programmes periodically on site during the road construction phase.	Contractor
Road safety	Injury or loss of life	• Demarcate roads clearly. • Off-road driving should not be allowed. • All vehicles that transport materials to and from the site must be roadworthy. • Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules. • 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. • 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. • Demarcate excavated areas and topsoil stockpiles with danger tape.	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
		• All building materials and equipment are to be stored only within set out and demarcated work areas. • Only road construction personnel will be allowed within these work areas. • Comply with all waste related management actions stated above in this table.	

Ablutions	Non-compliance with Health and Safety Regulations	• Separate toilets should be available for men and women and should clearly be indicated as such.
		• Portable toilets (i.e. easily transportable) should be available at every construction site:
		  ○ 1 toilet for every 15 females.
		  ○ 1 toilet for every 30 males.
		  ○ Sewage needs to be removed on a regular basis to an approved (municipal) sewage disposal site in Otjiwarongo. Alternatively, sewage may be pumped into sealable containers and stored until it can be removed.
		  ○ 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. • All workers should have access to the relevant personal protective equipment (PPE). • Sufficient potable water reserves should be available to workers at all times. • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable). • No workers should be allowed to drink alcohol during work hours.	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
		• No workers should be allowed on site if under the influence of alcohol. • Building rubble and domestic waste should be stored in skips. • Condoms should be accessible/ available to all construction workers. • 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. • The use of waterless dust suppression means (e.g. lignosulphonate products such as Dustex) should be considered. • Cover any stockpiles with plastic to minimise windblown dust. • Dust protection masks should be provided to workers if they complain about dust.	Contractor
Noise	Nuisance impacts	Work hours should be restricted to between 08h00 and 17h00 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.	Contractor
Recruitment of labourers	Negative conflict regarding recruitment	The Contractor should compile a formal recruitment process including the following provisions as a minimum: • 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.). • Recruitment should not take place at construction sites. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside these agreed upon procedures.	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
		• Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the Otjiwarongo project area and only then look to surrounding towns. • 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: • 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. • How these I&APs will be consulted on an ongoing basis. • 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 CR must appoint an ECO to liaise between the Contractor, I&APs, Developer. • The Contractor shall at every monthly site meeting report on the status of the implementation of all provisions of the EMP. • The Contractor should implement the EMP awareness training as stipulated above in this table. • 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 CR before construction commences.	Contractor, ECO, CR

Environmental Feature	Impact	Management Actions	Responsible Person
		• The Communication Plan, once agreed upon by the Developer, shall be legally binding. • All communication with the I&APs must take place through the ECO. • A copy of the EMP must be available at the site office and should be accessible to all I&APs. • 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. • The Contractor should liaise with the Developer regarding all issues related to community consultation and negotiation before construction commences. • A procedure should be put in place to ensure that concerns raised have been followed-up and addressed. • 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 CR prior to the commencement of construction activities.	
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: ○ If operating machinery or equipment, stop work; ○ Demarcate the site with danger tape; ○ Determine GPS position if possible; ○ Report findings to the construction foreman; ○ Report findings, site location and actions taken to superintendent; ○ Cease any works in immediate vicinity; ○ Visit site and determine whether work can proceed without damage to findings; ○ Determine and demarcate exclusion boundary;	Contractor

Environmental Feature	Impact	Management Actions	Responsible Person
		○ Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist; ○ Inspect site and confirm addition to project GIS; ○ Advise the National Heritage Council of Namibia (NHCN) and request written permission to remove findings from work area; and ○ Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: ○ Apply the chance find procedure as described above; ○ Schedule a field inspection with an archaeologist to confirm that remains are human; ○ Advise and liaise with the NHCN and Police; and ○ Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.	

5.5 OPERATION AND MAINTENANCE PHASE

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

Table 5-4: 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 services infrastructure 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: • The incorporation of indigenous vegetation into road development. • To mark the area with appropriate road warning signs (e.g. the road curves to the left/right)	Proponent
Noise	Noise nuisance impact	The proponent should consult with the view to incorporate the relevant local/national/international guidelines to manage the generation of traffic noise in the development area.	Proponent

5.6 DECOMMISSIONING PHASE

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

Table 5-5: Decommissioning phase management actions

Environmental Feature	Management Actions
Deconstruction activity	Many of the mitigation measures prescribed for construction activity for these developments **(Table 5-3** above**)** would be applicable to some of the decommissioning activities. These should be adhered to where applicable.
Rehabilitation	In the event that decommissioning is deemed necessary, excavations need to be rehabilitated according to the management actions laid out in **Table 5-3** above.

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 • Contractors provided with suitable lay-down and materials camp areas • Construction site to be kept tidy at all times • 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) • Recruitment to be done in accordance with Labour Act		
Vegetation Management	• Compilation of Tree Management Plan • Removal of trees should be limited and not to include protected species • Approval to be obtained from the Directorate of Forestry for removal of trees • 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 • Waste containers/bins regularly removed from site • Waste regularly taken to nearest landfill • 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 • Topsoil used to rehabilitate post-construction degraded areas		
General Health and Safety	• HIV/AIDS and TB education programmes provided to contract workers • 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 • Excavated areas- demarcated, not left open for long periods		
Dust	• Dust suppression means utilised • Stockpiles covered with plastic • 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 5-6: 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