

Environmental Management Plan for

*Township Establishments of
Engela Omafo Extensions 1, 2, 3,
4, 5, 6, 7, 8 and 9, in Helao Nafidi,
Ohangwena Region.*

May 2024




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ABBREVIATIONS

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

1 INTRODUCTION

An initial Environmental Clearance Certificate dated 09 February 2016 was granted to the Helao Nafidi Town Council by the Ministry of Environment and Tourism for the establishment of 9 townships namely; Engela-Omafo Extensions 1, 2, 3, 4, 5, 6, 7, 8 and 9, in Helao Nafidi.

The Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the above activity was conducted by Africa Planning Forum CC (APF) in collaboration with GCS Water and Environmental Engineering Namibia in 2016. Following the submission of the final Environmental Assessment Report, the ECC was granted as per letter the dated 09 February 2016 (Appendix C). In accordance with the Environmental Management Act No. 7 of 2007 and the Environmental Impact Assessment Regulations of 2012, the ECC is only valid for three years, and as such, it has expired.

GCS Water and Environmental Engineering Namibia was appointed to apply on their behalf to the Ministry of Environment, Forestry, and Tourism (MEFT) for the renewal of the ECC of the proposed development. The ECC was then granted as per the letter dated 14 May 2019 (Appendix C), ECC is only valid for three years, and as such, it has expired.

The proponent (Helao Nafidi Town Council) has thus appointed Stubenrauch Planning Consultants (SPC) to apply on their behalf to the Ministry of Environment, Forestry, and Tourism (MEFT) for the renewal of the ECC.

The approved EMP, which was initially submitted to MEFT, was drafted in 2016 and updated in 2019 for the first renewal and has subsequently been updated. The construction activities have commenced on site and are still ongoing; therefore, the environmental impacts assessed, and mitigation measures have been updated in this Environmental Management Plan. The EMP is herewith updated as part of the application to apply for the ECC renewal for the above proposed activities.

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 of 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 the development 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 as well as any other construction process(s) within the development areas;
- Operation and Maintenance – the period during which the development 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 these townships.

The decommissioning of these developments is not envisaged; however in the event that this should be considered some recommendations have been outlined in **Table 4-6**.

2 DEVELOPMENT DESCRIPTION

2.1 Engela-Omafo Extension 1-9

2.1.1 Locality

The proposed townships are located north-east of Engela-Omafo and east of the B1 national road, which forms the western boundary, while the proposed new bypass forms the eastern boundary. The northern boundary is formed by the Eliakim Namundjebo Street, better known locally as “Michael Jackson Drive”, the road leading to the Omuloka village forms the southern boundary (See **Figure 2-1 and 2-2** below for the locality map of the extensions).

2.1.2 Proposed Development

The proposed development involves the establishment of 9 townships namely; Engela-Omafo Extensions 1, 2, 3, 4, 5, 6, 7, 8, and 9, creation of streets and installation of bulk services in the proposed 9 townships, in Helao Nafidi.

The proposed extensions will make provision for Residential, General Residential, General Business, Local Authority, Institutional, Government, Private and Public Open Space zoned erven. The map below indicates the overall layout for the proposed townships.

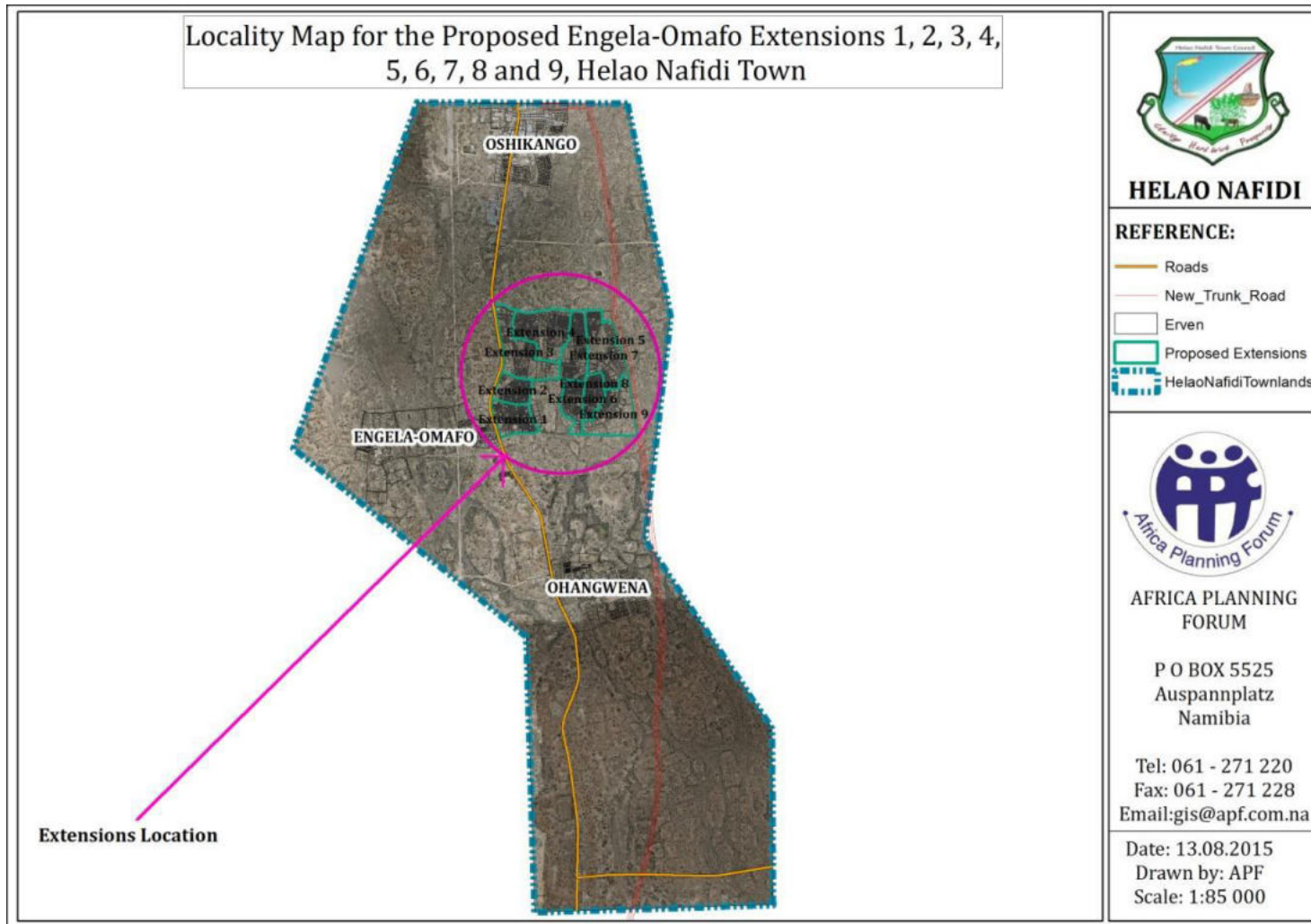


Figure 2-1: Locality map of proposed developments

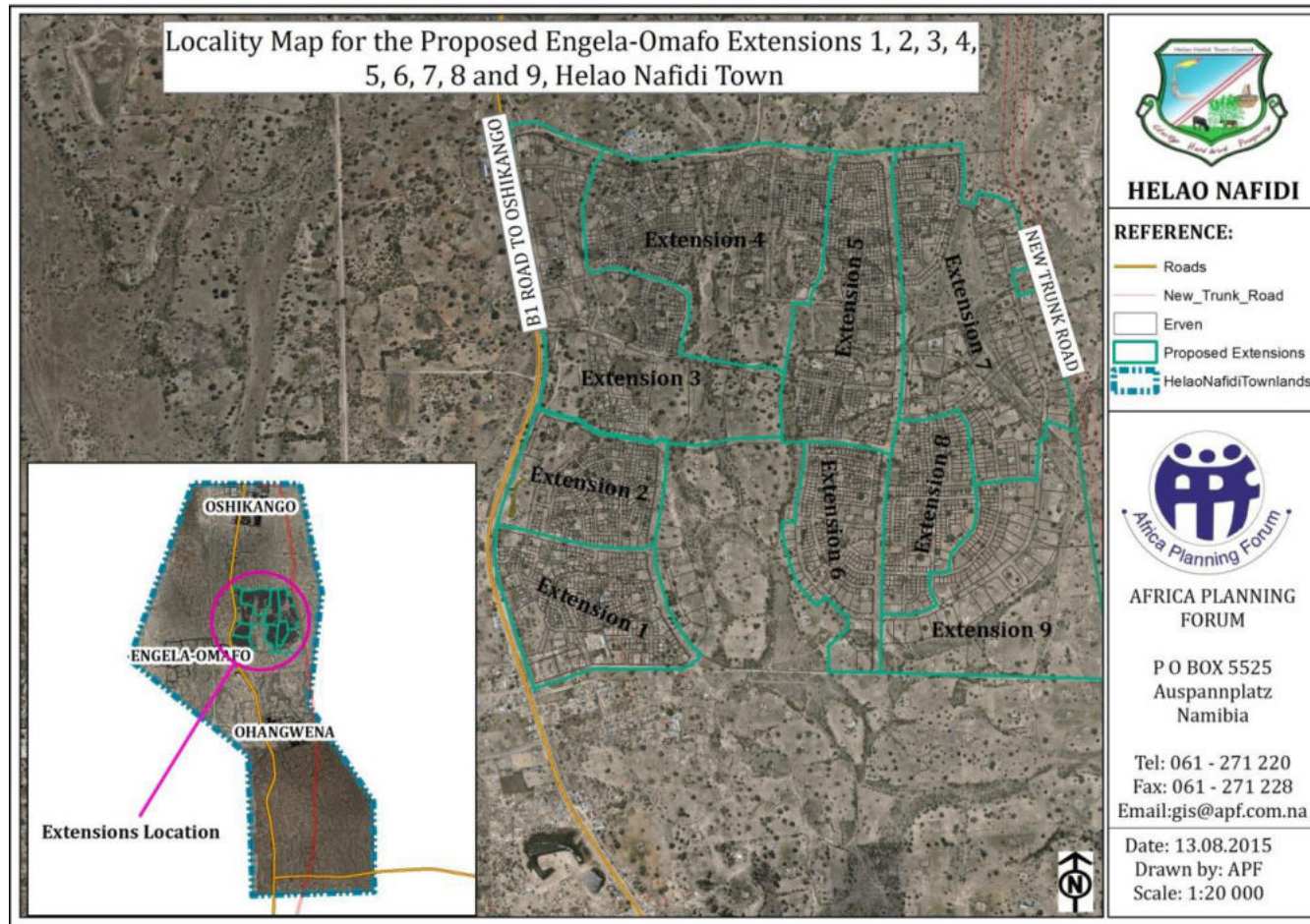


Figure 2-2: Locality map of proposed developments (Close Up)

2.1.3 Informants

The following informants were considered when preparing the layout designs for the proposed townships:

- Formalize the existing retail and residential developments as far as possible.
- To create residential erven generally above 330m².
- To create activity and mixed use corridors connecting activity nodes with one another.
- The greater Helao Nafidi is subject to seasonal flooding as it falls within the Cuvelai Basin. The layout design will incorporate all the lower lying areas which form part of the greater flood drainage system as well as the permanent water containment areas within Public Open Space.
- To respect the natural vegetation. The area is dotted with trees ranging from Makalani Palms, Marula and Mopane. The trees will be respected to the greatest degree possible, making sure they do not fall within road reserves which would see them removed. All the largest mature trees will be incorporated to form part of Public Open Spaces where they can serve as a public amenity.
- It is important that an engineering flood study is under taken for the proper and safe management of storm water in the area.
- Encourage sustainability by creating urban farming opportunities.
- Provide opportunities for institutional, recreational and commercial activities.
- Provide a well-defined road network.
- Respect the proposed Bypass alignment.

In terms of the above informants the various zoning maps were produced for the extensions (Please see the individual zoning maps of the extensions **Figures 2-3, 2-4 and 2-5** for the composite zoning maps).

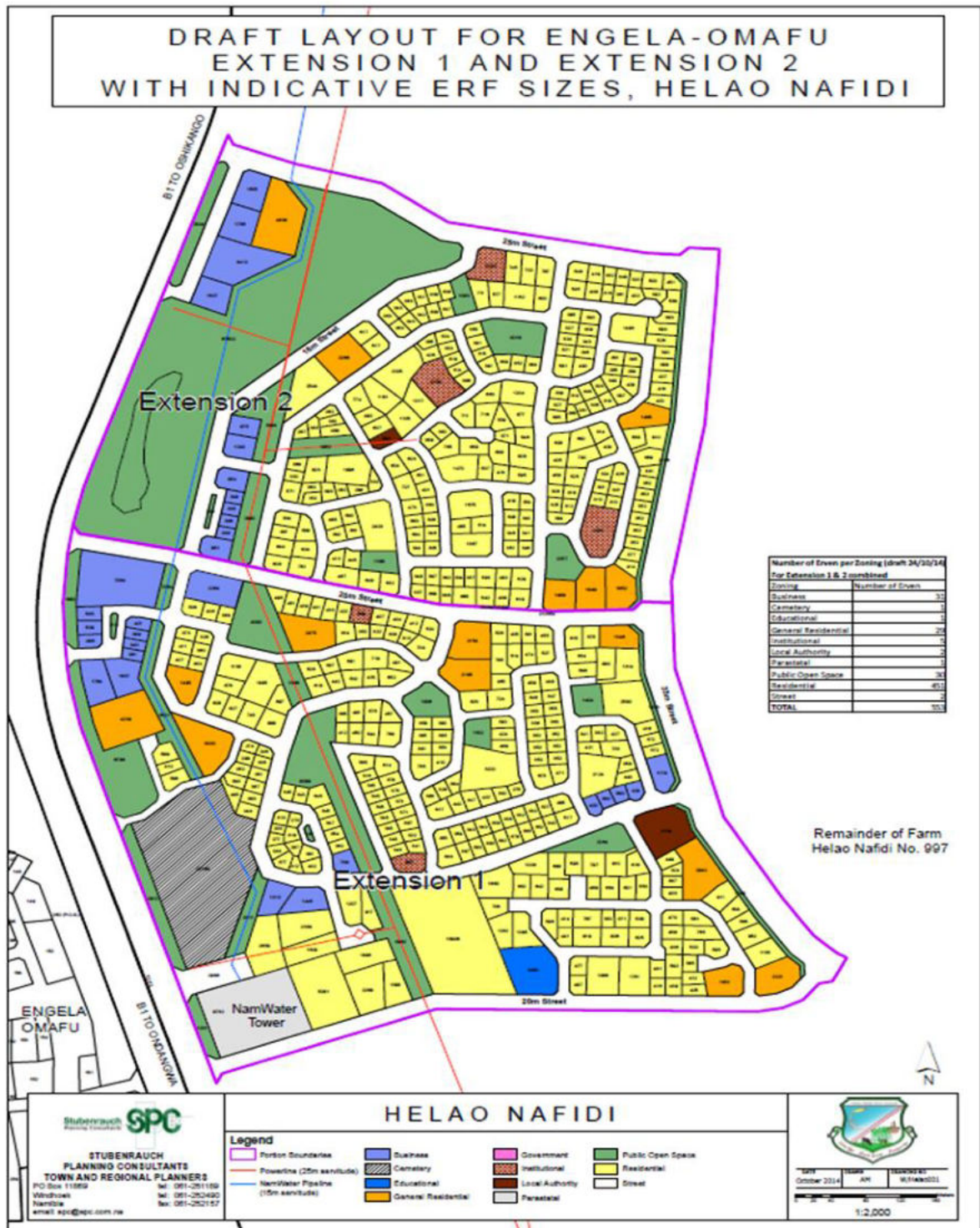


Figure 2-3: Planning layout for Engela-Omafufu Extensions 1 and 2

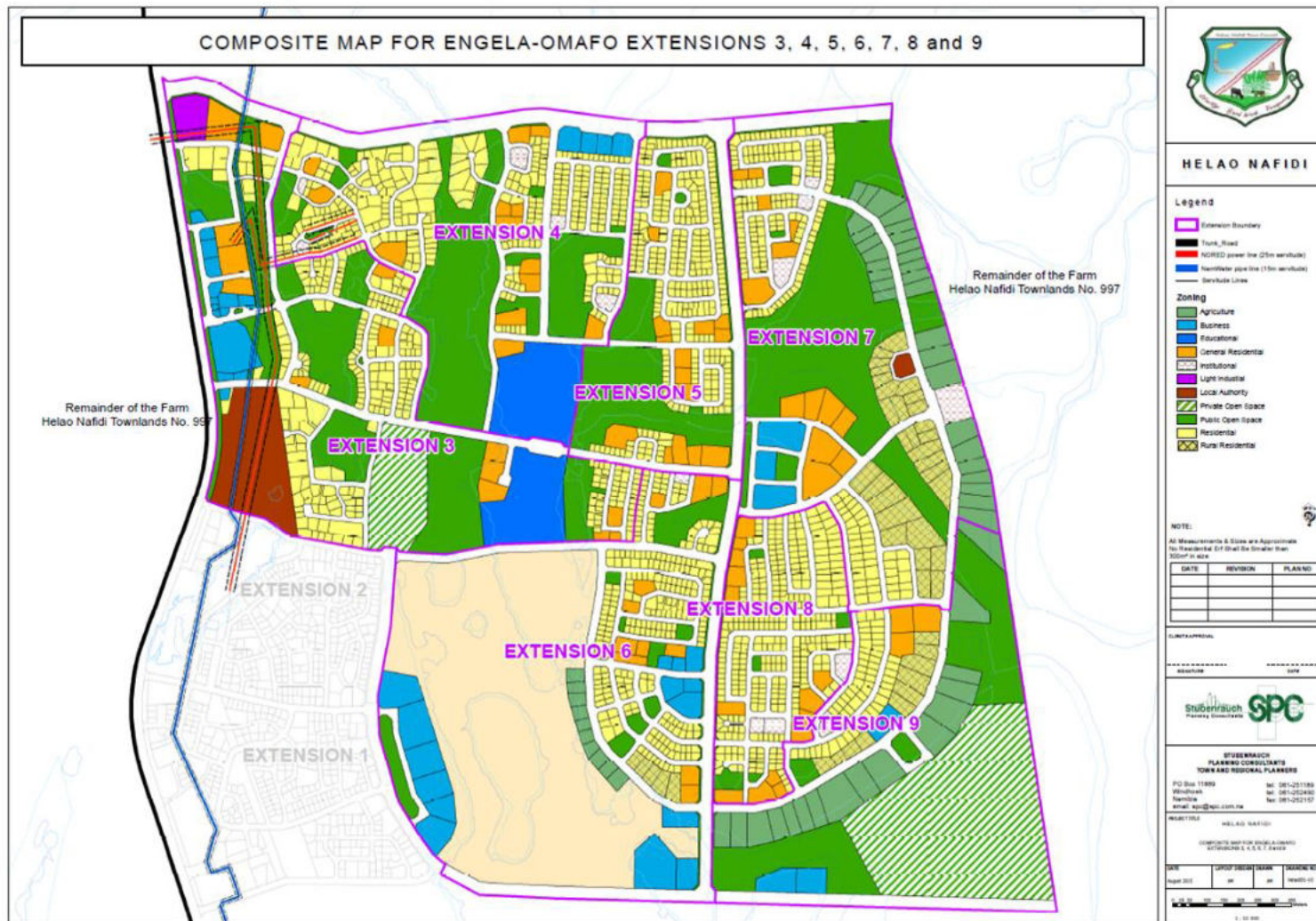


Figure 2-4: Planning layout for Engela-Omafo Extensions 3 to 9

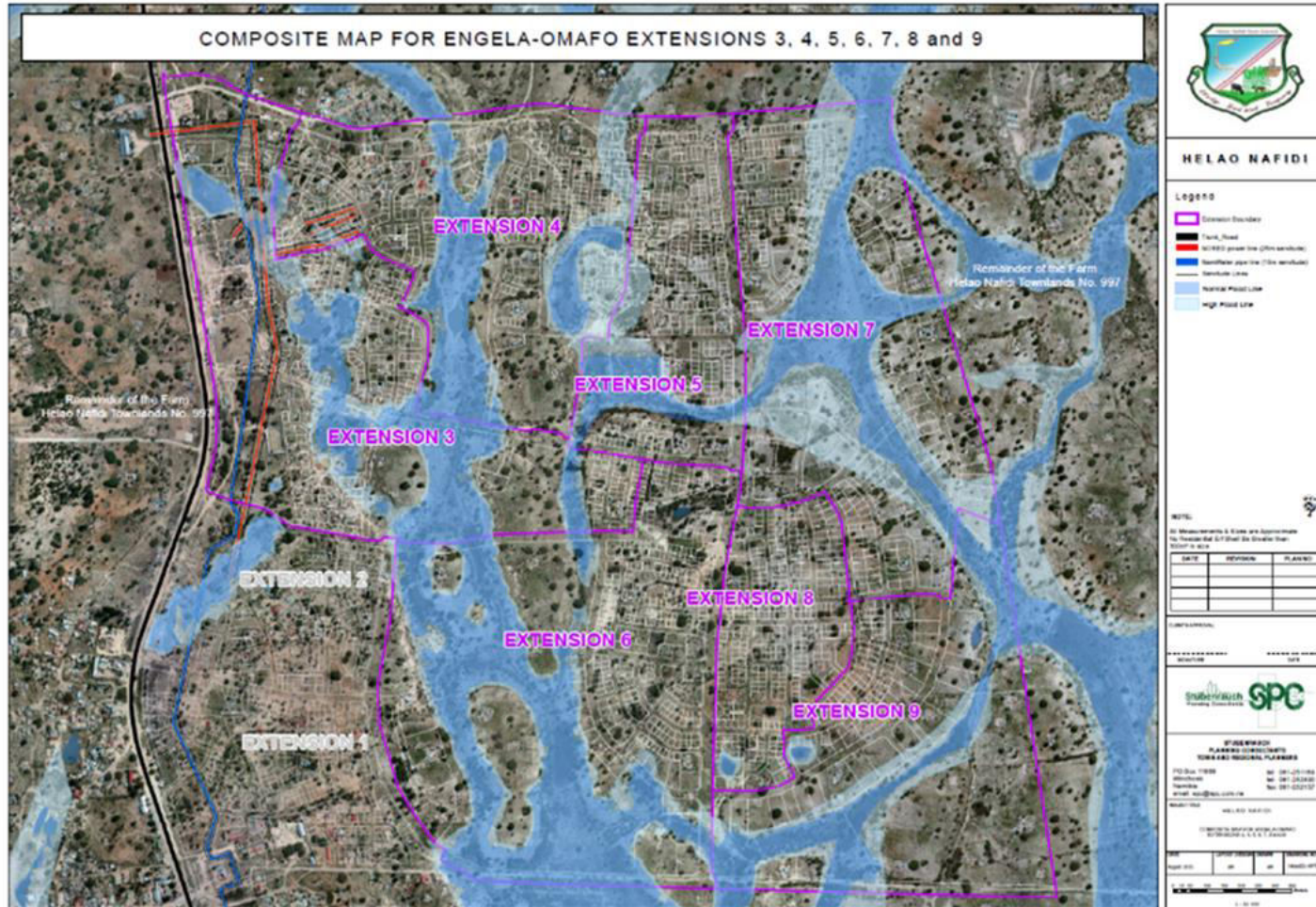


Figure 2-5: Display of areas within the proposed developments affected by annual flooding.

Table 2-1: Engela-Omafo Extensions 1, 2, 3, 4, 5, 6, 7, 8, and 9

Zoning	Ext 1 & 2	Ext 3	Ext 4	Ext 5	Ext 6	Ext 7	Ext 8	Ext 9	TOTAL
Residential	451	273	330	315	270	206	333	58	2236
General Residential	29	14	13	15	11	14	14	3	113
Rural Residential					5	29		10	44
Business	31	16	4		15	3		4	73
Government									
Educational	1	1	1						3
Hospitality									
Institutional	5		5		1	3	3	1	18
Local Authority	2	1				1			4
<u>Parastatal</u>	1								1
Light Industrial		1							1
Agriculture					10	29		16	55
Cemetery	1								1
Private Open Space		1						1	2
Public Open Space	30	18	11	5	15	9	7	4	99
Undetermined					1				1
Street	2	1	1	1	1	1	1	1	9
TOTAL	553	326	365	336	329	295	358	98	2660

3 ROLES AND RESPONSIBILITIES

The HNTC (the Developer) 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 HNTC 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 PROPONENTS’S REPRESENTATIVE

The proponent 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 (PR). The proponent 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 PR’s responsibilities are as follows:

Table 3-1 Responsibilities of PR

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in Table 4-1 are obtained/adhered to.	<ul style="list-style-type: none"> • Throughout the lifecycle of these developments
Making sure that the relevant provisions detailed in Table 4-3 are addressed during planning and design phase.	<ul style="list-style-type: none"> • Planning and design phase
Monitoring the implementation of the EMP monthly.	<ul style="list-style-type: none"> • Construction • Operation and maintenance
Suspending/evicting individuals and/or equipment not complying with the EMP	<ul style="list-style-type: none"> • Construction • Operation and maintenance
Issuing fines for contravening EMP provisions	<ul style="list-style-type: none"> • Construction • Operation and maintenance

3.2 ENVIRONMENTAL CONTROL OFFICER

The PR 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 PR/ proponent 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 PR, 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 proponent 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 4-4** applies to contractors appointed during the construction phase and **Table 4-5** 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 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 4-3**);
- Construction phase management actions (**Table 4-4**);
- Operation and maintenance phase management actions (**Table 4-5**); and
- Decommissioning phase management actions (**Table 4-6**).
- The proponent should assess these **commitments** in detail and should acknowledge their commitment to the specific management actions detailed in the tables below.

The responsible persons at the HNTC 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 above-mentioned proposed project activities. SPC will not be held responsible for the potential consequences that may result from any alterations to the above-mentioned layouts.
- It is assumed that construction labourers will be sourced mostly from the HN townlands areas and that migrant labourers (if applicable) will be housed in established accommodation facilities within Helao Nafidi townlands.
- Engineering designs have been carried out for the development of the associated services infrastructure (roads, potable water, storm water, sewerage and electrical reticulations) and they are ongoing.

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	<p>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.”</p> <p>Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.</p>	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	<p>Section 2 outlines the objective of the Act and the means to achieve that.</p> <p>Section 3 details the principle of Environmental Management</p>	The development should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	<p>GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.</p> <p>GN 30 provides the regulations governing the environmental assessment (EA) process.</p>	<p>The following listed activities are triggered by the proposed development:</p> <p>Activity 5.1 (d) (Land Use and Development)</p> <p>Activity 8.8 (Water resource developments)</p> <p>Activity 10.1 (a) (Infrastructure)</p> <p>Activity 10.1 (b) (Infrastructure)</p> <p>Activity 10.2 (a) Infrastructure</p> <p>Activity 11.2 (Other activities)</p>
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.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
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 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.
Urban and Regional Planning Act No 5 of 2018	To consolidate the laws relating to urban and regional planning; to provide for a legal framework for spatial planning in Namibia; to provide for principles and standards of spatial planning; to establish the urban and regional planning board; to decentralise certain matters relating to spatial planning; to provide for the preparation, approval and review of the national spatial development framework, regional structure plans and urban structure plans; to provide for the preparation, approval, review and amendment of zoning schemes; to provide for the establishment of townships; to provide for the alteration of boundaries of approved townships, to provide for the disestablishment of approved townships; to provide for the change of name of approved townships; to provide for the subdivision and consolidation of land; to provide for the alteration, suspension and deletion of conditions relating to land; and to provide for incidental matters.	The proposed development must adhere to the provisions regarding the subdivision and rezoning of land.

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 must 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	<ul style="list-style-type: none"> • 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	Contractors and users of the proposed development are to comply with these legal requirements.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	the Public Health Act 36 of 1919 (SA GG 979).	
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 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 Land Reform.
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. 1 of 1923), Preservation of Trees and Forests Ordinance, 1952 (Ordinance No. 37 of 1952) and the	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.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	Forest Act, 1968 (Act No. 72 of 1968); and to deal with incidental matters.	
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).
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 ENVIRONMENTAL ASSESSMENT GUIDELINES

Additional guidance is recommended for erven with the following zonings:

- Agricultural
- Industrial

Brief guidance is provided on prohibited activities as well as those requiring permission from the Department of Environmental Affairs in the form of an ECC. This chapter should be read in conjunction with the HN Conditions of Establishment document and the EIA Regulations.

Table 4-2: Environmental Assessment guidelines for agricultural and industrial erven

Development	Management Actions
Agricultural erven	<ul style="list-style-type: none"> • All activities listed under the definition for “noxious industries” by virtue of the distance to the nearest residential erven, should not be allowed. • As stated in Error! Reference source not found. EA is required for all activities listed in GG No. 4878 GN No. 29 “List of activities that may not be undertaken without Environmental Clearance Certificate”. • Confined Animal Feeding Operations (as opposed to free range operations) should be subject to EA and ECC. • With respect to wastewater management, the EA should consider as a minimum national wastewater quality guidelines (see Appendix B).
Industrial erven	<ul style="list-style-type: none"> • All activities listed under the definition for “noxious industries by virtue of the distance to the nearest residential erven, should not be allowed. • EA is required for all activities listed in GG No. 4878 GN No. 29 • With respect to waste management, water and air quality in particular, where applicable the EA should consider as a minimum the following: <ul style="list-style-type: none"> ○ The national wastewater quality guidelines (see Appendix B). ○ Air quality standards in keeping with those of the World Health Organisation or other internationally accepted standards. • If the existing industrial activity located along the northwest boundary of Engela-Omafo Extension 3 requires the storage of more than 30 cubic metres of fuel, an EA will be required.

It is recommended that the HNTC include the applicable provisions from **Table 4-2** above within the title deeds of affected erven to be sold.

4.4 PLANNING AND DESIGN PHASE

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

Table 4-3: Planning and design management actions

Aspect	Management Actions	Person Responsible
Traffic	<ul style="list-style-type: none"> • Ensure that road junctions have good sightlines. • Provide formal road crossings at relevant areas. • Provide for speed reducing interventions such as speed bumps at relevant road sections. 	Proponent, Contractor
Existing Service Infrastructure	<ul style="list-style-type: none"> • It is recommended that alternative and renewable sources of energy be explored and introduced into the proposed development to reduce dependency on the grid. • Solar geysers and panels should be considered to provide for general lighting and heating of water and buildings. • Water saving mechanisms should be considered for incorporation within the developments in order to further reduce water demands. • Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water. 	Proponent, Contractor
EMP Implementation	<ul style="list-style-type: none"> • The Proponent needs is to appoint a Developer’s Representative (DR) to manage all aspects of these developments for all development phases and to ensure the implementation of the EMP 	HNTPC (Proponent)
EMP training	<ul style="list-style-type: none"> • All construction workers are to undergo EMP training that should include as a minimum the following: <ul style="list-style-type: none"> ○ 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. 	DR, Contractor

Aspect	Management Actions	Person Responsible
Storm water	<ul style="list-style-type: none"> • The areas bounded by “Normal Flood Lines” (see Figure 2-5) should be incorporated into areas zoned “Public Open Space”. • The Developer should appoint professional engineer to design a detailed storm water management system as part of the infrastructure service provision for the developments. The system should as a minimum address the following: <ul style="list-style-type: none"> ○ Existing storm water infrastructure should be upgraded in line with the design of the storm water management system. ○ Canalising of run-off with concrete should be avoided as far as possible and natural run-off surfaces utilised or enhanced. ○ Where feasible and practical permeable/natural road shoulder and other run-off surfaces should be considered – minimise paved or impermeable areas. • Run-off from areas where surface water might become contaminated should be captured, detained and treated to sewage effluent standards (agricultural erven). 	Storm water
Roads	<ul style="list-style-type: none"> • Make ample provision in road design for pedestrian walkways and crossing especially near schools and busy/business nodes 	HNTC (Proponent), Contractor
Wastewater	<ul style="list-style-type: none"> • The development of the proposed wastewater treatment facility, which will be designed to accommodate the wastewater from the proposed developments, should undergo an EA. • The Developer should appoint a professional engineer to design the required aspects for the increase demand for wastewater treatment. These designs should consider as a minimum the following: <ul style="list-style-type: none"> ○ Sewerage lines should not be laid within river channels. ○ Sewer pipes should avoid crossing rivers. Where this is not possible the design should comply with the South African Bureau of Standards 1200 for sewer pipe designs. 	HNTC (Proponent)

Aspect	Management Actions	Person Responsible
	<ul style="list-style-type: none"> Water reclamation should be investigated and if feasible and practical incorporated into the new design of the sewerage system. 	
Borrow Pit	<ul style="list-style-type: none"> Building sand needs to be sourced from borrow pit with a valid ECC 	DR, Contractor, ECO
HNTC staffing capacity	<ul style="list-style-type: none"> A sufficient number of adequately qualified staff should be appointed to cater for increased demand for infrastructure maintenance (particularly storm water, wastewater and potable water reticulation) upon completion of construction of such services. 	HNTC (Proponent)
Socio-economic	<ul style="list-style-type: none"> The HNTC should appoint an experienced social impact assessment practitioner to compile a Relocation Action Plan to guide the relocation of HN residents from Oshikango to Engela-Omafo. 	HNTC (Proponent)

4.5 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 4-4: Construction phase management actions

Environmental Feature	Impact	Management Actions	Person Responsible
VEGETATION MANAGEMENT			
Conservation of vegetation	Loss of biodiversity	<ul style="list-style-type: none"> • The layout and development design should incorporate existing trees¹. • The Contractor should compile a Tree 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 so as 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 the protected tree species, which are to be found within the development area. • 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 trees will be planted to replace these. The nursery where these trees will be sourced from should also be included; • Each tree that is removed needs to be replaced with an indigenous tree species after construction; • Only a limited width +/- 5 m on the side of roads may be partially cleared of vegetation. 	Contractor, ECO, DR

¹a “tree” is defined as an indigenous woody perennial plant with a trunk diameter ≥150 mm

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Suitable locations for the contractors lay-down areas and materials camp should be identified with the assistance of the DR and the following should be considered in selecting these sites: <ul style="list-style-type: none"> 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, DR
WASTE MANAGEMENT			
Hazardous waste	Contamination of surface and groundwater sources.	<ul style="list-style-type: none"> 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
General waste	Visual impact and soil contamination	<ul style="list-style-type: none"> 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. 	Contractor

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> • Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter. • No waste/construction debris may remain on site after the completion of the project. 	
GROUND AND SURFACE WATER MANAGEMENT			
Water, Sewage and grey water	Contamination of surface and groundwater sources and water wasting	<ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 1. Used for dust suppression; 2. Used to water a vegetable garden, or to support a small nursery; 3. Used (reused) to clean equipment. • Grey water that is not recycled should be removed on a regular basis. • It is recommended that construction takes place outside of the rainy season in order to limit flooding on site and surface and ground water pollution. • 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. 	Contractor

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> • 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. • 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 area properly suited and prepared to receive and contain polluted waters. 	
BORROW PIT MANAGEMENT			
Topsoil	Loss of topsoil and associated opportunity costs	<ul style="list-style-type: none"> • When excavations are carried out, topsoil² 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. • It is recommended that construction takes place outside of the rainy season in order to minimise soil erosion. 	Contractor
Rehabilitation	Visual impact	<ul style="list-style-type: none"> • 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

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

Environmental Feature	Impact	Management Actions	Person Responsible
		<ol style="list-style-type: none"> 1. 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. 2. Rehabilitated excavated areas need to match the contours of the existing landscape. 3. 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. 4. Topsoil is to be spread across excavated areas evenly. 5. 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. 6. Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion. 	
GENERAL HEALTH AND SAFETY MANAGEMENT			
HIV/AIDS and TB training	Lack of awareness regarding implications of risky behaviour	<ul style="list-style-type: none"> • 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 construction phase. 	Contractor
Road safety	Injury or loss of life	<ul style="list-style-type: none"> • 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

Environmental Feature	Impact	Management Actions	Person Responsible
Safety around work sites	Injury or loss of life	<ul style="list-style-type: none"> • 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. • All building materials and equipment are to be stored only within set out and demarcated work areas. • Only construction personnel will be allowed within these work areas. • Comply with all waste related management actions stated above in this table. • A qualified traffic controller should be onsite always to direct the movement of other passenger vehicles as construction will be on-going. 	Contractor
Ablutions	Non-compliance with Health and Safety Regulations	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➤ 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. 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	<ul style="list-style-type: none"> • No open fires may be made anywhere on site. 	Contractor

Environmental Feature	Impact	Management Actions	Person Responsible
General health and safety	Injury or loss of life	<ul style="list-style-type: none"> • 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. • 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. 	Contractor
NOISE AND EMISSION MANAGEMENT			
Dust	Nuisance and health impacts	<ul style="list-style-type: none"> • A watering truck should be used on gravel roads with the most heavy 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

Environmental Feature	Impact	Management Actions	Person Responsible
Noise	Nuisance impacts	<ul style="list-style-type: none"> • 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
LABOUR AND RECRUITMENT MANAGEMENT			
Recruitment of labourers	Negative conflict regarding recruitment	<ul style="list-style-type: none"> • The Contractor should compile a formal recruitment process including the following provisions as a minimum: <ul style="list-style-type: none"> ➢ 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. ➢ Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the project area and only then look to surrounding towns. ➢ Clearly explain to all job-seekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary. 	Contractor, DR
COMMUNICATION MANAGEMENT			
Communication plan	Negative conflict with I&APs	<ul style="list-style-type: none"> • The Contractor or proponent should draft a Communication Plan, which should outline as a minimum the following: 	Contractor/ Proponent

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> • 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. 	
General communication	Negative conflict with I&APs	<ul style="list-style-type: none"> • The DR 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 DR before construction commences. • 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. 	DR,ECO, Contractor

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> • 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 Council 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 DR prior to the commencement of construction activities. 	
NATIONAL HERITAGE AND ARCHEOLOGY MANAGEMENT			
Archaeology	Loss of heritage resources	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➤ 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, ECO

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> ➤ 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: <ol style="list-style-type: none"> 1. Apply the chance find procedure as described above; 2. Schedule a field inspection with an archaeologist to confirm that remains are human; 3. Advise and liaise with the NHCN and Police; and 4. Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory. 	

4.6 OPERATION AND MAINTENANCE PHASE

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

Table 4-5: Operation and maintenance management actions

Environmental Feature	Impact	Management Actions	Person Responsible
WATER AND WASTEWATER MANAGEMENT			
Water	Surface and groundwater contamination	Ensure that surface water run-off accumulating on each portion is channeled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment.	Contractor, ECO
Sewage and grey water	Contamination of surface and groundwater sources and water wasting	<ul style="list-style-type: none"> • Do not allow the sewage (black water) to be discharged directly onto open soil. • Sewage pipelines must be regularly inspected to detect and prevent any leakages that could contaminate underground water sources. • The wash water (grey water) collected from the operations and maintenance activities on each portion should not be left standing for long periods of time as this promotes parasite and bacterial proliferation. Grey water should be recycled: <ol style="list-style-type: none"> 1. Used for dust suppression; 2. Used to water a vegetable garden, or to support a small nursery; 3. Used (reused) to clean the operation and maintenance equipment. • Grey water that is not recycled should be removed on a regular basis and channelled to the wastewater treatment facility. • Functional storm water drainage systems must be designed to prevent flooding or water bodies that stand for long periods of time so as to prevent them from being breeding grounds for mosquitoes and other disease-causing vectors and parasites and to avoid small animals from drowning. • No dumping of waste products of any kind in or near water bodies during the operation and maintenance activities of each unit. • Heavy operation and maintenance vehicles should be kept out of any water bodies and the movement 	Contractor, ECO

Environmental Feature	Impact	Management Actions	Person Responsible
		<p>of these vehicles should be limited where possible to the existing roads and tracks.</p> <ul style="list-style-type: none"> • Ensure that oil/ fuel spillages from vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. • Drip trays must be placed underneath vehicles when not in use to contain all oil that might be leaking from these vehicles. • Contaminated runoff from the units should be prevented from entering the surface and ground water bodies. • All materials on the units should be properly stored. • Disposal of solid waste resulting from the activities on the units should be properly managed and taken to the designated landfill site. • Workers should be given ablution facilities at the subject site and should be regularly serviced. • It is advised that the potential owners of the plots install self-contained Wastewater Treatment Systems which are more environmentally friendly. • Regular maintenance and upkeep of the Wastewater Treatment System should be conducted in order to ensure optimal functioning and reduce the potential for pollution. 	
Agricultural Activities	Contamination of surface and groundwater sources	<ul style="list-style-type: none"> • Measures to minimize the infiltration of agricultural activity to be implemented to avoid groundwater contamination. • Provision of chemical storage for crop farming. • Appropriate disposal of chemicals used in agricultural activities. • Strict adherence to packaging instructions when using fertilizers and chemicals for crop farming and related activities. • Effective irrigation scheduling should be practiced to enhance drainage of the soil and to conserve water. 	Contractor
WASTE MANAGEMENT			

Environmental Feature	Impact	Management Actions	Person Responsible
Hazardous waste	Contamination of surface and groundwater sources.	<ul style="list-style-type: none"> • All heavy vehicles and equipment on each portion should be provided with a drip tray. • All heavy vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of vehicles should take place only at a designated workshop area. • The workshop area should be lined with concrete. • The workshop should have an oil-water separator for collecting run-off from washing. • Spilled concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers. • All hazardous substances (e.g. fuel etc.) or chemicals should be stored in a specific location on an impermeable surface which is bunded. • Documentary evidence must be maintained to demonstrate that all Hazardous waste has been managed in a responsible and appropriate manner. 	Contractor, ECO
General waste	Visual impact and soil contamination	<ul style="list-style-type: none"> • The portions should be always kept tidy. All domestic and general waste produced daily should be cleaned and contained daily. • No waste may be buried or burned. • Waste containers (bins) should be emptied regularly and removed from the units to a recognised (municipal) waste disposal site such as incineration plants, landfills, and various types of recycling facilities (including composting plants). • 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 each portion. These should be clearly marked as such. • Labourers should be sensitised to dispose of waste in a responsible manner and not to litter. 	Contractor, ECO

Environmental Feature	Impact	Management Actions	Person Responsible
		<ul style="list-style-type: none"> • The principal of reducing, reusing and recycling of waste products wherever possible must be encouraged and emphasised during the operational phase of this development in order to achieve sustainable levels of waste production and reduction. • Pollution prevention and waste minimisation programs must be developed, implemented and maintained to eliminate, reduce, reuse, recycle, treat or appropriately dispose of all waste. • Environmental wastes, discharges and emissions are to be identified, monitored and reported where appropriate to ensure compliance with regulatory requirements. 	
VISUAL IMPACTS AND NOISE MANAGEMENT			
Aesthetics	Visual impacts	<p>The proponent should consult with a view to incorporate the relevant local/national/international development guidelines which addresses the following:</p> <ol style="list-style-type: none"> 1. The incorporation of indigenous vegetation into the development. 2. To mark the area with appropriate road warning signs (e.g. the road curves to the left/right). 	Proponent
Noise	Noise nuisance impact	<p>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.</p>	Proponent
VEGETATION MANAGEMENT			
Activities on site	Fauna and Flora Impacts	<ul style="list-style-type: none"> • Existing tracks should be used to access the site to prevent further damage to adjacent natural vegetation. • The proposed development should be restricted to the proposed footprint area. • Spraying of chemicals and application of fertilizers should be done according to standards. 	Proponent

4.7 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 4-6: Decommissioning phase management actions

Environmental Feature	Management Actions
Deconstruction activity	Many of the mitigation measures prescribed for construction activity for these developments (Table 4-4 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 4-4 above.

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 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 1 April 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 ₂ S	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 dm³ 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
Antimony	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 below note	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: Phosphates 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 (Igravimetric 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 O₂.

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Recycling of grey water 		
Borrow pit Management	<ul style="list-style-type: none"> • During excavations – topsoil stockpiled in demarcated area • Topsoil used to rehabilitate post-construction degraded areas 		
General Health and Safety	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Dust suppression means utilised • Stockpiles covered with plastic • Dust protection masks provided to workers (if complain about dust) 		
Noise	<ul style="list-style-type: none"> • Work hours 08h00 to 17h00 		
Communication	<ul style="list-style-type: none"> • Communication Plan drafted 		
Archaeology	<ul style="list-style-type: none"> • 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

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Environmental Control Officer (ECO)

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Date

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Contractor

.....
Date

.....
Developer's Representative (DR)

.....
Date

Appendix C: Environmental Clearance Certificates