TANNERY ESTATE WINDHOEK

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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Contents

1 INTRODUCTION

This ESMP is submitted for the purpose of obtaining Environmental Clearance and will be a contract with the Ministry of Environment and Tourism. This implies that its contents will also be legally binding on all parties involved, including the Developer, Contractors and Sub-contracts, the Home Owners Association and the Residents, as may be applicable. The Developer has the responsibility to develop it and include it in all documentation, to educate and communicate it; to enforce it; to integrate it with the entire scheme.

What is an Environmental and Social Management Plan (ESMP)?

An ESMP is a register of management actions and guidelines needed to ensure that undue or reasonably avoidable adverse impacts of the planning, construction, operation, and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced. It assigns responsibilities and is used as a checklist to monitor compliance at the site.

What are the legal implications and my obligations under this Plan?

The implementation of an ESMP is required in terms of the Environmental Management Act of 2007. Therefore the Developer is under a legal obligation to adhere to the recommendations in the Environmental and Social Management Plan.

Stages of the development covered

There are three stages of the development that are covered by this ESMP:

1) Planning and design stage of the overall development. This is the stage during which a multi disciplinary team considers alternatives for service provision that will be feasible and sustainable. Service corridors are determined and sites for reservoirs, sewerage treatment facilities, substations, etc. are determined. Guidelines are established for the architectural components and overall look and feel of the site. This stage has advanced for the Tannery Estate, but is still to be completed.

2) Construction stage of the services and individual properties. Services are constructed by the developer according to the design and guidelines above. Individual properties are developed according to the guidelines set by the developer.

3) Operational phase of the development. Each property owner is responsible for upkeeping their property according to the ESMP. The Home Owners Association oversees the upkeep of the overall development and the communal grounds

and corrects owners who undertake activities that are not in line with the ESMP or the design guidelines.

This ESMP covers each of these stages.

Responsibilities

The overall responsibility for the implementation of this ESMP during design and construction will lie with the owners of the development.

Each contractor involved needs to adhere to the construction ESMP (Section 5) and is obliged to appoint a person on the construction supervision team to monitor the provisions of the ESMP. Feedback is to be given to the developer during site meetings, and by means of monitoring reports. In order to ensure this is followed through, the developer needs to include Section 5 in the requests for quotations/tender documents and eventual contracts of each contractor and ensure that they are fully aware of the environmental requirements and have budgeted to meet them.

The operational phase becomes the responsibility of the Home Owners Association (HOA). It is advised that the HOA should have a designated portfolio for environmental management which will include vegetation management, monitoring of construction activities, groundwater management, waste management and all other responsibilities contained in Section 6 of this document.

2 LEGAL AND PERMIT REQUIREMENTS

Table 1 below contains a list of the legal requirements that need to be adhered to during the project planning, construction and operation. These requirements are the environmentally focussed ones and do not include all legal requirements pertaining to the project.

Table 1: Relevant legislated permit requirements

THEME	LEGAL INSTRUMENT	MANAGEMENT REQUIREMENTS	CONTACT PERSON
Archaeology	National Heritage Act 27 of 2004	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.	Rev Salomon April Tel: (061) 244 375/ 385/594
Environmental	Environmental Management Act 7 of 2007 EIA Regulations (EIAR) GN 57/2007 (GG 3812)	The amendment, transfer or renewal (after three years) of the Environmental Clearance Certificate (EIAR s19 & 20).	Ms Saima Angula Tel: 061 284 2751
Forestry	Forest Act 12 of 2001 Nature Conservation Ordinance 4 of 1975	• Protected tree species and any vegetation within 100 m from a watercourse may not be removed without a permit. • A Harvesting Permit is required if wood is to be collected (harvested) for use as fuel. • Protected tree species (*Acacia erioloba, Boscia albitrunca, Albizia anthelmintica*) to be removed require a permit.	Vincent Louw – Deputy Director of Forestry 0612087327
Labour	Labour Act 11 of 2007 Health and Safety Regulations (HSR) GN 156/1997 (GG 1617).	Adhere to all applicable provisions of the Labour Act and the Health and Safety regulations.	Labour Law Advice: Tel: 061 309 957
Water	Water Resources Management Act 13 of 2013	Water licences are required for water abstraction and use. A permit is required for any water treatment facility	

	City of Windhoek Drought Response Plan	Depending on water supply and demand situation at the time of development, water restrictions will likely be applicable.	
Zoning	Windhoek Town Planning Scheme	• Various Town Planning regulations to be met, i.e. density, building lines, parking, land use, nuisances, flood lines, etc. • The HOA assists the City of Windhoek in overseeing the entire scheme as may be applicable for the various zonings on the estate, the City of Windhoek has the legal mandate to enforce where there are transgressions. • The following are specifically applicable from an environmental , health and safety perspective: 26 Danger to life, health and amenity 27 Removal of injurious conditions These two sections provide general health and safety principles and may be used in cases where health and safety standards are not met. 29 Prohibited plants – Prosopis trees are not allowed to grow on any erf, therefore all Prosopis trees are to be removed. 37 Drilling of water - The Windhoek City Council has to approve the drilling and use of groundwater on any property.	Hugo Rust , Grazy Tjipo City of Windhoek 061-2902911
Traffic	Road Traffic and Transport Act 1999	• The entire act is applicable including the registration of vehicles, driving licences, transport of workers, etc.	

3 PLANNING AND DESIGN PHASE

Responsibilities

This phase is the responsibility of the Developer, with delegated authorities to those appointed for the various aspects of the development.

Goals

- To ensure that the design of all aspects of the facilities aim at environmental sustainability in the use of resources.

Table 2: Management requirements for the Planning and Design phase

ASPECT	MANAGEMENT REQUIREMENT
Briefs to design team (Architects, Engineers, agents, etc.)	• Brief all involved in design to consider environmental sustainability aspects and to demonstrate how the design incorporates optimal resource use.
General Design	• Include the following principles in the design of bulk and internal services: o Service corridors should avoid protected trees, significantly vegetated areas (e.g. clusters of bush and trees). o Consider aesthetic guidelines of the architectural manual (to be developed by the Developer). o Prominent features such as sewerage pumps, sub stations, etc. should be treated to fit the natural environment. Such features should not be visible from roads or significant vantage points, or should be disguised where appropriate. o Potential polluting facilities such as the sewerage pumps should be sited away and upstream from the boreholes, drainage lines and areas that flood periodically. o Facilities that could potentially produce an odour should be sited upwind from residences, tourist facilities and other areas of social activity. o All polluting activities e.g. sewerage pumpstations shall be bunded (separated) from underground water and surface water through using concrete, PVC and other materials as generally accepted in the industry.
Water saving in design	• Design the final combination of borehole water use, use of grey water vs. water saving strategies to achieve an optimal water saving strategy for irrigation of gardens, potable water supply, sewerage water treatment, etc.
Sewerage design	• Sewerage lines that cross riverbeds need to be lined to avoid pollution. Manholes are to be kept away from the boreholes and riverbeds. • Pumpstations are to be kept upstream, and away from boreholes, and

ASPECT	MANAGEMENT REQUIREMENT
	upwind and away from high activity areas.
Energy	• Consider where renewable energy may be promoted and installed in the development and promote such a strategy. The target for this development is .....% renewable energy.
Land footprints	• Identify the best possible architectural design and footprint for each property (considering slopes, views, orientation, features on site, etc.) and ensure that these are made legally binding. • Footprints, building lines and other measures should be designated for residences with the aim to avoid trees, clusters of vegetation, termite mounds, and other natural features on a site. The architectural manual and specifications for each erf should specify that each property is to design the house within those parameters. Architects of homeowners shall show on a plan all the existing natural features on the site, and homeowners shall be obliged to design their buildings incorporating these features as part of the design. The submission of building plans therefore includes a site plan which demonstrates how natural features on the site have been incorporated.
Survey	• Show all trees on erven, service corridors, etc. to keep them. Include these positions in the title deeds of new owners, in the contracts of contractors, etc. Specify fines where appropriate.
Design guidelines	Review the building design guidelines **(Appendix A)** and incorporate them in all property transactions so that they become legally binding.
Changes to design or project description	The environmental clearance for this project is defined by the project description. Any changes to the design which trigger listed activities, e.g. design on greenfields, alternative bulk infrastructure, water abstractions, and water treatment would require an amendment to this EIA or an additional one. Identify such changes and ensure that the necessary clearances are obtained.
Clearance renewal	This environmental clearance needs to be renewed every three years. Note the date when renewal is required and apply for renewal, noting any changes and challenges which need to be reflected in the renewal application.
Landscaping	Devise a strategy for implementing a landscape implementation and management plan, including the implementation of the nursery, sourcing of indigenous vegetation **(Appendix C**), production of compost, conservation and re-use of topsoil during construction, etc.
Borrow pits	The sourcing of gravel and sand for construction particularly for roads can be a challenge environmentally. It is difficult to rehabilitate borrow pits and they are unsightly. It is advised that gravel and sand be sourced from a quarry and sand operation which has obtained environmental clearance from the Ministry of Environment and Tourism and who implements such plans. This provision needs to be include in all construction contracts.
Historic tannery evaporation ponds	Implement a groundwater monitoring programme to establish any contaminants reaching the water. Analyse the soil and groundwater for Cr (VI). Backfill the evaporation ponds with clean soil.

ASPECT	MANAGEMENT REQUIREMENT
Tributary channel	Design the tributary "with nature", avoiding a concentrate channel, using natural materials to slow down water flow.
Flood line	The development is currently outside of the 1:50 year flood line. Monitor flood occurrences to gage proximity to the development over time.
Traffic	Improve the access point according to the Traffic Master Plan.

4 CONSTRUCTION TENDER PREPARATION PHASE

All those actions required during the tender preparation phase are included below. Environmental management requirements need to be made legal in all agreements with contractors. Because the project is however still in its planning phase, construction still far ahead and this list therefore indicative, these requirements need to be revised closer to actual construction.

Table 3: Construction tender preparation phase management requirements

ASPECT	MANAGEMENT REQUIREMENTS
EMP implementation	Relevant sections of this ESMP should be included in the tender documents for all development so that tenderers can make provision for implementation of the ESMP.
Responsibilities	• Depending on the structure of the development company, contractors, etc. design a structure for the responsibilities of this ESMP. The ESMP should be structured around the ER (Employers Representative) and an ECO (Environmental Control Officer) who take responsibility for implementing this ESMP.
Communication	• Compile a stakeholders list including neighbours, City of Windhoek, TransNamib, the Brakwater Neighbourhood Watch, the Brakwater Residents Association, etc. (see the stakeholders list for this project). Communicate to them as appropriate, e.g. when construction will commence. Make arrangements for access, non-working hours, etc.
Financial provision	• Financial provision for the compilation of a Waste Management Plan should be included as a cost item within tenders concerning the construction and/or maintenance of services infrastructure. • Financial provision for hauling to borrow pits further away and topsoil management. Sand harvesting is only permissible from operations that have clearance from the Environmental Commissioner and who have a permit from the Department of Water Affairs, a legitimate source for sand needs to be identified during tendering and the costs duly accounted for. • Financial provision for the facilitation of an induction programme for both

	senior, casual construction personnel as well as subcontractors and associated personnel should be included as a cost item within tenders concerning the construction and/or maintenance of services infrastructure and housing. • Financial provision for water and power conservation which is in line with City of Windhoek Drought Response Plan at the time of construction. • Financial provision for rehabilitation and clean up efforts as may be appropriate.
Recruitment	• Provisions designed to maximise the use of local labour should be included within tenders concerning the construction and/or maintenance of services infrastructure and housing. • A provision stating that all unskilled labour should be sourced from local communities (Windhoek) should be included within tenders. • Provisions promoting gender equality pertaining to recruitment should be included within tenders concerning the construction and/or maintenance of services infrastructure and housing.

5 CONSTRUCTION MITIGATION DETAILS

The following table provides a large scale overview of all the major environmental management themes pertaining to both general and site specific construction mitigation details. This table serves to act as quick reference, for the detailed mitigation details that follow below, for the implementation of the construction component of this ESMP.

The details provided here for the construction phase are indicative and need to be revised before the construction phase is to commence.

Table 4: Generic and site-specific environmental management actions for the construction phase

THEME	OBJECTIVE	SECTION
Waste management	Avoid and where not possible minimise all pollution associated with construction.	Section A
Borrow pits	Ensure topsoil protection and post-construction rehabilitation.	Section B
Health and safety	Safeguard health and safety of labourers and general public.	Section C
Dust and noise	Avoid and where not possible minimise dust and noise associated with construction.	Section D
Environmental training and awareness	Awareness creation regarding the provisions of the EMP as well as importance of safeguarding environmental resources.	Section E
Environmental conservation	Minimise construction activity footprint and safeguard biodiversity in ecologically sensitive areas.	Section F
Employment/ Recruitment	Minimise negative conflict through legal and fair recruitment practices.	Section G
Stakeholder communication	Provide a platform for stakeholders to raise grievances and receive feedback and hence minimise negative conflict	Section H
Socio-economic and Miscellaneous	Ensure due consideration is given to matters regarding the cultural and general wellbeing of the affected community and matters incidental thereto.	Section I

SECTION A: WASTE MANAGEMENT

ASPECT	MITIGATION MEASURE
	GENERIC MITIGATION DETAILS
Waste management plan	The Contractor should compile a Waste Management Plan which should address as a minimum the mitigation measures included below.
Hazardous waste	• All heavy construction vehicles and equipment on site should be provided with a drip tray. • Drip trays are to be transported with vehicles wherever they go. • Drip trays should be cleaned daily and spillage handled, stored and disposed of as hazardous waste. • All heavy construction vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of construction vehicles should be 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 collect 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.

Sewage and grey water	• Do not allow the sewage (black water) to be discharged directly onto open soil.
	• All sewage must be removed regularly and disposed of at a recognised (municipal) sewage treatment facility, unless sewerage lines are already in place, on which latrines can be fixed for the construction period.
	• The water collected from wash basins and showers (grey water), should not be left standing for long periods of time as this promotes mosquito breeding as well as parasite and bacterial proliferation. Grey water should be recycled:
	  o Used for dust suppression;
	  o Used to water a vegetable garden, or to support a small nursery;
	  o Used to clean equipment.
	• If grey water will not be recycled it should be removed along with the black water on a regular basis.

General waste	• 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. • A sufficient number of separate waste containers (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
SPECIFIC MITIGATION DETAILS	
	• The construction site or any other workshops should be kept away from the boreholes, and the riverbed. The old tannery pond area is considered to be a suitable site for construction camps and laydown areas.

SECTION B: BORROW PITS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
	Not applicable -
SPECIFIC MITIGATION MEASURES	
	• It is assumed that the Contractor/s will obtain borrow material for all requirements of the project, i.e. road base layers, foundations, etc. from commercial sources. • Contractors will only be permitted to obtain such material from operators who have an environmental clearance in place, meaning that their sites are managed in an environmentally sensitive manner. • The Developer shall work out a strategy for storing topsoil and spoil that is removed in areas to be cleared, to be used later for the landscaping of the terrain.

SECTION C: HEALTH AND SAFETY

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION MEASURES	
Health and Safety	All contractors shall adhere to the Labour Act in terms of Health and Safety. Strict penalties, including dismissal should be in place for non-compliance of the labour Act and the Regulations pertaining to Health and Safety.
HIV/AIDS and TB training	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.
Road Safety	• Demarcate roads clearly. • Off-road driving should not be allowed. • All vehicles that transport materials to and from the site must be road worthy. • Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules (The Road Traffic and Transport Act, 1999). Note specifically also regulations pertaining to the transport of workers e.g. no workers to be transported on the back of an open truck. • Loads upon vehicles should be properly secured to avoid items falling off the vehicle. • All drivers are to be free from the influence of alcohol. •
Safety Around Excavated and Work Areas	• Excavations should be left open for an absolute minimum time. • Excavate short lengths of trenches and box areas for services or foundations in such a way that the trench will not be left unattended for more than 24 hours. • Demarcate the following areas with danger tape on a daily basis: o Construction sites; o All excavation works; o Soil and other building material stockpiles; and o Temporary waste stockpiles • Provide additional warning signage in areas of movement and in "no personnel" areas where workers are not active. • 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 mitigation measures laid out in **Section A** (Waste Management mitigation details)
Ablutions	• Separate ablutions (toilet, hand basin and soap) 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

ASPECT	MITIGATION MEASURE
	construction site: 1 toilet for every 25 females. 1 toilet for every 50 males. (this applied for the construction of infrastructure, for the construction of houses, one toilet will be acceptable). Sewage waste needs to be removed on a regular basis to an approved (municipal) sewage disposal site. Workers responsible for cleaning the toilets should be provided with latex gloves and masks.
Open fires	• No open fires may be made anywhere on site. • No wood may be collected within or near the project area. The Contractor must supply wood (or other fuel) for cooking or heating purposes.
General	• Dust protection masks should be provided to workers if they complain about dust. • Potable water should be provided to workers. • 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.

SECTION D: DUST AND NOISE

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Dust	Dust suppression measures should be made applicable where there is a risk to nearby communities and the workforce.
Noise	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.
SPECIFIC MITIGATION DETAILS	
Dust	Place all stockpiles, screening activities and other dust producing activities downwind from sensitive receptors such as already built residences, businesses, etc. In cases where this is not possible, apply semi-purified or grey water to dust generating surfaces in windy conditions.

SECTION E: ENVIRONMENTAL TRAINING AND AWARENESS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Environmental Induction (Training)	All construction workers are to undergo environmental induction (training) which should include as a minimum the following: • Explanation of the importance of complying with the ESMP. • 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. • Explanation of the specific mitigation measures within this EMP especially unfamiliar provisions. • This training must be undergone by all new workers before they may commence with work. • A signed copy is to be kept for every worker that this course was attended. Workers need to be made aware of disciplinary actions and/or penal measures and procedures in case of non-conformance.

SECTION F: ENVIRONMENTAL CONSERVATION

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Conservation of vegetation	• The layout and building design should incorporate large indigenous trees. • The Contractor should compile a Tree Management Plan which should include the following as a minimum: o All trees except prosopis within the work area of the contractor should be marked and protected. o Trees which are impossible to conserve should be marked on the map and in the field. The trees to be conserved vs. those to be removed are to be agreed upon contractually with coordinates for each. o The Contractor should apply to the nearest forestry office for a permit to remove protected trees. o Each tree that is removed needs to be replaced after construction (see **Appendix B** for list of recommended trees); o Some of these trees can be obtained at the nearest forestry office or at a commercial nursery. • Areas to be cleared of vegetation need to be demarcated and kept to a minimum. These need to be marked and the entire workforce instructed and managed so that the restricted area boundaries are honoured.
Materials camp and lay-down areas	In the case of construction of services, suitable locations for materials camps and lay-down areas should be identified with the assistance of the Developer and ER and the following should be considered in selecting these sites. Avoid sensitive areas (e.g. rivers or drainage lines, vegetated areas). In the case of individual homes being constructed laydown areas should be within the erf boundary and shall be neatly stowed.
SPECIFIC MITIGATION DETAILS	
Coordinates	• All contractors must be given the list of coordinates of trees to be conserved. Trees removed that are on this list should be penalised with a fine of N@ 20 000.00.
Water conservation and energy efficiency	• The contractors should submit plans of how they are to conserve water and energy by using available technologies, training and awareness raising, management, demand management, penalty systems, etc. which are appropriate for this project. The City of Windhoek Drought Response Plan is applicable, and depending Windhoek's water demand and supply situation at the time of construction, should be adhered to.
Construction water	• Construction water is to be sourced from Windhoek's semi-purified water or from the boreholes on site.
Laydown area	• The laydown area shall be on the historic tannery pond area.

SECTION G: EMPLOYMENT/RECRUITMENT

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Legislation	Adhere to the legal provisions in the Labour Act (see **Table 1** below contains a list of the legal requirements that need to be adhered to during the project planning, construction and operation. These requirements are the environmentally focussed ones and do not include all legal requirements pertaining to the project. Table 1) for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc) in the Contract.
Recruitment	The Contractor should compile a formal recruitment process including the following provisions as a minimum: • Recruitment should not take place at the construction site. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process. • Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those from the project area (Windhoek and Groot Aub). • Clearly explain to all job-seekers the terms and conditions of their respective employment contract (e.g. period of employment etc.) – make use of interpreters when necessary.

SECTION H: STAKEHOLDER COMMUNICATION

ASPECT	MITIGATION MEASURE
	GENERIC MITIGATION DETAILS
Communication plan	The Contractor should draft a Communication Plan, which should outline as a minimum the following: • How stakeholders, 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 stakeholders will be consulted on an ongoing basis; • Make provision for grievance mechanisms – i.e. how concerns can/ will be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the even feedback is deemed unsatisfactory.
General communication matters	• The appointed Contractor shall appoint a person (the environmental control officer, ECO) from the construction team to take responsibility for the implementation for all provisions of this ESMP. • The Contractor shall at every site meeting report on the status of the implementation of all provisions of the ESMP. • The Contractor should implement the environmental awareness training as stipulated in **Section E**. • The Contractor must list the stakeholders of the project and their contact details with whom ongoing communication would be required for duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the before construction commences. • The Communication Plan, once agreed upon by the Developer, shall be binding. • All communication with the stakeholders must take place through the ECO. • A copy of the ESMP must be available at the site office and should be accessible to all stakeholders • 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.
	SPECIFIC MITIGATION DETAILS
	• The stakeholders list shall at least include City of Windhoek, Environmental, and Water Divisions, the Brakwater Residents Association, the Brakwater Neighbourhood watch (for large infrastructure construction only), all property owners (for infrastructure construction projects and those of

	"communal facilities) and the neighbouring property owners (for all private construction projects on erven).

SECTION I: SOCIO-ECONOMIC AND MISCELLANEOUS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Archaeology	• 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: o If operating machinery or equipment stop work; o Demarcate the site with danger tape; o Determine GPS position if possible; o Report findings to foreman; o Report findings, site location and actions taken to superintendent; o Cease any works in immediate vicinity; o Visit site and determine whether work can proceed without damage to findings; o Determine and demarcate exclusion boundary; o Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist; o Inspect site and confirm addition to project GIS; o Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and o Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: o Apply the chance find procedure as described above; o Schedule a field inspection with an archaeologist to confirm that remains are human; o Advise and liaise with the NHC and Police; and o Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.
SPECIFIC MITIGATION DETAILS	
Workforce accommodation	• No workers are to be accommodated on site. • Security guards may be accommodated for large infrastructure contracts upon agreement and arrangement of accommodation, food provision, and rules for restricted access to the terrain.

6 OPERATION AND MAINTENANCE PHASE

The operation and maintenance phase will be the responsibility of the managing body of the estate. The Developer needs to ensure that this section of the document gets transferred to the applicable agreements and made part of their future obligations.

This section of the ESMP needs to be revised and updated when the sale of erven is being prepared.

Table 5: Operation and maintenance phase mitigation measures

ASPECT	MITIGATION MEASURE
ESMP implementation	If any construction is to be conducted as part of maintenance works for the services infrastructure within the project area please refer to the construction mitigation measures of this ESMP (**Section 5**).
Post-construction environmental training and awareness	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.
Implementation of design limits	All owners and contractors are to be provided with the applicable sections of the ESMP, and monitoring this process should be continuous.
Monitoring	The Homeowners Association should designate and remunerate a person to oversee the above and to ensure that standards are being met.
Pollution	A pollution prevention strategy should be devised for dealing with spillages and leakages particularly in the no-go and sensitive groundwater zones (as determined by the groundwater specialist). Leakages should be constantly detected and spillages assigned to a team for immediate attention. Hazardous chemicals are to be handled and stored away from the open ground. All contractors are to adhere to the measures provided in the construction component of this ESMP. Sewerage lines need to be monitored for leakages and maintained.
Waste	In integrated waste management plan should be developed for the estate. A private waste collection company for recyclable waste is recommended. Organic waste may be collected for communal composting. No hazardous waste is to be dumped on site. Building rubble is to be disposed of at designated sites. Strict rules in this regard should be imposed on the residents and contractors.
Water management and conservation	A water management and conservation strategy should be compiled and revised from time to time and new residents and owners made aware **(see Appendix A).**
Energy efficiency	An energy efficiency plan for operations should be devised for the development and revised from time to time and new residents and owners constantly made aware.

ASPECT	MITIGATION MEASURE
Vegetation	No tree felling, wood gathering, burning, harvesting, or damaging to any plant species. Dead trees, logs, vegetation such as aloes, etc. should be left in their natural state and not disturbed. Continue to monitor and manage.
Biodiversity	• No hunting, trapping, setting of snares or any other disturbance of any fauna species. • Restrict numbers of pets, particularly cats – this is very important for biodiversity. • Any new building activities should adhere to the construction ESMP – footprints should be kept as small as possible and trees conserved according to the mentioned plan.
Building and Design Guidelines	• Continue to implement and enforce these as new homes and other buildings are added to the estate.
Green corridors	• Maintain hiking and cycling paths along green corridors

APPENDIX A:

RECOMMENDATIONS FOR BUILDING AND DESIGN GUIDELINES

1. INTRODUCTION

These building and design parameters need to be reviewed at the outset of the project. Natural resources should be incorporated into the design and the layout of the structures. Engineering solutions should be ecologically-minded.

These guidelines need to be thoroughly reviewed by the developer and the Home Owners' Association to familiarize themselves with the guidelines and principles provided below. This should be done in close collaboration with the appointed project architect who should also form part of the design review panel to ensure that these guidelines are implemented and maintained.

The principles should be integrated into the entire design concept, and standards and specifications should be set for each property. All new owners of properties will need to submit their designs to the developer and/or Home Owners' Association. Designs should adhere to the requirements prescribed in the ESMP and the *Recommendations for Building and Design Guidelines*.

2. PRINCIPLES FOR PLANNING AND DESIGN

In order to realise sustainable development it is important to consider sustainable architecture. Sustainable architecture seeks to minimize the negative environmental impact of buildings by enhancing efficiency and control in the use of materials, energy, and development space.

Sustainable architecture is based on the following principles:

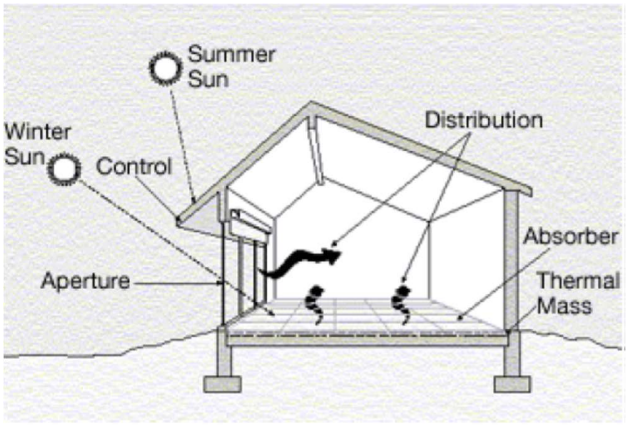
Footprint and available resources

The best footprint is to be identified for each site, considering slope, conservation worthy features such as trees, drainage lines, views, wind directions, orientation, etc.

This footprint should become a requirement for the site and to be sold with the land as part of its agreement.

Energy efficiency

- The green house/building has reduced dependency on electricity for its basic needs. Passive solar design uses the natural movement of heat and air to maximize solar heat gain in the winter and to minimize it in the summer.



- Although design principles vary by climate and location, the basic strategies remain the same and should include the following:
  - *Window selection*
  - *Site orientation*
  - *Overhangs and awnings*
  - *Natural cooling*

- The design must allow for passive and active cooling, the maximum use of daylight and reduced need for energy-consuming building systems.
- Guidelines should be set for where reflective glass is to be avoided, in order to consider the neighbours and community.
- Landscaping should also be used as an option for optimizing solar heat gain and shading.

Each design submission should demonstrate how these principles were taken into account.

Water Efficiency

- The Central Area of Namibia's predicament with water supply increases the need to reduce the demand on potable water resources by using water conserving appliances including toilets, shower, taps, washing machines and dish washers.
- Reduce surface water runoff (keep surfaces penetrable using gravel, mulch, natural grasses, spaced paving, and paved areas to a minimum, use natural water diversions, e.g. pebbled surface, gabion, etc. instead of concrete pipes; etc.); keep the area in its natural state as far as possible and landscape with indigenous plants as far as possible.
- Trees and shrubs that form part of the landscaping should only be of the approved species as included in **Appendix B**.
- The use of impermeable paving should be minimized and should complement the design and the surrounds and to minimize run-off.

- Water recycling systems for grey water should be considered.
- Include water tanks on each property.
- Swimming pools need to be covered at all times.
- Construct swimming pools that complement nature and blending into the natural landscape and use alternative filtering systems instead of harmful chemicals.

Indoor air quality

The physical well-being of the occupants is the primary concern of this principle. Its area of concern is the general atmosphere within a house/building. Hazardous building materials are also avoided by this principle.

Green materials

Sustainable architecture also considers the use of material that will not waste energy in its production, transport and use in construction. Green materials also involve the use of nontoxic and renewable materials so that natural resources are not depleted.

In the context of the site, this means using materials that are sourced and produced locally in favour of imported ones.

Green building systems

This includes the various active design considerations that seek to monitor and reduce power consumption, water use, temperature, air quality, etc.

Examples of green building systems are photovoltaic cells, solar water heaters, low-flush water closets, water saving fixtures and water recycling systems.

Good design

Good design, is designing buildings which have an influence on energy usage, repair and maintenance, and inevitably, on the property's value. Good design should also complement the natural environment and demonstrate the understanding of the site's topographical, visual, ecological, surface hydrology and other sensitivities.

The layout should follow the contours of the site and structures broken up into smaller elements, to go along the contours of the site and to avoid large paved and retained areas.

The building envelope should be shaped by the character of the development and terrain, i.e. nature estate, but should at least include the following:

- Only one dwelling will be permitted per site.
- The maximum coverage (footprint) of an erf should be 50%
- All regulations of the Windhoek Town Planning Scheme are to be adhered to.

Extraordinary building lines should be adhered to where applicable. The architect is free to specify further building line restrictions to achieve privacy, sense of place, visual quality or other objectives. In order to claim the proposed development as being sustainable it is important to incorporate sustainable architecture as part of the development guidelines for this development.

3. INFRASTRUCTURE DEVELOPMENT GUIDELINES

3.1. *Roads*

Environmental objectives

- Speed reduction measures to control traffic speed. Incorporate existing trees within the road reserve.
- Alignment design measures to limit light pollution and noise pollution by vehicles.

Appropriate technologies

Appropriate technologies to improve the environmental profile consist of:

- Internal access roads with width limitations, trees left as islands and other speed reduction measures (e.g. speed humps) to control traffic speed.
- Align light away from individual housing units.

3.2. Water

Environmental objectives

- Water source and treatment optimisation.
- Infrastructure design optimisation.
- Infrastructure visibility mitigation.
- Flood mitigation

Appropriate technologies

Appropriate technologies to improve the environmental profile consist of:

- The channel for the tributary is to be of gabions, or other technology that reduces water flow velocity. Concrete should be avoided.
- Avoid dead end situations in the supply system by using ring-feeder design principles.
- Each ring feed could also provide for automatic draining system if water is not used in the ring for a period that may be detrimental to the water health requirements. The drained water can be used of irrigation purposes.
- No waterlines or other related facilities should be positioned below the groundwater table to avoid intrusion of untreated water into the system.
- Adequate fire protection capacity is essential for the system.

3.3. Sewer

Environmental objectives

- Protect the Klein Windhoek River and the site from pollution.
- Position the pump station upstream and away from the boreholes.
- Storm water channels to be accommodated along internal road network as open channels lined with natural rock to ensure optimal water infiltration.

Appropriate technologies

Appropriate technologies to improve the environmental profile consist of:

- All containment facilities such as manholes and pump stations should have a continuous casted concrete outer shell and poly-utherane inner lining to negate any possible seepage into the groundwater due to the operational wear of the facility.
- All pump stations should be dual chamber systems with dual pump systems and facilities for an external auxiliary pump that can be connected during emergencies.
- Sewer lines should avoid the flooded area on the estate.
- Design and install pre-determined connection points to the sewer system to assure the building contractors use standardised connections that are tested to be leak proof.
- Mark the connection points with clearly visible markers to avoid confusion and accidental incorrect connections.

- Assure that all internal lines and connections made are tested for leaks according to SABS methods before the water connection to the dwelling is allowed and certified.
- Put an accidental spill recording and management system in place that will require immediate attention from the management body.
- The accidental spill recording and management system must be executed by a technical maintenance team that is trained and skilled in toxic spill management.
- The sewer conveyance system must be inspected that will allow for a full inspection of the system on a monthly basis. The objective is to do preventative maintenance on an immediate basis to prevent the occurrence of accidental spills. The inspection should include visual and operational inspections of the:
    - Conveyance and containment systems.
    - Mechanical components.
    - Electrical components.

3.4. Solid Waste

Environmental objectives

- Effective environmentally sensitive solid waste management system.
- Effective waste recycling management system.
- Off-site storage of waste during construction.

Appropriate technologies

- Waste containers at dwellings must be closed and lockable to keep out game and especially baboons. If baboons have access to possible food sources in the waste containers it may lead to conflict.
- Encourage home owners to separate waste that can be recycled and to be collected by an appropriate and legally acceptable waste collection company and transported to recycling facilities.
- Encourage home owners to separate plant material and garden refuse. A communal composting system should be considered.

3.5. Electricity

Environmental objectives

- Partial on-site power supply (renewable energy)

- Subsurface bulk and distribution system if any, with low visual impact.
- Design limitations on public and private light emission.

Appropriate technologies

- Use sub-surface lines on both the bulk supply line and the distribution lines to minimise the visual impact and also the threat to large birds.
- Street lighting must only be used as guides on the road route. The lights must be covered as to provide focused light at ground level and to limit diffused light pollution. The light strength must be of low intensity.

APPENDIX B:

RECOMMENDED PLANT LIST

This is a preliminary list of indigenous plants (plants occurring naturally in the region of the project) or which are expected to adapt well to this dry climate. Plants have to adapt to rainfall conditions, so that irrigation can be limited to the minimum.

TREES	
SCIENTIFIC NAME	COMMON NAME
Acacia Karoo	Sweet thorn/Soetdoring
Acacia erioloba	Camel Thorn/Kameeldoring
Acacia erubescens	Yellow-bark Acacia/Withaak
Acacia hereroensis	Mountain Thorn/Berg doring
Acacia sieberana	Paper bark Acacia
Albizia anthelmintica	Worm cure albizia/
Boscia albitrunca	Shepherd"s tree/Witgat
Combretum erythrophyllum	Bush willow/Rivier vaderlands wilg
Dombeya rotundifolia	Wild pear/Wilde peer
Mundulea sericea	Cork Bush/Kurkbos
Olea europeae	Olive/Olien
Ozoroa crassinervia	Namibian Resin tree/ Namibiese harpuisboom
Ozoroa paniculosa	Common Resin bush/ Harpuisboom
Pappea capensis	Jacket plum/Doppruim
Searsia lancea	Karee
Searsia marlothii	Bitter Karee
Ziziphus mucronata	Buffalo Thorn/Blinkblaarwag-n-bietjie
Barleria spp.	Bush violet/Bosviooltjie
Carissa macrocarpa	Big Num Num
Croton gratissimus	Lavender Feverberry
Cyphostemma currori	Kobas
Dichrostachys cinerea	Kalahari Christmas Tree

Ehretia alba	Puzzle bush/Deurmekaar bos
Gardenia volkensii	Savanna gardenia /bosveld katjiepiering
Grewia flava	Raisin bush
Leonotis leonurus	Wild dagga
Polygala virgata	Purple broom bush
Sutherlandia frutescens	Cancer bush
Tarchonanthes camphoratus	Camphor bush
Rhigozum obovatum	Yellow pomegranate
HERBACEOUS PERENNIALS	
All indigenous Aloe species	
Bulbine capitata	Scented grass bulbine