

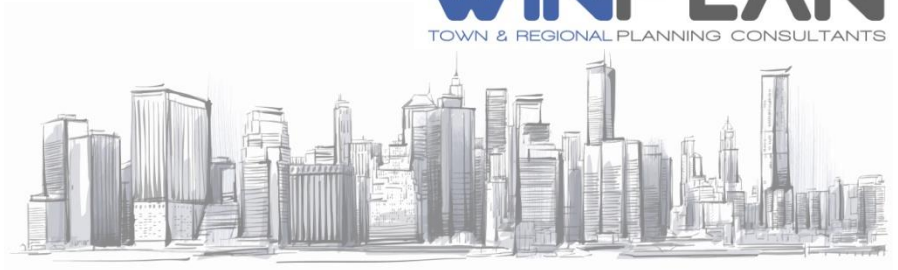
## **ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

**PROPOSED TOWNSHIP ESTABLISHMENT OF TWO NEW  
EXTENSIONS IN TAMARISKIA, SWAKOPMUND**



**ENVIRONMENTAL MANAGEMENT PLAN**  
FEBRUARY 2022

**WINPLAN**  
TOWN & REGIONAL PLANNING CONSULTANTS



Project Title: **TAMARISKIA TOWNSHIP ESTABLISHMENT**

Type of Project: **ENVIRONMENTAL MANAGEMENT PLAN**

Project Location: **TAMARISKIA EXTENSION 2, SWAKOPMUND**

Competent Authority: **MINISTRY OF URBAN AND RURAL DEVELOPMENT**  
**NAMIBIA PLANNING AND ADVISORY BOARD / TOWNSHIPS BOARD**  
**PRIVATE BAG 13289**  
**WINDHOEK**  
**NAMIBIA**

Approving Authority **DIRECTORATE OF ENVIRONMENTAL AFFAIRS**  
**MINISTRY OF ENVIRONMENT AND TOURISM**  
**PRIVATE BAG 13306**  
**WINDHOEK**

Proponent/Client: **EDDY ANGULA TRUST**  
**081 787 7467**  
**SWAKOPMUND**

Consultancy: **WINPLAN**  
**PO BOX 90761, KLEIN WINDHOEK**  
**TEL.: (061) 246 761**  
**E-MAIL: winplan@winplan.com.na**

## TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	<b>i</b>
<b>APPENDICES</b> .....	<b>ii</b>
<b>GLOSSARY</b> .....	<b>iii</b>
<b>1. BACKGROUND INFORMATION</b> .....	<b>1</b>
1.1 PROJECT LOCATION .....	1
1.2 TOWNSHIP LAYOUTS .....	1
1.3 BULK SERVICES AND INFRASTRUCTURE .....	2
1.3.1 Access .....	2
1.3.2 Water Supply .....	2
1.3.3 Storm Water .....	2
1.3.4 Electricity Supply .....	2
1.3.5 Sewage Disposal .....	2
1.3.6 Solid Waste Disposal .....	2
1.4 INTRODUCTION TO THE ENVIRONMENTAL MANAGEMENT PLAN .....	2
1.4.1 Purpose of the EMP .....	2
1.4.2 Scope of the EMP .....	3
<b>2. ENVIRONMENTAL MANAGEMENT PLAN</b> .....	<b>3</b>
2.1 RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT .....	3
2.2 TRAINING AND INDUCTION .....	4
2.3 ENVIRONMENTAL CONTROL OFFICER (ECO) .....	4
2.4 ENVIRONMENTAL REGISTER .....	4
2.5 DISPUTES AND DISAGREEMENTS .....	5
2.6 ENVIRONMENTAL INCIDENT REPORTING .....	5
2.7 ENVIRONMENTAL MONITORING .....	5
2.8 NON-COMPLIANCE .....	6
2.9 SITE MANAGEMENT .....	6
2.9.1 Contractors Camp .....	6
2.9.2 Ablution Facilities .....	7
2.9.3 Eating Area .....	7
2.9.4 Access Routes .....	7
2.9.5 Staff Management .....	8
2.9.6 Fire and Safety Management .....	8
2.9.7 Aesthetics .....	9
2.9.8 Cement and Concrete Batching .....	9
2.9.9 Hazardous Substances .....	9

2.9.10	Waste Management .....	9
2.9.11	Information Board .....	10
<b>3.</b>	<b>MANAGEMENT OF ENVIRONMENTAL ASPECTS .....</b>	<b>11</b>
3.1	CONSTRUCTION PHASE.....	11
3.1.1	Erosion and Sedimentation .....	11
3.1.2	Ground and Surface Water Pollution .....	12
3.1.3	Habitat Destruction and Loss of Biodiversity .....	13
3.1.4	Visual Aesthetics and Sense of Place .....	15
3.1.5	Dust and Emissions .....	15
3.1.6	Traffic Safety .....	16
3.1.7	Health, Safety and Security .....	17
3.1.8	Natural Resources .....	18
3.2	OPERATIONAL PHASE.....	19
3.2.1	Erosion and Sedimentation .....	19
3.2.2	Ground and Surface Water Pollution .....	19
3.2.3	Habitat Destruction and Loss of Biodiversity .....	20
3.2.4	Visual Aesthetics and Sense of Place .....	22
3.2.5	Noise and Disturbance .....	23
3.2.6	Traffic and Safety .....	23

## APPENDICES

- Appendix A: Locality Maps
- Appendix B: Township Layouts

## GLOSSARY

<b>Activity:</b>	The physical work that a proponent proposes to construct, operate, modify, decommission or abandon or an activity that a proponent proposes to undertake.
<b>Alien Species:</b>	It refers to a non-indigenous plant, animal or micro-organism; or an indigenous plant, animal or micro-organism, translocated or intended to be translocated to a place outside its natural range of nature, that does not normally interbreed with individuals of another kind, including any subspecies cultivar, variety, geographic race, strain, hybrid or geographically separate population.
<b>Assessment:</b>	The process of identifying, predicting and evaluating the significant effects of activities on the environment; and the risks and consequences of activities and their alternatives and options for mitigation with a view to minimise the effects of activities on the environment.
<b>Batch Plant:</b>	Machinery used on site for the mixing and production of concrete and associated equipment and materials.
<b>Bund:</b>	An enclosure designed to hold at least 120% of the contents of a liquid storage vessel, tank or drums to contain any spillage.
<b>Construction Activity:</b>	A construction activity is any action taken by the contractor, his subcontractors, suppliers or personnel during the construction process.
<b>Environment</b>	An interconnected system of natural and human-made elements such as land, water, air, all living organisms and matter from nature as well as cultural, historic, economic and social heritage and values.
<b>Environmental Management Plan (EMP):</b>	A plan that describes how activities that may have significant environments effects on the environment are to be mitigated controlled and monitored.
<b>Contaminated Water:</b>	Water contaminated by the activities of the contractor, e.g. concrete water and runoff from plant/personnel wash areas.
<b>Contractor:</b>	The principal person or company, including all subcontractors, undertaking the construction of the development as appointed by the proponent.

<b>Construction Camp:</b>	Refers to all storage stockpiles sites, site offices, container sites, other areas required to undertake construction and rest areas for construction staff or management.
<b>Environmental Control Officer (ECO):</b>	A suitably qualified professional who oversees the construction phase and ensure that all environmental specifications and EMP obligations are met during the phase. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMP by the contractor.
<b>Emergency Situation</b>	<p>An incident, which potentially has the ability to significantly impact on the environment, and which, could cause irreparable damage to sensitive environmental features. Typical situations entail amongst others the:</p> <ul style="list-style-type: none"> <li>• Spill of petroleum products and lubricants into the aquatic system;</li> <li>• Potential damage, erosion and slumping of unstable river embankments or drainage channels;</li> <li>• Potential event of impeding the continuous flow of water to downstream water users dependant on the flow; and</li> <li>• Dangerous situation where livestock and children can be injured by any activity emanating from the construction or rehabilitation of the project implementation.</li> </ul>
<b>Environment:</b>	<p>The complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including :</p> <p>(a) The natural environment that is the land, water and air, all organic and inorganic material and all living organisms; and</p> <p>(b) The human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.</p>
<b>Environmental Impact Assessment (EIA):</b>	The process of examining the environmental effects of a development as prescribed by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012) for activities listed as List of Activities which may not be undertaken without an Environmental Clearance Certificate from the Environmental Commissioner (GN. No. 29 of 2012).
<b>Hazardous Substance:</b>	A substance that, in the reasonable opinion of the engineer and/or ECO, can have a harmful effect on the environment.

<b>Listed Activity:</b>	An activity listed in terms of section 27(2) of the Environmental Management Act and the List of Activities which may not be undertaken without an Environmental Clearance Certificate from the Environmental Commissioner (GN. No. 29 of 2012).
<b>Mitigation</b>	The implementation of practical measures to reduce adverse impacts of to enhance beneficial impacts.
<b>Monitoring:</b>	Regular inspection and verification of construction activities for degree of compliance to the EMP.
<b>No-Go Areas:</b>	Areas identified as being environmentally sensitive in some manner and demarcated on plan, and on the site with pegs or fencing and which are out of bounds to unauthorised persons. Authorisation must be obtained prior to entry.
<b>Project Engineer:</b>	The person(s) who represents the proponent and are responsible for the technical and contractual implementation of the works to be undertaken by the appointed contractors.
<b>Proponent:</b>	The legal entity duly authorised and appointed representative, with rights to undertake the development.
<b>Rehabilitation</b>	Restoring a disturbed area to more or less its natural state.
<b>Resident Engineer (RE):</b>	A person who represents the project engineer on site and is responsible for the technical and contractual implementation of the works to be undertaken.
<b>Search and Rescue:</b>	The location and removal of specified plant species, without unnecessary damage, and their transfer to a specified location (on-site nursery).
<b>Solid Waste:</b>	All solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste.
<b>Species of Special Concern:</b>	Those species listed in the Endangered, Threatened, Rare, Indeterminate, or Monitoring categories of the South African Red Data Books, and/or species listed in Globally Near Threatened, Nationally Threatened or Nationally Near Threatened categories (Barnes, 1998).
<b>Specification:</b>	A technical description of the standards of materials and workmanship that the Contractor is to use in the works to be executed, the



	performance of the works when completed and the manner in which payment is to be made.
<b>Topsoil:</b>	The top 150 mm of soil (topsoil) and root material of cleared vegetation.
<b>Works:</b>	The construction operations and all related and incidental works, such as search and rescue, fencing and rehabilitation, in connection with the execution and carrying to completion of the project.

## 1. BACKGROUND INFORMATION

### 1.1 PROJECT LOCATION

The proposed project sites are located within the Townlands area of Swakopmund (see Appendix H). These sites are currently undeveloped although the effects of human activity are clearly conspicuous on the sites. Infrastructure and services for the project sites among other include roads, water services, and bulk electricity. The areas are mainly surrounded by residential erven and houses already established.

The proposed township establishment would include two (2) new extensions within the Townlands of Swakopmund. These Extension numbers still needs to be allocated by the office of the surveyor General. The total size of the proposed sites is approximately 9.5 Hectares and is located to the northern central area of Swakopmund.

### 1.2 TOWNSHIP LAYOUTS

The layout of the proposed two Extensions will make provision for residential and public open space erven (See Appendix I). The following tables give more insight into the proposed township development.

The preliminary layout plan for **Erf RE 540 Tamariskia, Extension 2** provides for the following:

LAND USE	NO OF ERVEN	%	TOTAL AREA (m <sup>2</sup> )
Residential	73	65%	28510
Public Open Space	95	10%	4213
Street Portion	1	1%	12
Remainder (Street)		26%	11275
<b>Total</b>		<b>100%</b>	<b>44010</b>

The preliminary layout plan for **Erf 673 Tamariskia Extension 2** provides for the following:

LAND USE	NO OF ERVEN	%	TOTAL AREA (m <sup>2</sup> )
Residential	87	59%	31641
Public Open Space	4	10%	5078
Remainder (Street)		30%	15628
<b>Total</b>		<b>100%</b>	<b>52347</b>

## **1.3 BULK SERVICES AND INFRASTRUCTURE**

All bulk services such as water, electricity and sewerage are readily available in the town of Swakopmund. Once a detailed design has been completed, services for the newly created Extensions will be linked to the existing services network of Swakopmund.

### **1.3.1 Access**

Tamariskia is located next to the C34 running from Swakopmund along the coast all the way to Skeleton Coast. Access from the C34 is subject to approval from Roads Authority. Access will be obtained from Kwikstretjie on the eastern side of the proposed new extension.

### **1.3.2 Water Supply**

The Swakopmund Town (STC) will supply water to the proposed new extensions through the existing Municipal Water Reticulation System.

### **1.3.3 Storm Water**

The design of the internal street network will include provision for storm water and to accommodate the storm water generated by the townships. Underground storm water structures with catch pits complying with accepted engineering standards will be constructed.

### **1.3.4 Electricity Supply**

Electricity will be supplied from ErongoRed who the current supplier for Swakopmund Town. The proposed new extensions are located within an existing municipal fabric and will merely be connected to the bulk infrastructure.

### **1.3.5 Sewage Disposal**

The proposed new development will be connected to the existing municipal sewer network.

### **1.3.6 Solid Waste Disposal**

Solid waste created by the various land uses will be collected and disposed of through the municipal waste collection and management systems and discard of at an approved waste disposal site.

## **1.4 INTRODUCTION TO THE ENVIRONMENTAL MANAGEMENT PLAN**

### **1.4.1 Purpose of the EMP**

The purpose of the EMP is to provide specifications for "good environmental practice" for application during construction and operation. As such, the EMP provides specifications that the proponent and the appointed contractors must adhere to in order to minimise adverse environmental impacts associated with the construction and operational activities. The

proponent to which authorisation was granted, is ultimately responsible for the overall environmental performance.

The guidelines for the execution of an EMP include the following:

- Responsibilities for the environmental performance of the proposed development are communicated to the construction workers;
- Communications channels to report on environmental performance, problems and priorities are in place;
- A monitoring schedule is established to identify potential negative environmental impacts associated with the construction and operation of the proposed development;
- Method Statements (mitigation measures) are implemented to avoid or minimise the identified negative environmental impacts (rehabilitation of eroded areas; bush clearings; complaints from the public) as well as to enhance the positive impact on the environment (employment; support of conservation efforts); and
- Monitoring programme or schedule is developed to track the plans that have been implemented so as to ensure the effectiveness of the plan.

#### **1.4.2 Scope of the EMP**

In order to ensure a holistic approach to the management of environmental impacts during the construction works as well as the operational phase, this EMP sets out the methods by which proper environmental controls are to be implemented by the contractor and all other parties involved, and monitored by the Independent Environmental Control Officer (ECO) and Resident Engineer (RE).

This EMP intends to guide and manage the construction and operational activities on each site and surrounding areas as they relate to the natural environment. It further describes mitigation measures. In addition, this document must be seen as open-ended, requiring regular review and updating via the correct channels in order for it to effectively guide environmental management of this project.

The provisions of this EMP are binding on the proponent until such time that ownership is transferred to the community or any other stakeholder, if it is the case. Any third party appointed by the proponent in terms of the design and construction must comply with the conditions of this EMP.

The EMP is a dynamic document subject to similar influences and changes created by variations to the provisions of the project specification. Any substantial changes shall require the approval from the Environmental Control Officer (ECO).

## **2. ENVIRONMENTAL MANAGEMENT PLAN**

### **2.1 RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT**

The Eddy Angula Trust will be responsible for environmental control on site during both the construction and operational phase. It is imperative that a daily briefing meeting be held at all times during the construction phase to reach an agreement on specific roles of various parties and penalties for non-compliance.

### **2.2 TRAINING AND INDUCTION**

The Eddy Angula Trust is responsible to ensure that environmental awareness and education of all employees and contractors are carried out. The Trust should further ensure that employees and contractors are made aware of the environmental requirements of the project.

The EMP should form part of the Terms of Reference of all contractors, sub-contractors and suppliers. All of the above is obligated to sign a contract to ensure that they are familiar with this EMP and that they comply. All senior staff (foremen/supervisors) should familiarise themselves with the contents of this EMP and they should render training and assistance to the rest of the employees and staff members on the contents of this EMP.

### **2.3 ENVIRONMENTAL CONTROL OFFICER (ECO)**

The Environmental Control Officer (ECO) for the site is an independent environmental consultant appointed by the Eddie Angula Trust to monitor and review the on-site environmental management and implementation of this EMP.

The duties of the ECO include (but are not limited to) the following:

- To ensure that the conditions of the EMP are adhered to at all times and that the appropriate actions are taken;
- To provide an environmental register at the site to be completed by any person/s reporting an environmental incident, issue or concern;
- To identify potential environmental impacts prior to the onset of decommissioning;
- To ensure that the Environmental Impacts (EI) are kept to a minimum;
- To report to the Eddie Angula Trust and the contractor on a regular basis and to inform them of any major environmental impacts;
- To attend important site meetings;
- To inspect the site and surroundings on a regular basis;
- To request the removal of any person/s or equipment not complying with the specifications set out in this EMP;
- To review the EMP on a continuous basis and to submit a report to the relevant stakeholders and/or authorities;
- The ECO shall submit all written/verbal requests and/or instructions to the KTC via the contractor or project engineer.

## **2.4 ENVIRONMENTAL REGISTER**

An environmental register should be kept on site in which incidents related should be recorded. This will include information related to incidents such as spillages, dust generation as well as complaints from surrounding neighbours. Records should also be kept of any actions taken. The register should be open for any person/s on site. The ECO should be responsible for the environmental registry on site.

## **2.5 DISPUTES AND DISAGREEMENTS**

Any disputes or disagreements between role players on site (with regard to environmental management) will be referred to the Directorate of Environmental Affairs (Ministry of Environment and Tourism). If no resolution on the matter is possible it must be presented to an outside party agreed by all parties involved.

## **2.6 ENVIRONMENTAL INCIDENT REPORTING**

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

All complaints received should be directed to the CEO of the Eddie Angula Trust and channelled to the appointed ECO. The Eddie Angula Trust management should respond to the complaint within a week or as soon as possible. All complaints should be entered in the environmental register and all responses and actions taken to address these should be taken.

## **2.7 ENVIRONMENTAL MONITORING**

The day-to-day monitoring and verification that the EMP is being adhered to shall be undertaken by the appointed contractor.

The ECO shall visit and inspect the site at least once a month to ensure that correct operational procedures are being implemented and that the contractor is complying with the environmental specifications of the EMP.

Additional site inspections by the ECO may be required during the initial and final stages of the construction phase. The ECO shall address any queries to the project engineer. If the queries cannot be resolved at this level, they shall be referred to the proponent, if necessary.

The ECO will carry the responsibility of monitoring the implementation of the EMP on site, assisted by the project engineer. In this regard, the ECO will submit a monthly monitoring report to the DEA until after all rehabilitation work has been completed.

Regular meetings will be held between the project engineer and the ECO. The purposes of the meetings shall be:

- To establish the suitability of the contractor's methods and machinery in an effort to lower the risk involved for the environment.
- To discuss possible non-conformance to EMP guidelines or environmental legislation.
- To assess the general state of the environment on site and discuss any environmental problems which may have materialised.
- To accommodate the local community in the decision-making process regarding social and environmental issues on site.

Any non-compliance with the agreed procedures of the EMP is a transgression of the various statutes and laws that define the manner by which the environment is managed. Non-conformance identified during monitoring must be recorded. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the contractor and could stand as evidence should legal action required.

If possible photographs should also be included as evidence to substantiate the report. This report will also suggest mitigation measures to correct the non-conformance (if necessary) and contemplate revisions to any of the strategies used in the construction phase, whether they pertain to monitoring or to construction methods used on site. The non-conformance shall be documented and reported as part of the Monitoring Report.

## **2.8 NON-COMPLIANCE**

The ECO shall issue the contractor a notice of non-compliance whenever transgressions are observed. The contractor/s shall act immediately when such notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken.

The Eddy Angula Trust is responsible for reporting non-compliance with the EMP, to the ECO. The Eddy Angula Trust management together with the ECO must thereafter take the following actions:

- Investigate and identify the cause of non-compliance;
- Report matters of non-compliance to the ECO;
- Implement suitable corrective actions;
- Take actions to prevent reoccurrence of the incident;
- Assign responsibility for corrective and preventative action;
- Any corrective action taken to eliminate the causes of non-compliance shall be fitting to the magnitude of the incident.

## **2.9 SITE MANAGEMENT**

### **2.9.1 Contractors Camp**

The extent and location of the contractor's camp shall be indicated on the site plans to be approved by the engineer and ECO. The planning and design for the construction camp must ensure that there is minimal impact on the environment.

The following should apply:

- The construction camp will be placed within an existing disturbed area as far as possible;
- The camp shall be located in an area of low environmental and social sensitivity;
- The construction camp must preferably be located in such a manner as to minimise visual impact;
- Its final location shall be identified in consultation with the engineer and ECO;
- With the decommissioning of the structures all compacted platforms and slab foundations must be ripped up and be removed.

All vehicles will be allocated a dedicated parking area in the construction camps. The position of which will be agreed by the project engineer and ECO. No storage of vehicles will be allowed outside of the designated areas.

### **2.9.2 Ablution Facilities**

Washing and acts of excretion and urination are strictly prohibited other than at the designated facilities provided. The Contractor shall provide suitable sanitary arrangements within the boundaries of the construction camps or within walking distance ( $\pm 200\text{m}$ ) from where construction activities are taking place.

The exact location of the facilities shall be approved by the ECO and resident engineer prior to establishment. All temporary portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.

Toilets supplied by the contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers and be within walking distance of the staff. These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided. The contractor shall ensure that toilets are emptied regularly, as well as before the builders' holidays. The contractor shall further ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site. Discharge of waste from toilets into the environment is prohibited.

### **2.9.3 Eating Area**

Eating areas should be within the boundaries of the construction camp as agreed with by the ECO. Temporary eating areas (i.e. outside the construction camp) would require very strict requirements and control and would only be allowed once approved by the ECO.

The contractor shall provide adequate refuse bins at the eating area (i.e. permanent or temporary eating areas) to the satisfaction of the ECO and shall ensure that all eating areas are cleaned on a daily basis. Collected waste shall be stored in a central waste area at the main construction camp and disposed of at the local solid waste site on a regular basis. Waste receipts in this regards should be kept on site.



Waste bins at the eating areas should have scavenger proof lids and not left overnight, but removed to the main construction camp on a daily basis.

Cooking of food shall be done using gas cookers only and within the main construction camp only. Cooking with wood is strictly prohibited. No fires may be lit except if approved by the engineer or ECO, and in properly prepared facilities approved by the engineer.

#### **2.9.4 Access Routes**

During the construction phase all construction related traffic shall only access the sites from existing roads and accesses. No new tracks/roads shall be established and only existing roads may be used. Work sites shall be clearly demarcated and road signs erected where needed. The general public shall not have uncontrolled access to the site during the construction phase. In addition, vehicle access will be limited to one or two entrances to facilitate control.

The movement of plant and workmen shall be restricted to the construction areas and essential access routes. The choice of access routes, which shall need the approval of the ECO and project engineer shall where possible, be existing routes. The contractor/s shall control the movement of all vehicles and plant machinery so that they remain on designated/demarcated routes.

Only if absolutely necessary will new routes (temporary or permanent) be allowed, but should be planned in consultation with the ECO and project engineer, constructed and maintained in such manner not to cause any harm or damage to the natural environment or be of any nuisance to the affected community. Temporary roads should be rehabilitated soon after their purpose has expired and should be done in a manner as approved by the ECO.

Special care should be taken to prevent spillages on the roads. Vehicles should be equipped with drip trays to prevent oil and fuel spillages. In the event of spillages, it should be reported to the ECO and resident engineer immediately and cleaned as soon as possible.

The speed limit for light vehicles is 40 km/h and for heavy vehicles 20 km/h. No vehicles are to leave or reverse off designated access roads unless at areas previously agreed to with the project engineer or ECO. Notices should be placed on visible locations in the vicinity of the construction site to warn the public of construction activities and indicating that heavy vehicles may be using the road. Failure to maintain road signs, warning signs or indicator lights, etc., in a good condition shall constitute ample reason for the project engineer to suspend the work until the road signs, etc., have been remedied to his satisfaction.

During construction of roads the contractor/s shall protect all areas susceptible to erosion by installing all necessary temporary and permanent drainage works as soon as possible.

#### **2.9.5 Staff Management**

The contractor must ensure that their employees have suitable personal protective gear and equipment and that they are properly trained in first aid and fire fighting. It is advised that training records be kept for future reference.

### **2.9.6 Fire and Safety Management**

Proper handling, storage, use and disposal of any hazardous waste should be conducted. All electrical installations and wiring at the site must be done and approved by a qualified electrician who would also issue a certificate of compliance.

No fires may be lit except if approved by the project engineer or ECO, and in properly prepared facilities approved by the ECO. Fires shall be kept small and appropriate to their function. Smoking is only permitted in designated smoking areas. Appropriate signage shall be erected in these areas. A container filled with sand and a dedicated fire extinguisher must be available at the smoking area.

The contractor shall take all reasonable measures and active steps to avoid increasing the risk of fire through activities on site and prevent the accidental occurrence and spread of fire. The contractor shall further ensure that there is sufficient fire-fighting equipment on site at all times.

Relevant occupational Health and Safety requirements shall be adhered to. Telephone numbers of emergency services, including the fire safety officer, shall be displayed clearly in the contractor's office near a telephone. No firearms are permitted.

Staff must be made aware of their responsibilities to ensure that impacts such as fire, safety and pollution are taken care of. This must form part of the Environmental Education. The movement of construction workers must be controlled and access to adjacent properties must be prohibited. All excavated areas and/or holes should be clearly demarcated.

### **2.9.7 Aesthetics**

The contractor shall take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

### **2.9.8 Cement and Concrete Batching**

Concrete mixing directly on the ground shall be strictly prohibited and shall only take place in an impermeable surface. All runoff from batching areas shall be strictly controlled and water contaminated by cement shall be collected, stored and disposed of at a suitable wastewater disposal facility.

### **2.9.9 Hazardous substances**

Petroleum, chemicals, harmful and hazardous waste shall be stored in an enclosed and bonded area at the main construction camp. This area shall be subject to the approval of the project engineer and ECO. The waste shall be disposed of at an appropriate disposal site. Any spillage of more than 200 litres must be reported to the Ministry of Mines and Energy as per the regulations of the Petroleum Products Act.

The contractor shall take all preventative measures to ensure that surface or groundwater pollution from hazardous substances does not occur.

### **2.9.10 Waste Management**

During the construction phase, waste will be generated in the form of rubble, cement bags, pipes and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase.

No burying or dumping of any waste materials, rubble or refuse shall occur on site. The contractor shall set up a solid waste control and removal system at the main construction camp and waste shall be disposed of at the local solid waste site on a regular basis. Waste receipts in this regards should be kept on site.

Waste bins at the eating areas should not be left overnight, but removed to the solid waste control and removal system at the main construction camp on a daily basis. The accumulation of construction waste materials must be avoided as far as possible.

In addition the contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water to fit into the larger wastewater management system. The contractor shall prevent the discharge of water contaminated with any pollutants, such as soaps, detergent, cements, concrete, lime, chemicals, glues, solvents, paints and fuels, into the environment. The contractor shall notify the ECO and resident engineer immediately of any pollution incidents on Site.

Water from kitchens, showers, sinks, etc. shall be discharged into a conservancy tank for removal from site. Runoff from fuel depots/workshops/truck washing areas and concrete swills shall be directed into a conservancy tank and disposed of at an approved municipal hazardous waste site.

Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. This includes, but is not limited to; concrete batching areas, vehicle washing, workshop wash bays, paint wash and cleaning. Wash areas for domestic use at the main construction camp shall ensure that the disposal of contaminated water is sanctioned by the ECO.

### **2.9.11 Information Board**

The contractor will be responsible for putting up information boards on site. The number of and locations of these information boards shall be agreed upon by the ECO. The contents of these information boards shall be provided by the contractor and resident engineer as well as the ECO and will essentially be to advise the public of the construction activities and the prohibition on entering certain areas. The information board shall also provide contact details of the ECO, to ensure that the public have access to additional information and also have a communication channel to lodge complaints and raise other issues.

### 3. MANAGEMENT OF ENVIRONMENTAL ASPECTS

#### 3.1 CONSTRUCTION PHASE

##### 3.1.1 Erosion and Sedimentation

Impact Description	<p>Erosion and sedimentation will take place in the event that soils are exposed to the natural elements (i.e. winds and rains) through clearing of vegetation or steep excavations, which in turn could result in seasonal (rain season) degradation of habitats and visual downgrade. The amount of erosion and sediment transport is directly related to what time of the year the construction activities occur and the duration thereof. If clearing and grading activities take place during the wetter months of the year (November to March), substantially more erosion would result.</p> <p>Considering the natural conditions (i.e. topography, soil composition and vegetation cover) erosion and sedimentation can be expected if not effectively managed and mitigated. Due to the fact that the project area falls within a very low rainfall area, it is not expected to be that sensitive to erosion and sedimentation.</p>
Mitigation Measures	<p>Apply acceptable engineering standards and design, or Best Management Practices (BMP). BMPs are defined as physical, structural, and/or managerial practices, that when used singly or in combination, prevent or reduce the expected impact/s. Structural BMPs typically include sediment ponds or traps, stabilised construction entrances, filter fences, check dams, and riprap. Managerial BMPs include preserving the natural vegetation, leaving buffer zones, and providing dust control.</p> <p>Plan the timing of construction to avoid clearing and grading during erosive high rainfall months of the year. Avoid unnecessary and excessive vegetation clearance and disturbance of top soil.</p> <p>Contractor should draft a Rehabilitation Plan and re-vegetated exposed areas once construction at the particular area ceased. The Rehabilitation Plan should provide for a phased approach ensuring that no large area is exposed to natural elements (e.g. wind, water).</p>
Responsible Party	Contractor/Proponent

### 3.1.2 Ground and Surface Water Pollution

<p>Impact Description</p>	<p>Construction activities are associated with a variety of potential pollution sources (i.e. cement, oils, diesel, chemicals, paints, etc.), either having a direct and immediate impact or indirect and longer-term impact. As a single incident, in order for ground water to be contaminated, very large quantities of pollutants will have to be released into the environment, of which volumes are not associated with this type of development. Although, however small these potential sources of pollution might be, it still requires special attention (i.e. planning, control and management) to avoid any potential pollution of the immediate environment.</p> <p>The groundwater of the area is not regarded as being of good quality and is not expected to be negatively affected by any pollution, but should be avoided. The study area contains no standing permanent water ponds / artificial wetlands, but can potentially be expected during the rainy season. No flooding of the study area is expected.</p>
<p>Mitigation Measures</p>	<p>Draft and implement a Construction Waste Management Plan to be maintained for the duration of the construction phase.</p> <p>Waste should be stored in appropriate containers in an appropriately constructed area protected against exposure to high intensity rainfall.</p> <p>Waste should be frequently disposed of at the Swakopmund landfill site.</p> <p>Storage of any material or substance that may cause pollution to water sources should be safely handled and stored in accordance with appropriate legislation.</p> <p>A Storm Water Management Plan should be drafted to be maintained for the duration of the construction time frame.</p> <p>Ensure proper maintenance of all construction vehicles and equipment, and conduct continues maintenance and check-ups.</p> <p>Draft and implement a detailed Preparedness and Emergency Plan for all construction related spillages.</p> <p>Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. Polluted soil and building rubble must be transported away from the site to an approved and appropriately classified waste disposal site. Polluted soil</p>

	<p>must be remediated where possible.</p> <p>Drip trays must be placed underneath construction vehicles when not in use to contain all oil that might be leaking from these vehicles.</p> <p>All fuel tanks must be bonded to 120% of the capacity of the tank in order to contain any spillages that might take place.</p> <p>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. These polluted waters should be transported and disposed at the local waste site for hazardous materials.</p> <p>Appointing qualified and reputable contractors is essential. Proper training of construction personnel would reduce the possibility of the impact occurring.</p> <p>'Best' practice measures should be applied to minimise the potential discharge of pollutants onto open soil especially near ephemeral rivers.</p>
Responsible Party	Contractor/Proponent

### 3.1.3 Habitat Destruction and Loss of Biodiversity

Impact Description	<p>The proposed change in land use will permanently change the present landscape and result in the displacement of existing vegetation and faunal populations, including invertebrates and other living organisms.</p> <p>Removal of the natural vegetation cover to make way for the roads, buildings and other infrastructure is inevitable. This should however be done within a responsible manner to avoid unnecessary removal of ground cover or any protected species.</p>
Mitigation Measures	<p>Conduct a pre-construction vegetation survey to establish protected/endangered species to be marked and incorporated into the development.</p> <p>Avoid clear felling i.e. removal of all the indigenous trees/shrubs and grasses of the area prior to development. If required to remove indigenous trees introduce a policy of re-establishing (i.e. planting) 5 indigenous tree species for each indigenous species removed.</p>

	<p>Incorporate the protected species as well as some of the other bigger tree/shrub species in the overall final landscaping of the area. The bigger tree/shrubs often serve as habitat to a myriad of indigenous fauna – e.g. loose bark, cavities, etc. Indigenous plant species also require less maintenance and water than exotic species.</p> <p>Identify and mark trees or other vegetation that should be protected and that should not be removed during construction.</p> <p>Show overall environmental commitment by adapting a minimalistic damage approach.</p> <p>A Rehabilitation Plan should address all aspects of the natural environment on completion of construction and prior to operation.</p> <p>Restrict construction vehicle movement to the site or beyond the construction site boundaries.</p> <p>No hunting, trapping, setting of snares or any other disturbance of any fauna species.</p> <p>During the planning phase of the construction period, the appointed contractor should identify areas for lay down areas and construction vehicle sites within areas that are already cleared or disturbed.</p> <p>Only prominent gravel tracks should be utilised during the construction phase, to avoid track proliferation. Off-road driving should be strictly prohibited.</p> <p>Permits should be obtained for protected plant species that unavoidably need to be removed.</p> <p>Construction activities should be subject to well-coordinated planning to avoid unnecessary removal of vegetation particularly protected plant species. Unnecessary destruction of habitats within the footprint of the construction site should be avoided.</p>
Responsible Party	Contractor/Proponent



### 3.1.4 Visual Aesthetics and Sense of Place

Impact Description	<p>Although temporary, construction activities are known to have a visual impact due to the nature of the activity. The surrounding land uses to the proposed project sites are typical uses like institutional, business, and residential uses which are normally associated with a town. The activities to be accommodated on the proposed project area are in line with these.</p>
Mitigation Measures	<p>Keep as much natural vegetation on site as possible to screen construction site and activities. Undertake rehabilitation of the disturbed areas.</p> <p>Restrict the amount of structures on site and restrict the height to a maximum of 3 meters, where possible.</p> <p>If required structures should be painted in natural colours to lessen the visual impact.</p> <p>Keep the construction site tidy and clean of any construction waste, especially over weekends.</p> <p>No accommodation of any staff should be allowed on site.</p> <p>Limit construction vehicle movement in the area to a minimum and use designated pre-demarcated routes having the least possible impacts on residents.</p>
Responsible Party	Contractor/Proponent

### 3.1.5 Dust & Emissions

Impact Description	<p>The air quality in the area is considered to be good, based on the potential impact that current activities in the area are likely to have on air quality.</p> <p>Dust and emissions are associated with construction activities (i.e. digging; clearing; excavating etc.) of which the severity is directly related to the extent of the development and the nature of the receiving environment. Given the activities within the immediate surroundings, dust is expected to be more of a nuisance than emissions, as a result of construction activities.</p> <p>Considering the prevailing winds throughout the year and the surrounding receptors, dust nuisance is not expected to be of any significance. However, dust control is considered important and requires effective mitigations.</p>
Mitigation Measures	Regular dust suppression, if required, during times of strong

winds, should minimise dust impacts mainly with respect to the contractor's staff. Dust suppression by means of wetting should only be done with treated wastewaters.	winds, should minimise dust impacts mainly with respect to the contractor's staff. Dust suppression by means of wetting should only be done with treated wastewaters.
Removal of vegetation should be restricted to the minimum and should only be done when necessary.	Removal of vegetation should be restricted to the minimum and should only be done when necessary.
Construction activities during high winds should be limited to those activities not generating dust.	Construction activities during high winds should be limited to those activities not generating dust.
Handling and transport of erodible materials should be avoided under high wind conditions.	Handling and transport of erodible materials should be avoided under high wind conditions.
Where possible, topsoil stockpiles should be located in sheltered areas and covered.	Where possible, topsoil stockpiles should be located in sheltered areas and covered.
Appropriate dust suppression measures should be used when dust generation is unavoidable particularly during prolonged dry periods in summer. Such measures shall also include the use of temporary stabilising measures.	Appropriate dust suppression measures should be used when dust generation is unavoidable particularly during prolonged dry periods in summer. Such measures shall also include the use of temporary stabilising measures.
No fires should be allowed on-site for any purpose and construction waste are not allowed to be burned on-site.	No fires should be allowed on-site for any purpose and construction waste are not allowed to be burned on-site.
It is imperative that all machinery and vehicles on site is road worthy and do not give rise to excessive smoke or emissions.	It is imperative that all machinery and vehicles on site is road worthy and do not give rise to excessive smoke or emissions.
The contractor's workers are to be provided with access to dust masks.	The contractor's workers are to be provided with access to dust masks.
Responsible Party	Contractor/Proponent

### 3.1.6 Traffic Safety

Impact Description	Construction activities are associated with an increase in vehicles of different kinds (i.e. workers' busses, delivery vehicles and construction vehicles) to and from the project site, which inevitably increase risk and conflict. It is important that all vehicle drivers be informed of their potential impact on the environment and on the roads, and that the necessary measures are taken to prevent any accidents as a result of increased traffic.
Mitigation Measures	Contractor's workers should adhere to speed limits.  Appropriate signs and flag man should be in place along the roads being used by construction vehicles notifying road users and residents of the construction activity and roads used by construction vehicles.

Responsible Party	<p>Drivers of construction vehicles should have valid driver's licenses with ample experience on proper road usage and manners on-site as well as when making use of public roads.</p> <p>Construction vehicles' need to be in a road worthy condition and maintained throughout the construction phase.</p> <p>Make use of predetermined roads on the construction site and refrain from creating new roads for access purposes.</p> <p>The movement of heavy vehicles to and from the construction site must occur outside of peak traffic hours (thus after 08h30 and before 16h30). Delivery vehicles should preferably stick to the same times to avoid peak hour traffic and resulting nuisance to residents.</p> <p>Provide traffic signals and road markings where necessary to ensure safe traffic movement.</p>
Responsible Party	Contractor/Proponent

### 3.1.7 Health, Safety & Security

Impact Description	<p>Areas in which construction activities are taking place usually are associated with criminal activity, posing a security risk to those residing in the area. It is not to say that these criminal activities are as a result of the construction staff, but is known to happen in the vicinity of construction sites.</p>
Mitigation Measures	<p>Construction workers should not overnight at the site, but only the security personnel.</p> <p>Ensure that all construction personnel are properly trained.</p> <p>Provide for a first aid kit and properly trained person to apply first aid when necessary.</p> <p>A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases.</p> <p>Restrict unauthorised access to the site and implement access control measures.</p> <p>Clearly demarcate the construction site boundaries along with signage of no unauthorised access.</p> <p>Clearly demarcate dangerous areas and no go areas on site.</p>

	<p>Staff and visitors to the site must be fully aware of all health safety measures and emergency procedures.</p> <p>The contractor must comply with all applicable occupational health and safety requirements. The workforce should be provided with all necessary Personal Protective Equipment (PPE) including earplugs.</p> <p>All affected land owners should be notified at least one month in advance who the appointed contractor is and provided with details about the proposed construction activities and timeline.</p>
Responsible Party	Contractor/Proponent

### 3.1.8 Natural Resources

Impact Description	<p>The construction phase requires both water and electricity of which water is currently the source under pressure. The construction of roads would require the highest volume of water followed by dust suppression.</p> <p>Alternative water resources (such as treated wastewater) should be used during the construction phase. A very small part of the construction phase would require potable water.</p>
Mitigation Measures	<p>There should be no tolerance towards water wastage.</p> <p>Treated wastewater should be obtained and used for the bulk of the construction requirements.</p> <p>Temporary catchment dams should be constructed to capture water if construction takes place during the rainy season.</p> <p>Local underground water not fit for human and animal consumption should be used.</p>
Responsible Party	Contractor/Proponent

## 3.2 OPERATIONAL PHASE

### 3.2.1 Erosion and Sedimentation

Impact Description	<p>Erosion and sedimentation during the operational phase is highly unlikely, as provision will be made for storm water management, which reduces the occurrence of erosion and sedimentation.</p> <p>It will however take place in the event where open areas are cleared of vegetation, for whatever reason, which would then result in erosion and sedimentation. Open areas should therefore be kept within a natural state and no vegetation removal should be tolerated.</p>
Mitigation Measures	<p>The storm water culverts and system should be well maintained.</p> <p>The occurrence of erosion should be monitored and mitigated.</p>
Responsible Party	Proponent/Residents

### 3.2.2 Ground and Surface Water Pollution

Impact Description	<p>Ground and surface water pollution can have a negative effect on the receiving environment. Sources of potential pollution include, but are not limited to hazardous liquids (i.e. diesel/petrol/cleaning liquids) stored at homes or businesses; leakages from wastewater network; pesticides; improper storage of domestic waste and dumping of waste within open areas. Increased run-off created as a result of the proposed development (i.e. roofs and other hard surfaces) could enhance pollutant transportation, as well as increase the distance pollutants can be transported from its source.</p> <p>There are no permanent standing water bodies on the project sites that had been identified during the site visits. As mentioned previously, in order for groundwater to be contaminated, large amounts of pollutants will have to seep through the soil over a period of time. It is therefore our opinion that the significance of potential damage to water resources as a result of the proposed development is low. Care should be taken to protect the environment and to prevent any possible pollution.</p> <p>It is important to note that it is not only the quality of the surface water that can be negatively affected, but also the aesthetic component of the natural environment. With the correct attitude and with precautionary measures in place,</p>
--------------------	--

	groundwater contamination and waste pollution in general, can easily be prevented.
Mitigation Measures	<p>Draft and implement a Wastewater Management Plan that aims at monitoring the entire wastewater network and checking for any leakages, by the Local Authority.</p> <p>Continuous awareness of harmful practises and keeping of hazardous liquids should be undertaken by the Local Authority.</p> <p>The discharge of pesticides and herbicides in harmful quantities should be prevented. Pesticides and herbicides should not be used during periods of rainfall; and biodegradable pesticides and herbicides with short half-lives of three days or less should be used. It is recommended to rather use local indigenous flora throughout the landscaped areas and minimise any other plants, trees and lawns as part of the landscaping areas to minimise the necessity for any pesticides and herbicides.</p> <p>Ensure that surface water are channelled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment.</p>
Responsible Party	Proponent/Residents

### 3.2.3 Habitat Destruction and Loss of Biodiversity

Impact Description	The most destructive disturbance to the local habitat takes place during the construction phase, when the land is prepared for the intended infrastructure. The risk of further habitat destruction during the operational phase depends on the mind-set and environmental awareness of the residing community.
Mitigation Measures	<p>Conduct an erf-specific vegetation survey to establish protected/endangered tree/shrub species to be marked and incorporated into the erf layout. If required to remove indigenous trees, introduce a policy of re-establishing (i.e. planting) 5 indigenous tree species for each indigenous species removed. Permits should be obtained for protected plant species that unavoidably need to be removed.</p> <p>Incorporate the protected species as well as some of the other bigger tree/shrub specimens in the overall final landscaping of the erf. The bigger tree/shrubs often serve as habitat to a myriad of indigenous fauna – e.g. loose bark, cavities, etc. Indigenous species also require less maintenance and water than exotic species.</p>

Show overall environmental commitment by adapting a minimalistic damage approach.

Avoid introducing potential invasive alien species – e.g. *Lantana*, *Prosopis*, *Opuntia*, *Tecoma*, etc. species – in the eventual landscaping (i.e. ornamental plants) as these have the potential of escaping and infesting the local surroundings.

No hunting, trapping, setting of snares or any other disturbance of any fauna species within the open areas.

Avoid unnecessary and excessive vegetation clearance and disturbance of top soil for purpose of landscaping. With regards to landscaping the following should be done –

- Landscaping should be done using local and indigenous vegetation.
- Lawns as part of the landscaping should be limited to the minimum.
- No alien species should be used as part of the landscaping.

Recreational activities should be done in a coordinated manner and of a minimum impact (e.g. hiking, cycling). Existing tracks should be used for purpose of hiking and cycling to restrict any further impact to the ecology.

Off-road driving should be strictly prohibited.

Residents should be informed and educated not to remove any plants or animals from the open areas.

Eliminate point discharges for storm water outflow and release storm water at the same rate as natural runoff restricting erosion and habitat loss.

Habitat corridors should be created by introducing culverts underneath the planned roads. This will enhance migration of small fauna species through the proposed development area.

Fencing of erven should be done not to restrict smaller animals from migrating. Fences should provide for the necessary spacing in between wires to allow smaller animals from moving freely. In the event of electrification, the bottom wires should be for alarming purpose only and not for electrocuting as this will result in various deaths, especially smaller reptiles.

	Prevent the killing of species viewed as dangerous – e.g. various snakes – setting of snares (i.e. poaching) or collection of veld foods (e.g. tortoises).
Responsible Party	Proponent/Residents

### 3.2.4 Visual Aesthetics and Sense of Place

Impact Description	The operational phase consisting of various buildings and infrastructure will have an urban sense of place. The lasting visual aesthetics is determined by the architecture and scale of buildings, emphasised by the receiving environment's topography and vegetation cover.
Mitigation Measures	<p>Keeping as much natural vegetation within the entire property to enable screening. Landscaping on ground level with indigenous trees and shrubs can soften the visual impact from the larger and immediate surroundings. This will increase the sense of place and make the development easier on the eye. Landscaping will further reduce noise impacts, glare and heat.</p> <p>Structures and buildings can be constructed or clad with natural stone to blend with the colours of the immediate surroundings. Buildings should be painted with natural colours to promote blending with the natural environment and to lessen the visual impact.</p> <p>Care needs to be taken with reflective or bright surfaces so that glare is avoided.</p> <p>Large areas of bright colours are to be avoided although small areas of colourful accent may be used provided that the colours are chosen to compliment the environment. Generally, darker colours and neutral greys are proposed.</p> <p>Roofs are usually most visible and the finishes need to be chosen to reduce the visual impact from elevated positions. Neutral greys are generally most useful in making structures recessive.</p> <p>Light sources must be placed in such a way, or shielded, so as to provide light only to the area that needs to be lit. Light spillage and pollution must be minimised.</p> <p>Introduce architectural guidelines to minimise the impact (i.e. reduce height of structure to the minimum; cover residential dwellings like structures to appear as natural as possible; etc.)</p>
Responsible Party	Contractor/Proponent/Residents



### 3.2.5 Noise & Disturbance

Impact Description	<p>Apart from vehicle movement, no other noises of significance are associated with the operational activities. Noise disturbance from the C34 main road running through the town is to be expected.</p> <p>Urban developments of this scale and nature are not associated with activities generating unhealthy noise levels, such as industrial activities or agricultural activities. The increase in vehicle movement to and from the proposed developments will have a slight increase in traffic noise compared to the current status, but is expected to be of low significance.</p>
Mitigation Measures	Consider the existence of traffic along the roads during the design and orientation of dwellings.
Responsible Party	Contractor/Architects

### 3.2.6 Traffic & Safety

Impact Description	Operational activities in this respect are associated with vehicle movement of residents' and visitors' to and from the proposed developments.
Mitigation Measures	Proper road designs (soft bends, circles etc.) should be incorporated to limit speeding and maintained for the duration of the lifetime of the development.
Responsible Party	Contractor/Proponent