



Paratus Telecom, TKF Project Environmental Management Plan (EMP)

For the Installation of a Telecommunication Cable between
Buitepos and Walvis Bay along the existing Transnamib Servitude.

21st April 2017



Project Name:

Paratus Telecommunications – Installation of Fibre Optic Cable between Buitepos and Walvis Bay along the existing Transnamib Servitude

Stage of Report

Environmental Management Plan – Submission to Authorities

Client

Paratus Telecommunications

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ENVIRONMENTAL COMPLIANCE CONSULTANCY



DECLARATION OF INDEPENDENCE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

I, **Stephan Bezuidenhout**, declare that –

General declaration:

- I act as the independent environmental practitioner in this application/tender
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations



SIGNATURE30th March 2016

DATE

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Definitions and Abbreviations

DEA	Directorate of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECC	Environmental Compliance Consultancy
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
Ha	Hectares
HAZMAT	Hazardous Material
I&APS	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
MAWF	Ministry of Agriculture Water and Forestry
MET	Ministry of Environment and Tourism
MSDS	Material Safety Data Sheet
Paratus	Paratus Telecommunications

1. INTRODUCTION

1.1. BACKGROUND

Environmental Compliance Consultancy (ECC) has compiled this Environmental Management Plan (EMP) in accordance with the Environmental Management Act, 2007 on behalf of Paratus Telecommunication (Paratus).

Paratus intends to install a single fibre optic cable on the existing servitude using existing pylons (where available or replacing poles if required) from Buitepos to Walvis Bay, Namibia. The purpose of this EMP is to support the request for environmental clearance for the installation of the fibre optic cable on the existing railway servitude utilising existing infrastructure as available (refer to figure below).

The railway servitude has already impacted the areas through which it has been constructed, and the activities and infrastructure associated with the railway (e.g. roads, tracks, pylons) will continue to impact the adjacent environment, however, any additional potential environmental impact resulting from the cable will be minimised by environmental management.

The route does not traverse any pristine areas, not even within the Dorob National Park between Swakopmund and Walvis Bay (Cunningham, 2017). This document represents the Environmental Management Plan (EMP) for the proposed installation of a single fibre optic cable from Buitepos to Walvis Bay, Namibia.

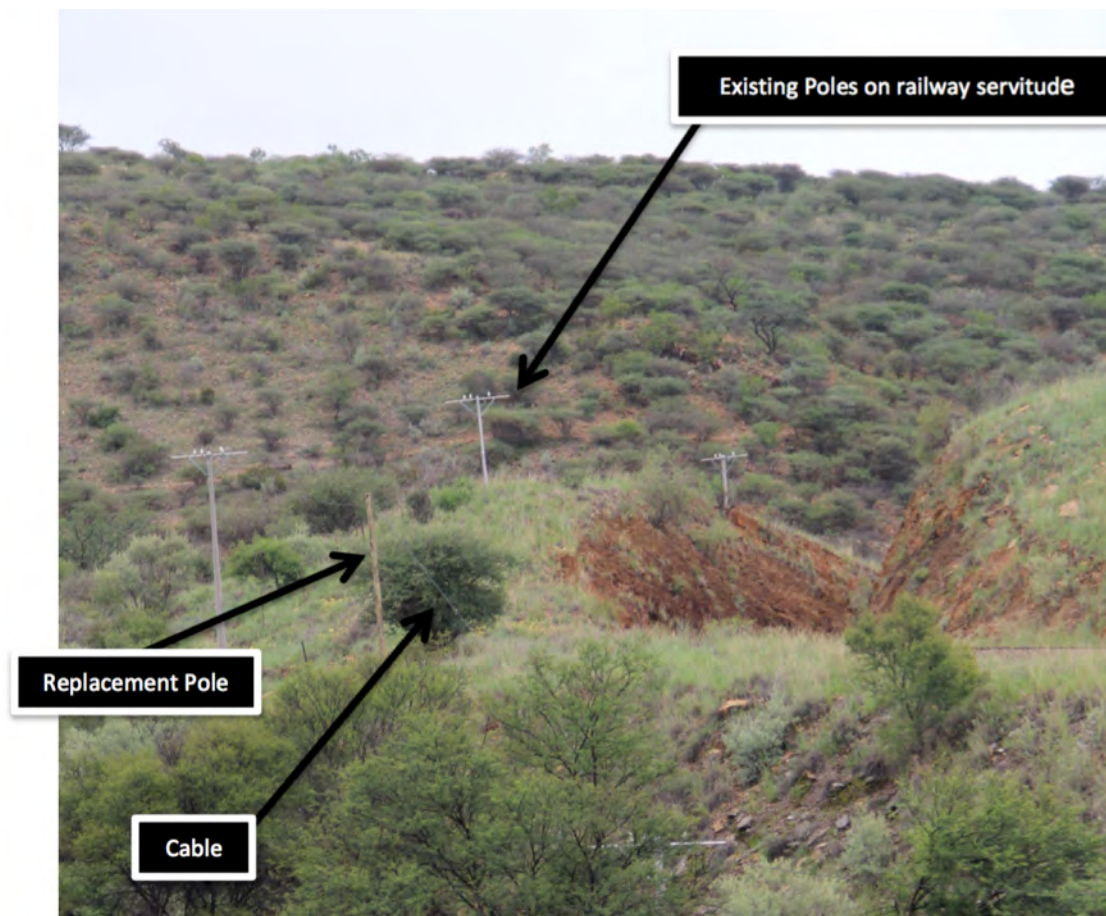


Figure 1 - Paratus Fibre Optic Cable installation on existing servitude – existing Paratus project status complete.

1.2. DOCUMENT HIERARCHY

In terms of the Namibian Environmental Impact Assessment (EIA) Regulations (Government Notice (GN) 28, 29, and 30 promulgated on 6 February 2012) enacted in terms of the Namibian Environmental Management Act (Act no. 7 of 2007) (EMA), the proposed activity requires an Environmental Management Plan.

This Environmental Management Plan (EMP) has been developed to assist Paratus during the construction and operational/maintenance phase. Where there is any conflict between the provisions of this EMP and any contractor's obligations under their respective contracts, including statutory requirements (such as licences, Project Approval conditions, permits, standards, guidelines and relevant laws), the contract and statutory requirements are to take precedence.

In the event of any real or perceived ambiguity between elements of this EMP, the Contract and/or statutory requirements, the Contractor shall first gain clarification prior to implementing that element of the EMP over which the ambiguity is identified.

1.3. OBJECTIVES

The objective of this EMP is to detail the environmental management framework, practices and procedures that will be followed during the installation of the cable, replacing missing poles, and during any follow-up maintenance or repair work, with the aim of minimising potential environmental impacts and ensuring that statutory requirements and other obligations are fulfilled.

1.4. PROJECT SUMMARY

Paratus Telecommunication intends to install a fibre optic cable from Buitepos on the eastern boundary of Namibia, to Walvis Bay on the west coast of Namibia (see figure 2).

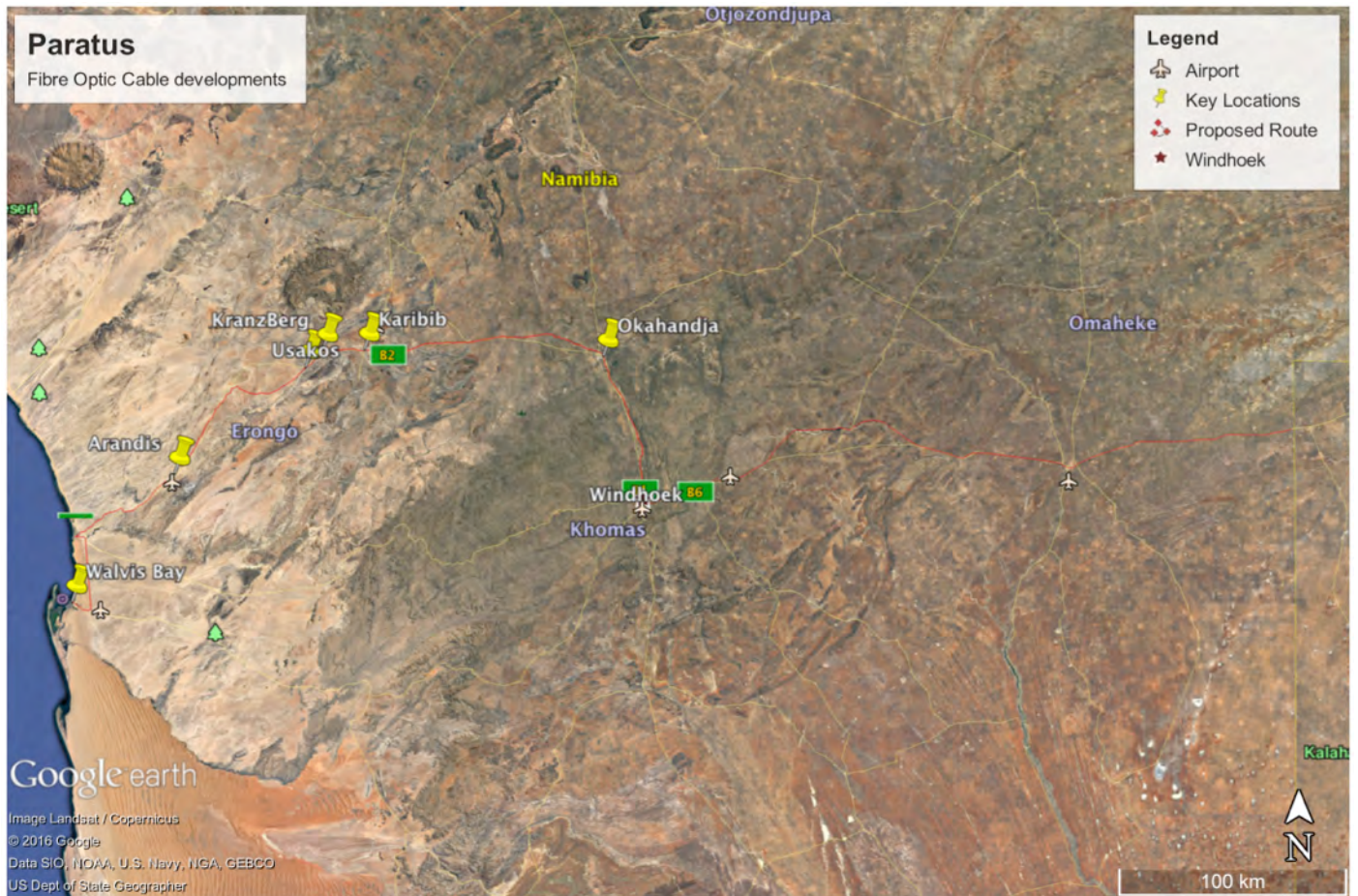


Figure 2 - Proposed Cable Route along existing servitude

Poles and cables will be stock-piled along the route during the construction phase. To expedite the construction process and limit long distance travel to and from towns, workers will make use of fly camps along the route as required.

The project will utilise existing roads and servitude access points. To ensure minimal impact to the environment and due to the nature of the works materials are generally carried in by hand to the required site limiting any potential ground disturbance.

The Ministry of Environment and Tourism (MET) has requested that the contractors only use pre-existing roads during the construction process, for the placement of poles and for access to construction, storage and encampment sites.

The cable will be suspended from existing poles on the railway servitude. In the case where existing poles are missing for example due to TransNamib removal, damage or theft, the poles will be replaced by Paratus. Each pole approximately 7m long will be buried 1m into the ground, standing 6m high in line with the existing poles. Poles are spaced approximately 60 to 70 m apart refer to figure 1. The earth removed when digging the holes for the poles is used to backfill the same holes to bury the poles see figure 3.



Figure 3 - Low impact installation of poles (existing Paratus project – status complete)

The proposed cable route follows the existing railway servitude. The area has historically been impacted by the initial construction of the servitude. The impact (albeit minor impact) to the area continues through the continued use of the servitude. No part of the route can be considered “pristine” (Cunningham, 2017). Additional Impact will thus be limited to vegetation clearance and ground disturbance when digging the holes, storing the poles and at campsites. The suspended cable can be considered an aerial impact and as such a ecologist specialist study has been conducted to inform the project and this EMP.

None of vertebrate fauna or flora found throughout the proposed route is associated exclusively with, or is unique to, the various habitats (and associated vegetation types) throughout the proposed route (Cunningham, 2017). The most significant impact from the cable installation is likely to be associated with “pylon sensitive” birds, but it is considered to be marginal (Cunningham, 2017). Refer to desktop study for lists of protected species that may occur along the project route, noting the site is already previously disturbed so the occurrence of protected vegetation is deemed unlikely (Appendix 1).

2. ENVIRONMENTAL MANAGEMENT FRAMEWORK

2.1. ROLES AND RESPONSIBILITIES

Paratus Telecommunications environmental management structure for construction and operations for the project is outlined below:

2.2. PROJECT MANAGER

A Project Manager will be appointed by Paratus Telecommunications and will be available throughout construction and for the duration of the cable installation process. The Project Manager will be responsible for the following roles:

- Ensuring the construction contractor/s are aware of the commitments made in the EMP and any other relevant regulatory requirements and that construction will be undertaken in compliance with these;
- Conducting project meetings regularly during the construction period to review actions arising from previous inspections, current status of tasks and schedule of upcoming tasks;
- Arranging an independent 3rd party audit to assess the level of compliance to the EMP;
- Liaising with the Paratus Environmental Officer

2.3. ENVIRONMENTAL OFFICER

An Environmental Officer (EO) will be appointed or nominated responsible for the project. The EO will be available, as required, throughout construction and operation of the project. The EO will be responsible for the following roles:

- Being the principal contact point in relation to environmental performance of the project;
- Notifying relevant regulatory authorities if serious environmental incidents occur as soon as practical;
- Being responsible for all management plans and environmental monitoring;
- Being responsible for receiving and responding to environment-related complaints received from the public or other stakeholders;
- Bearing authority and independence to demand reasonable steps as required to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant construction activities be ceased immediately should an adverse impact on the environment be likely to occur.
- Utilising the tools attached to this document as appendices to monitor compliance (Appendices 2-4).
 - Weekly Checklist must be completed by the ECO and findings submitted to the Project Manager
 - Monthly EMP Checklist must be completed monthly by the ECO. Findings are to be submitted to the Project Manager
 - Internal Compliance Certificate must be completed monthly by the ECO incorporating the checklist' findings. This certificate must be submitted to the Project Manager

In addition, the Environmental Officer will be responsible for the following:

- Maintaining and providing assistance in the implementation of this EMP;
- Undertaking environmental monitoring and ensuring statutory compliance with government agencies and legislation;
- Maintaining environmental records including environmental monitoring data, complaints and environmental incident reports;
- Ensuring that best environmental practice is undertaken throughout the duration of the construction period.

- Provisioning of environmental awareness/management training and inductions;
- Timely distribution of any relevant environmental documentation, including revisions to this EMP, to all construction managers and contractors;
- Reporting to the Project Manager

2.4. SAFETY OFFICER

A Safety officer for the project will be available, as required, throughout construction of the project. The Safety Officer will be responsible for the following roles:

- Being the principal contact point in relation to safety performance of the project;
- Reporting to the Project Manager and Paratus Health and Safety Department;
- Ensuring that best Health and Safety practice is undertaken throughout the duration of the construction period;
- Provisioning of Health and Safety awareness/management training and inductions; and
- Maintaining Health and Safety records including monitoring data, risk assessments and incident reports.

2.5. PERMITS REQUIRED

During the construction phase of the cable installation, certain situations may arise that will necessitate action on the part of the contractors for which permits may be required. The following is a list of permits that may potentially be required. Some of these can be applied for during the planning phase in order to avoid delays during construction.

Table 1 - General and specific permits that may be required during the installation phase

ACTION	PERMIT	AUTHORITY
Cutting or removing trees or branches	Permit for removal of protected and unique species.	Ministry Agriculture, Water and Forestry
Drilling at road crossings	Permit from the local Municipality to allow the contractor to drill through the road/pavement	Relevant City Council or road authority

2.6. PARATUS TELECOMMUNICATIONS CONTRACTORS

During the construction and installation phase, the Contractor/s, including all employees and subcontractors, are responsible for the following:

- Undertaking construction activities in accordance with this EMP as well as relevant policies, procedures, management plans, statutory requirements, and contract requirements;
- Implementing appropriate environmental and safety management measures;
- Reporting of environmental issues, including actual or potential environmental incidents and hazards, to the Environmental Officer or Project Manager; and
- Ensuring appropriate corrective or remedial action is taken to address all environmental hazards and incidents reported by employees and subcontractors.

2.7. TRAINING REQUIREMENTS

All project personnel including contractors, subcontractors and employees are required to undertake environmental induction prior to commencing work on site. The employer and contractor shall ensure that all site personnel have a basic level of environmental awareness training.

Training will include the following:

- A general site specific induction that outlines
 - What is meant by “environment”
 - Why the environment needs to be protected and conserved
 - How construction activities can impact on the environment and
 - What can be done to mitigate against such impacts.
- Familiarisation with this EMP and its requirements
- Awareness of social responsibility during construction.
- Awareness of emergency and spill response procedures.
- Appropriate incident reporting methods and requirements.
- The importance of conformance with this EMP, as well as relevant statutory requirements.
- The potential consequences of non-compliance with this EMP and relevant statutory requirements.

2.8. ENVIRONMENTAL EMERGENCY AND RESPONSE

The Environmental Officer will be the primary contact person in the event of an environmental emergency. As discussed under Section 2.3, the Environmental Officer has the authority and independence to request reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse environmental impact be anticipated.

In the event of an incident that requires the emergency services, the following services should be contacted:

Table 2 - Emergency Services contact telephone numbers

TOWN	AMBULANCE	POLICE	FIRE BRIGADE
GOBABIS	+264 625 62275	+264 62 10111	+264 625 66666
WITVLEI	+264 625 62275	+264 62 10111	
OMITARA	+264 62 56 6200	+264 62 10111	+264 62 54 0231
WINDHOEK	+264 61 211 111	+264 61 10111	+264 61 211 111
OKAHANDJA	+264 625 03030	+264 62 10111	+264 625 01051
USAKOS	+264 64 53 0023	+264 64 10111	+264 64 53 0023
ARANDIS	+264 645 10022	+264 64 10111	+264 645 10171
SWAKOPMUND	+264 64 410 6000	+264 64 41 5000	+264 64 410 4639
WALVIS BAY	+264 64 21 6300	+264 64 10111	+264 81 122 0888

For large-scale spills and other significant environmental incidents, the fire services should be contacted as required and the MET office informed of the incident (telephone +264 61 284 2111). All correspondence with MET should be undertaken by the Project Manager as guided by the Environmental Officer.

For the clean-up of smaller spills, the relevant Material Safety Data Sheet (MSDS) should be consulted to determine the appropriate clean-up procedure. Basic spill response training will be provided as part of the site environmental induction, spill response equipment, including relevant MSDS copies, will be provided in areas where potentially environmentally hazardous chemicals may be used.

All environmental incidents, regardless of their size or significance, should be recorded and reported to either the Project Manager or Environmental Officer.

3. INCIDENT REPORTING

The Contractor must have an accident and incident reporting system that covers all applicable statutory requirements.

3.1. MINOR INCIDENT OR “NEAR MISS”

Any incident or “near miss” involving the Client, the Client’s nominated representative, the Contractor, its subcontractors or any third party’s personnel, property, plant or equipment, must be

- 1) Orally reported to the Client or the Client’s nominated Representative:
 - a. immediately and without delay
 - b. regardless of whether or not injury to personnel has occurred
 - c. or property or equipment has been damaged.
- 2) Written up and handed to the Client or the Client’s nominated Representative by the end of the shift . The written report should:
 - a. state all known facts and conditions at the time of the incident and
 - b. include a preliminary assessment of the most likely potential consequences of the incident under the current circumstances.

3.2. SERIOUS INCIDENT

For any serious incident involving a fatality, or permanent disability, the incident scene must be left untouched until witnessed by a representative of the Police. This requirement does not preclude immediate first aid being administered and the location being made safe.

3.3. INCIDENT REPORT AND CLOSE OUT

The Contractor must investigate the cause of all work accidents and significant incidents and must provide the Client or the Client’s nominated Representative with the results of the investigation and recommendations on how to prevent a recurrence of such incidents. A formal root-cause investigation process should be followed.

4. ENVIRONMENTAL MANAGEMENT MEASURES

A number of potential environmental impacts may occur during the cable installation process and once the cable is installed. These can be divided into 3 sections: (1) Pre-installation/Survey; (2) Installation/Construction and (3) Operational/Maintenance Phases. Potential impacts included:

Table 3 - Potential Impacts for the survey, installation and maintenance phases

IMPACT	PHASE 1 = SURVEY, 2 = CONSTRUCTION, 3 = MAINTENANCE / REPAIR
Environmental education	1, 2, 3
Health and Safety	2, 3
Air quality and dust (vehicular traffic)	1, 2, 3
Surface water quality	2
Soil removal and contamination	2, 3
Spills	2
Destruction or removal of vegetation and the introduction of weeds or alien species	2, 3
Relocation of fauna	2, 3
Waste generation and disposal	2, 3
Heritage Management	2, 3

Individual management plans have been developed to minimise these impacts and provide a management framework for the Contractor. A summary of each management plan is provided below:

- **Education Plan** – General behaviour and accountability from the construction crew based on basic education as described in sections 2.6 and 2.7 above.
- **Health and Safety Management Plan** – Apart from compliance to sections 2.6 and 2.7, workers should be provided with all necessary facilities and equipment in the field and should follow safe construction practices.
- **Air Quality Management Plan** - Air quality management measures to minimise the production of airborne dust and other gaseous emissions.
- **Surface and Ground Water Quality Management Plan** - Surface water and Groundwater management measures including controls and measures to avoid contamination of water sources.
- **Soil Removal and Contamination Management Plan** – Soil removal and relocation management measures to minimise soil erosion, the mixing of different soil types and topsoil contamination.
- **Spill Management Plan** - Preventative measures to minimise the potential for a spill and management measures should a spill occur.
- **Vegetation Management Plan** – Minimize and manage the amount of natural vegetation that has to be removed or cut for the safe installation of the poles and cable. Prevention and management measures for introduced weed species and alien invasives.
- **Fauna Relocation Management Plan** – Minimize and manage the relocation of fauna and habitats (e.g. nests) and provide alternates.
- **Waste Management Plan** - Procedures for the appropriate management of waste materials.
- **Heritage Management Plan** - Procedures for the appropriate management of Heritage sites.

5. EDUCATION MANAGEMENT PLAN

5.1. INTRODUCTION

Education of staff is the easiest way to prevent environmental damage and promote health and safety of the people involved in the project, and those living around construction areas. All site personnel should uphold an acceptable level of general conduct with respect to social and environmental awareness.

5.2. OBJECTIVES

The main objective of the Environmental Education Management Plan is to ensure a basic level of environmental and social awareness. The construction activities and the behaviour of the workers must not significantly impact adjoining properties such as farms and villages.

5.3. RESPONSIBILITIES

Contractor - The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed, and implement the necessary management practices in order to meet the objectives listed above.

Environmental Officer - To ensure that the objectives listed above are being met.

5.4. GENERAL MANAGEMENT PROCEDURES

A general regard for the social and ecological well being of the route and adjacent areas is expected of the team working on this project. The Contractor will minimise the potential for harm and/or injury during the cable installation activities by undertaking the following management measures, as required:

- Vehicle movements will be restricted to pre-existing designated roads only.
- No vegetation may be cut for use at the camps (e.g. fire wood).
- No trespassing on adjacent land.
- No snares or catching of wildlife is permitted.
- Prevent excessive noise.
- Prevent unsocial behaviour.
- Construction staff are to make use of the facilities provided for them.

Table 4 - General procedures and restrictions for the construction and maintenance phases

Aspect	Phase	Restriction / Action	Responsibility
Roadside camps	1 Survey, 2 Construction, 3 Maintenance	Workers may not bring pets onto the construction site or to the fly camp.	Project Manager & Contractor
	1 Survey, 2 Construction, 3 Maintenance	Trespassing on properties adjoining the railway servitude is forbidden.	Project Manager & Contractor
	2 Construction, 3 Maintenance	Workers may not harvest firewood from the site or from the areas adjacent to it.	Project Manager & Contractor
	2 Construction, 3 Maintenance	The campsite must be kept clean to minimise the visual impact of the site and minimise vermin and pests. Litter and waste management measures must	Contractor

		be adhered to at all times.	
	2 Construction, 3 Maintenance	Workers may not construct snares or catch wildlife in any other way.	Contractor
	2 Construction, 3 Maintenance	Construction staff must make use of the facilities and equipment provided for them. No ad-hoc alternatives allowed e.g. fires for cooking; the use of surrounding bush as a toilet.	Project Manager & Contractor
Noise pollution	2 Construction, 3 Maintenance	Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise impact	Contractor
	2 Construction	Notice of particularly noisy activities must be given when the construction site is close to inhabited areas.	Contractor
	2 Construction, 3 Maintenance	Noise from roadside camps must not be disturbing or offensive to local communities.	Contractor
Rehabilitation	2 Construction, 3 Maintenance	The contractor should repair any damage that the construction works have caused to neighbouring properties (e.g. repair fences).	Contractor
	3 Post-installation, Maintenance	Areas that have been disturbed during construction must be progressively revegetated.	Contractor
	3 Post-installation, Maintenance	All structures comprising the construction camp are to be removed from site.	Contractor
	3 Post-installation, Maintenance	Fences, barriers and demarcations associated with the construction phase are to be removed from the site.	Contractor
	3 Post-installation, Maintenance	All waste and rubble must be removed from the site	Contractor & Project Manager

5.5. EDUCATION AND GENERAL MANAGEMENT MONITORING PROGRAMME

It is recommended that regular (weekly) and ad-hoc site inspections are completed to determine if the contractor and workers are adhering to the regulations and the EMP. It is the contractor's responsibility to ensure that the instructions, environmental and social awareness aspects of this EMP are properly understood and implemented. A general inspection involving the Client, Contractor and Environmental Control Officer is to be undertaken, post-construction, along the route to ensure that all construction materials have been removed and that remedial measures have been initiated to restore the construction site to the original or planned final condition and standard.

6. HEALTH AND SAFETY MANAGEMENT PLAN

6.1. INTRODUCTION

General operations and construction activities, including roadside camping, have the potential to affect amenity, safety, the environment and human health. A general regard for the social and ecological well-being of the route and adjacent areas, as well as the safety of the workers and the surrounding communities, is expected of the team working on this project.

This Health and Safety Management Plan describes the strategies and procedures that will be implemented to ensure the health and safety of construction workers and nearby sensitive receptors. This Plan identifies and encompasses the safe work practices that are expected of all the Paratus employees, Contractor's and Sub-Contractor's employees who are engaged in the installation, maintenance and repair of the fibre optic cable.

6.2. OBJECTIVES

The main objective of the Health and Safety Management Plan is to ensure the safety of workers in the field, at campsites, and of the surrounding community through appropriate conduct and safety measures. Apart from compliance to sections 2.6 and 2.7, workers should be provided with all necessary facilities in the field e.g. drinking water, personal protective clothing and safety equipment, as well as emergency response training. Field workers must be provided with the telephone numbers of emergency services, and means of contacting these services in the event of a serious incident.

- All workers must be issued and use their own safety equipment as required for specific tasks.
- All workers must adhere to general conduct regulations regarding their own personal safety, as well as the well-being of their colleagues and the surrounding community.
- Workers must be aware of and trained in emergency response methods.
- As far as is possible, all precautions must be taken to ensure that no harm comes to the general public, either directly through construction-related activities or indirectly through irresponsible behaviour of workers on site.

6.3. RESPONSIBILITIES

Contractor - To implement the necessary management practices in order to meet the objectives listed above.

Safety Officer - To ensure that the objectives listed above are being met and to provide performance feedback to the Contractor.

6.4. HEALTH AND SAFETY MANAGEMENT PROCEDURES

Activities that may potentially cause harm to any worker or any member of the surrounding community during the cable installation include the following:

- Vehicle movements.
- Clearing of vegetation and topsoil when digging holes for poles.
- Installation of poles and fibre optics cable.
- General activities around the campsites.

The Contractor will minimise the potential for harm and/or injury during these activities by undertaking the following management measures, as required:

- Vehicle movements will be restricted to pre-existing designated roads only.
- Appropriate speed limits will be set and enforced, particularly on dirt roads.
- Vehicles may not be driven at night in the field or under the influence of medication, alcohol or drugs.
- No alcohol or drugs may be present on site.
- No firearms are allowed on site or in vehicles transporting staff to/from site (unless used by security personnel).
- The Contractor must initiate and maintain programs that conform to all applicable Health and Safety laws or other regulations.
- The Contractor must, at their own cost, establish and maintain safeguards for the protection of workers and the public.

Table 5 - Health and Safety management and mitigation measures for the construction and operational / maintenance phase

Aspect	Phase	Mitigation Measure	Responsibility
Injury prevention	2 Construction, 3 Maintenance	All on-site personnel (including visitors) must use be issued with and wear the following minimum personal safety equipment at all times: • Safety hat • Safety footwear with steel toe protection • Safety glasses with side shields ▪ Prescription glasses must comply with the same standard or impact safety spectacles must be worn over them • Suitable protective clothing (Overalls for all employees involved in manual labour / Long trousers and long sleeves for visitors) • Safety vests and reflective taping as required • Hearing and respiratory protection as required • Hand protection as required	Contractor
	2 Construction, 3 Maintenance	Ensure adequate and functional equipment, stability and safe practices in all aspects of installation operations and site activities	Contractor
	2 Construction, 3 Maintenance	Construction material and equipment must be stacked and stored in a neat, safe and accessible manner, in an area demarcated by the Client, Client representative or Consultant.	Project Manager & Contractor
Personal Protective Equipment and clothing (PPE)	2 Construction, 3 Maintenance	Suitable and adequate Personal Protective Equipment (PPE) should be issued prior to the commencement of any work.	Contractor
	2 Construction, 3 Maintenance	Replacement PPE must be issued. A signed register must be kept to record such replacements.	Contractor
	2 Construction, 3 Maintenance	Ensure adequate and functional equipment, stability and safe practices in all aspects of installation operations and site activities	Contractor
Specific PPE - Welding	2 Construction, 3 Maintenance	• Hard hats with fixed side knobs • Impact Spectacles & Welding Hood • Spats/Apron/Yoke/Respirator • Welding gloves • Knee pads for welders kneeling • Steel toe cap Safety Boots / Shoes	Contractor
Specific PPE - Gas Cutting, Reaming	2 Construction, 3 Maintenance General work	• Hard hats with fixed side knobs • Impact Spectacles & Full Face Visor (reaming) • Front flip goggles (gas cutting) • Spats and Apron • Cutting/Welding gloves	Contractor

		• Steel toe cap Safety Boots / Shoes	
Specific PPE - Grinding	2 Construction, 3 Maintenance General work	• Hard hats with fixed side knobs • Impact Spectacles & Full Face Visor • Hand Protection as required • Spats and Apron • Steel toe cap Safety Boots / Shoes • Ear-plugs for noise exceeding 85Db • Nuisance Dust Masks – 3M Standard	Contractor
Specific PPE - Gloves	2 Construction, 3 Maintenance General work	Applicable Gloves to be worn for all Hand Operations • Termination of cables – glass cutting gloves • Using a Stanley knife - glass cutting gloves • Welding - welding gloves • Gas/Argon cutting – welding gloves • Gloves for artisans and helpers	Contractor
Hazardous materials	2 Construction, 3 Maintenance	There must be an approved and legally appropriate policy for the use, transportation, handling and storage of fuel and hazardous materials.	Contractor
	2 Construction, 3 Maintenance	No chemical, which is potentially hazardous, may be brought onto the site without prior acknowledgement from the Client or the Client's nominated Representative	Project Manager & Contractor
	3 Post-installation, Maintenance	All hazardous materials and waste products must be disposed of in accordance with applicable laws and regulations or in accordance with generally approved practices.	Project Manager

6.5. HEALTH AND SAFETY MONITORING PROGRAMME

The Contractor is solely responsible for undertaking work with the highest regard for the health and safety of its employees, the Client's employees and all persons at or in the vicinity of the site. The Contractor must manage all reasonably foreseeable hazards during the cable installation and routine maintenance and/or repairs, thereafter. Prior to construction activities, the Contractor must submit a Materials Safety Data Sheet with its request for acceptance of each hazardous substance that the Contractor proposes to use on site. The Client or Client's representative can compare on site substances to the approved list during ad-hoc site visits.

7. AIR QUALITY MANAGEMENT PLAN

7.1. INTRODUCTION

Particulate and gaseous emissions from earthworks, vehicle exhausts, wind erosion and other activities associated with the project have the potential to affect amenity, safety, human health and the environment.

This Air Quality Management Plan describes the strategies and procedures that will be implemented to ensure that the health and amenity of construction workers and nearby sensitive receptors are protected from elevated concentrations of airborne dust and other gaseous emissions. The impacts of construction with respect to airborne dust are expected to be limited to vehicular traffic and the digging of holes for the poles. In cases where generators and other machinery are used, there will be some release of exhaust fumes that will impact the immediate vicinity, but will be of short duration.

7.2. OBJECTIVES

The main objective of the Air Quality Management Plan is to ensure that emissions from construction activities are controlled to an acceptable level and do not significantly impact adjoining properties such as the neighbouring communities, farms or other sensitive receptors.

- As far as is reasonably practical construction activities should not generate visible dust.
- Machinery should not emit excessive exhaust fumes.

7.3. RESPONSIBILITIES

Contractor - To implement the necessary management practices in order to meet the objectives listed above.

Environmental Officer - To ensure that the objectives listed above are being met and to provide performance feedback to the Contractor.

7.4. AIR QUALITY MANAGEMENT PROCEDURES

Activities that may potentially emit dust during the cable installation include the following:

- Vehicle movements
- Machinery operations
- Clearing of vegetation and topsoil when digging holes for poles
- Refilling holes

The Contractor will minimise the potential for dust generation during these activities by undertaking the following management measures, as required:

- Vehicle movements will be restricted to pre-existing designated roads only.
- Appropriate speed limits will be set and enforced, particularly on dirt roads.
- Ground disturbance will be minimised as far as practical.
- Vehicles and machinery will be maintained so as to limit exhaust fume emissions.

Table 6 - Air quality mitigation measures for the construction and maintenance phase

Aspect	Phase	Mitigation Measure	Responsibility
Dust and fumes	2 Construction, 3 Maintenance	Vehicles travelling to and from the construction site along the identified routes must adhere to speed limits so as to avoid producing excessive dust.	Contractor
	2 Construction, 3 Maintenance	Vehicles and machinery are to be regularly serviced according to the manufacturers' specifications and kept in good working order so as to minimise exhaust emissions.	Contractor
Rehabilitation	Post-installation	Progressively revegetate areas disturbed during construction	Project Manager & Contractor

7.5. AIR QUALITY MONITORING PROGRAMME

Visual monitoring of construction activities can ensure the minimum discharge of airborne dust and other emissions according to the Air Quality Management Plan.

8. SURFACE AND GROUNDWATER MANAGEMENT PLAN

8.1. INTRODUCTION

Chemical and waste spills must be contained so as not to contaminate the soil or groundwater. Any contact with groundwater must be treated with exceptional care and reported immediately, so as to minimize the potential for contamination of an aquifer. It is important to limit the potential for wastewater seepage to groundwater.

This Surface and Groundwater Management Plan outlines appropriate surface and groundwater water management measures, monitoring programs and reporting procedures to be implemented during cable installation.

8.2. OBJECTIVES

This Surface and Groundwater Management Plan has been prepared to minimise potential impacts on surface and groundwater resulting from construction and the campsites. It is important report any contact with or contamination of groundwater to the Environmental Officer as soon as possible.

8.3. RESPONSIBILITIES

Construction Contractor - required to take all reasonable measures to prevent the discharge of sediments and pollutants from the construction site and roadside camps in to surface and groundwater sources. Report any contact with groundwater, while in the process of installing poles, to the Environmental Officer.

Environmental Officer - to ensure that the objectives listed above are being met and to provide performance feedback to the Contractor.

8.4. SURFACE AND GROUNDWATER MANAGEMENT MEASURES

The Surface and Groundwater Management measures are designed to minimise the runoff of sediment-laden or polluted water into the surrounding environment. Construction and operational activities that could potentially alter natural surface water and groundwater quality include:

- Chemical spills
- Refuelling
- Seepage of waste water into groundwater
- Clearing of topsoil and vegetation.

The following requirements are to be met by the Contractor to ensure that groundwater is not contaminated:

- All potentially contaminated runoff is to be directed to an adequately sized siltation basin before assessing the quality and gaining authority for discharged to the environment.
- Portable toilets must be supplied and used by the construction crew.
- The mixing of concrete and cleaning of mixing equipment shall be restricted to pre-determined areas.
- Oil and chemicals must be safely stored and removed when the construction site moves.
- Any contact with groundwater must be treated with exceptional care and reported immediately, so as to minimize the potential for contamination of an aquifer.
- If any groundwater is intersected during the digging of holes, operations must be temporarily stopped, the hole (with the water) must be photographed and further instruction sought from the Project Manager and the Environmental Officer.

Table 7 - Water quality mitigation measures for the construction and maintenance phase

Aspect	Phase	Mitigation Measure	Responsibility
Pollution control measures.	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any surface and/or groundwater intersected during cable installation operations	Contractor
	2 Construction, 3 Maintenance	Visual monitoring during rainfall events for runoff of polluted water	Contractor
	2 Construction, 3 Maintenance	Cooking oil and chemically laden water must not be disposed of into surface water sources or into the bush	Contractor
	2 Construction, 3 Maintenance	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks.	Contractor
	2 Construction, 3 Maintenance	Chemicals, oil and fuel must be stored securely to prevent any accidental spills.	Contractor & Project Manager
Sewage and Grey water	2 Construction, 3 Maintenance	Portable chemical toilets are to be provided for the construction works.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Portable toilets are to be cleaned on a regular basis. No sewage may be discharged directly onto open soil.	Contractor
	2 Construction, 3 Maintenance	If grey water is not recycled on site it should be removed along with the black water as the campsite moves along the cable route.	Contractor & Project Manager
Cement	2 Construction, 3 Maintenance	Cement mixing should take place on plastic liners to avoid contamination of surface and ground water.	Contractor
	2 Construction, 3 Maintenance	Cleaning of cement mixing equipment shall only be done using proper cleaning trays.	Contractor
	2 Construction, 3 Maintenance	Ready mix concrete should be used where possible and where agreed upon by the Contractor.	Contractor & Project Manager
	2 Construction, 3 Maintenance	All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.	Contractor & Project Manager

8.5. SURFACE AND GROUNDWATER QUALITY MONITORING PROGRAMME

Every effort must be made throughout the construction process to preserve the quality of surface water sources throughout the cable route. Containment of waste and chemicals and the correct disposal thereof must be of an acceptable standard. Personnel must report any unusual conditions and intersection with groundwater immediately to the Consultant Representative. A photographic record should be kept for future comparison (e.g. during maintenance and/or repair work).

9. SOIL EROSION AND CONTAMINATION MANAGEMENT PLAN

9.1. INTRODUCTION

Construction and associated activities can cause erosion of topsoil, compaction of sediment surfaces and sediment-loaded stormwater runoff that can result in mixing of soil types upon deposition. Soil can be contaminated through accidental chemical and fuel spills and through activities associated with the roadside camps.

This Soil Management Plan has been prepared to minimise potential impacts on soil, such as contamination or topsoil erosion.

9.2. OBJECTIVES

The Soil Management Plan outlines appropriate management measures, monitoring programs and reporting procedures to be implemented during the construction phase and also for any repair or maintenance procedures. Measures to minimise the mixing of different soil types and excessive removal of topsoil are provided. Chemical and waste spills must be contained so as not to contaminate the soil or groundwater.

9.3. RESPONSIBILITIES

Construction Contractor - required to take all reasonable measures to prevent soil erosion, soil pollution, contamination and mixing of soil types during the installation phase of the project, and excessive compaction or soil disturbance by the movement and storage of machinery and equipment.

Project Manager - required to review and assess the Contractor's management measures on an ongoing basis.

Environmental Control Officer - required to ensure topsoil is managed in accordance with the sites top soil management plan.

9.4. SOIL EROSION MANAGEMENT AND CONTAMINATION PREVENTION MEASURES

Appropriate soil management measures are to be implemented and maintained by the Contractor throughout the duration of the project. Construction and operational activities that could potentially alter the natural state of the soil include:

- Chemical and fuel spills
- Seepage of waste water
- Digging of unnecessary pits or channels
- Clearing of topsoil and vegetation.
- Mixing of soil types.
- Compaction of soils at campsites and at bulk storage areas.

The following requirements are to be met by the Contractor to ensure that soil is appropriately managed and the impacts of clearing, digging and compaction of sediment and soil are minimised, and to ensure that soil is not contaminated:

- Wastewater runoff is to be controlled by intercepting it appropriately.
- Vegetation clearing must be kept to the absolute minimum required to complete the installation processes safely. A photographic record should be kept of "before" and "after" clearing and installation.

- Soil dug up for the installation of poles must be stored to the side of the hole and then used to backfill the hole. If there is more than one layer of different soils types (e.g. red Kalahari sand overlying black silt), the layers must be stored in separate piles and returned in the correct order (i.e. black silt first then red sand on top). A photographic record should be kept of the empty holes (before the pole is placed inside it and it is back-filled) and the back-fill piles before they are returned to the hole.
- If any groundwater is intersected during the digging of holes, operations must be temporarily stopped, the hole (with the water) must be photographed and further instruction sought from the Project Manager and the Environmental Officer.
- The mixing of concrete and cleaning of mixing equipment shall be restricted to pre-determined areas.
- Oil and chemicals must be safely stored and removed when the construction site moves.
- Poles stored in stockpiles must be placed only on already disturbed areas (sidings etc.), not on lichens, grasslands or ephemeral drainages.
- Compacted soils should be ripped upon completion of construction.
- All exposed soils should be immediately rehabilitated through the replanting of indigenous vegetation.

Table 8 - Soil erosion and contamination mitigation measures for the construction and maintenance phases

Aspect	Phase	Mitigation Measure	Responsibility
Soil erosion	2 Construction, 3 Maintenance	Vegetation must not be cleared unless absolutely necessary for the safe completion of the cable installation.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any surface disturbance and clearing during cable installation operations	Contractor & Project Manager
	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any soil disturbance and removal (pole holes) during cable installation operations.	Contractor & Project Manager
	Post-installation	Soils that have been compacted at camps, by bulk storage and by machinery, should be ripped upon completion of cable installation and when the camp moves on to the next site.	Contractor
	Post-installation	Exposed soils should be immediately rehabilitated upon completion of cable installation through the replanting of vegetation. A photographic record can be kept.	Contractor & Project Manager
Soil mixing	2 Construction	A photographic record should be kept of soil removal during construction and subsequent replacement thereafter.	Contractor, Project Manager
	2 Construction	Store removed soil to the side of the hole for back filling. Store different soil types in different piles and replace in correct order.	Contractor
Contamination and Pollution Control	2 Construction, 3 Maintenance	Chemicals, oil and fuel must be stored securely to prevent any accidental spills.	Contractor
	2 Construction, 3 Maintenance	Portable chemical toilets are to be provided for the construction workers.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks.	Contractor
Cement	2 Construction, 3 Maintenance	Cement mixing should take place on plastic liners to avoid contamination of surface and ground water.	Contractor
	2 Construction, 3 Maintenance	Cleaning of cement mixing equipment shall only be done using proper cleaning trays	Contractor
	2 Construction, 3 Maintenance	Ready mix concrete should be used where possible and where agreed upon by the Contractor	Contractor & Project Manager
	2 Construction, 3 Maintenance	All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.	Contractor & Project Manager

9.5. SOIL EROSION AND CONTAMINATION MONITORING PROGRAMME

Management measures to minimise the mixing of different soil types and excessive removal of vegetation and topsoil can be monitored by means of “before’ and “after” photographic records. Subsoil stockpiles should be stored close to the work-in-progress to avoid mixing of soils types and unnecessary topsoil loss and erosion. Personnel must report and contain any spills. Rehabilitation measures (replanting / ripping of compacted surfaces) can be recorded photographically.

10. SPILL MANAGEMENT PLAN

10.1. INTRODUCTION

The uncontrolled release of fuels and other chemicals has the potential to result in the contamination of soil, groundwater and surface water, which may lead to serious environmental harm. On this basis, the storage and use of fuels or other chemicals must be managed to minimise the risk of a release, and measures must be in place to promptly address impacts should a release occur.

10.2. OBJECTIVES

This Spill Management Plan has been prepared to minimise the potential for the uncontrolled release of fuels, oils and other chemicals. Preventative measures to minimise the potential for a spill are listed. Should a spill occur, this plan provides guidance for the Contractor on the appropriate spill response measures.

10.3. ROLES AND RESPONSIBILITIES

Contractor - required to implement the spill prevention and response measures listed below.

Project Manager/Environmental Control Officer - required to ensure that the Contractor has appropriately implemented the spill prevention measures listed below and that any spills have been appropriately managed and reported by the Contractor.

10.4. SPILL PREVENTION MEASURES

The following management measures are to be implemented by the Contractor:

- Spill kits are to be made available throughout the construction works. The kits are to include, as a minimum, the following items:
 - Absorbent materials.
 - Sawdust.
 - Shovels.
 - Heavy-duty plastic bags.
 - Protective clothing (e.g. gloves and overalls).
- Major servicing of equipment shall be undertaken offsite in appropriately equipped workshops. Major repairs are not to occur on site.
- Provision of adequate and frequent training on spill management, spill response and refuelling must be provided to all onsite staff.
- Fuels, lubricants and chemicals are to be stored within appropriately sized, impermeable bunds or trays with a capacity not less than 110% of the total volume of products stored.
- All fuel and chemical storage and handling equipment (including transfer hoses, etc.) shall be well maintained.
- Storage and handling of fuels and chemicals shall be in compliance with relevant legislation and regulations.
- No refuelling is to take place within 50 metres of groundwater boreholes, surface water or streams.
- Material Safety Data Sheets are to be kept for each chemical used on site. These must be easily accessible to all construction personnel.

10.5. SPILL RESPONSE MEASURES

The primary concern, in the event of any spill, is the health and safety of any residents and contractors in the vicinity. Of secondary, but highly significant, importance, is the protection of water sources and then soil and vegetation.

The following points therefore apply to all spills on site:

- Assess the situation for potential hazards.
- Do not come into contact with the spilled substance until it has been characterised and necessary personal protective equipment (PPE) is provided.
- Isolate the area as required.
- Notify the Project Manager or Environmental Officer.

The following measures are to be implemented by the Contractor in response to a spill:

- Spills are to be stopped at source as soon as possible (e.g. close valve or upright drum).
- Spilt material is to be contained to the smallest area possible using a combination of absorbent material, earthen bunds or other containment methods.
- Spilt material is to be recovered as soon as possible using appropriate equipment. In most cases, it will be necessary to excavate the underlying soils until clean soils are encountered.
- All contaminated materials recovered subsequent to a spill, including soils, absorbent pads and sawdust, are to be disposed to appropriately licensed facilities.
- The Environmental Officer and Project Manager are to be informed as soon as possible in the event of a spill.
- A written Incident Report must be submitted to the Project Manager.

Table 9 - Spill mitigation measures for the construction and maintenance or repair phases

Aspect	Phase	Mitigation Measure	Responsibility
Stored Hazardous Chemicals	2 Construction, 3 Maintenance	Hazardous chemicals are to be stored in bunded areas.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Hazardous chemicals (such as fuels) are to be handled over areas provided with impervious surfaces.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Spills of hazardous chemicals are to be contained and cleaned-up to ensure protection of the environment	Contractor & Project Manager
	2 Construction, 3 Maintenance	All the necessary PPE required for the safe handling and use of petrochemicals and oils shall be provided to, and used or worn by, the onsite staff	Contractor
Machinery and Equipment Maintenance	1 Pre-Installation 2 Construction, 3 Maintenance	Major servicing of equipment shall be undertaken offsite in appropriately equipped workshops. Major repairs are not to occur on site.	Contractor
	2 Construction, 3 Maintenance	For small repairs and required maintenance activities all reasonable precautions to avoid oil and fuel spills must be taken (e.g. spill trays, impervious sheets).	Contractor & Project Manager
	2 Construction, 3 Maintenance	Vehicles and machinery are to be regularly serviced to minimise oil and fuel leaks	Contractor
	2 Construction, 3 Maintenance	All the necessary PPE required for maintenance activities must be issued to staff whose duty it is to manage and maintain the machinery and equipment.	

11. VEGETATION MANAGEMENT PLAN

11.1. INTRODUCTION

The uncontrolled clearing of natural vegetation has the potential to have serious long term environmental effects, such as soil erosion, change in vegetation type, increase of invasive species, and bush encroachment. Weeds are opportunistic plant species that have the potential to affect and change native ecosystems by invading and overrunning the indigenous species. Once introduced, aliens and weeds compete more effectively for resources, therefore threatening the survival of native flora and consequently, reducing food sources for native fauna.

This Vegetation Management Plan has been prepared to minimise the potential impacts on natural vegetation including deforestation, bush encroachment and the introduction of invasive weeds and alien species.

11.2. OBJECTIVES

This Vegetation Management Plan has been prepared to minimise the potential for the uncontrolled cutting of trees and grasses. The main objective is to minimize and manage the amount of natural vegetation that has to be removed or cut for the safe installation of the poles and cables, and to prevent the introduction of alien plant species to the site and surrounding areas.

11.3. ROLES AND RESPONSIBILITIES

Contractor - required to take all reasonable measures to prevent excessive destruction and/or removal of natural vegetation, and to prevent the introduction of invasive or alien species.

Project Manager / Environmental Officer - required to review and assess the Contractor's management measures on an ongoing basis.

11.4. VEGETATION MANAGEMENT PROCEDURES

Activities that may potentially change the structure of the natural vegetation include the following:

- Harvesting of firewood and grasses by campsite staff.
- Removal of trees for the installation of poles.
- Clearing of vegetation and topsoil when digging holes for poles.
- Refilling holes using material other than the soil that was removed while digging the hole.
- Introduction of alien and/or invasive species from other regions along the cable route.

The Contractor will minimise the potential for change in and damage to the natural vegetation by adhering to the following management measures:

- No harvesting of firewood or grasses from around the campsites.
- No disposal of grasses, seeds, roots or tree pods collected from elsewhere allowed around the campsite or construction site.
- Vehicles and staff should not carry grass, seeds, plants or pods across different environmental regions along the cable route.
- Where trees need to be cut for the safe installation and proper functioning of the fibre optic cable, a photographic record of "before" and "after" must be kept.

- Prior to cutting or removing trees, permission must be granted from the relevant authority (permits may be required).
- Poles must be stored in stockpiles only on already disturbed areas (sidings etc.), not on lichens, grasslands or ephemeral drainages.

Table 10 - Vegetation removal and alien species introduction mitigation measures for the construction and maintenance phases

Aspect	Phase	Mitigation Measure	Responsibility
Removing or cutting trees	1 Survey	Permit for removal of protected and unique species.	Ministry Agriculture, Water and Forestry
	2 Construction, 3 Maintenance	A photographic record shall be kept of "before" and "after" removal and/or cutting or any trees	Contractor, Project Manager
	2 Construction, 3 Maintenance	As far as possible, Contractors are advised to avoid removing any trees along the routes. They should rather trim them. Only where trees are directly obstructing the line and there is no alternative, should they be cut down completely.	Contractor, Project Manager Environmental Officer
Clearing Vegetation	1 Survey, 2 Construction, 3 Maintenance	The clearing of vegetation may not be undertaken without the prior permission of the local authority.	Contractor, Project Manager Environmental Officer
	1 Survey, 2 Construction, 3 Maintenance	The clearing of vegetation should be discussed with local landowners.	Contractor, Project Manager
	2 Construction, 3 Maintenance	A photographic record shall be kept of "before" and "after" any vegetation clearing.	Contractor, Project Manager
	Post-installation	Progressively revegetate areas disturbed during construction.	Environmental Officer, Project Manager, Contractor
Stock piles	2 Construction, 3 Maintenance	Stockpiles of poles should be placed only on areas already disturbed (e.g. sidings) and not on any vegetated areas, grasslands or ephemeral drainages. Particular care should be taken not to damage lichens.	Contractor, Project Manager
Vegetation removal	2 Construction, 3 Maintenance	No firewood, fruit, medicinal plants or any other natural material may be collected, consumed or removed from site by the Contractor or their personnel along the route.	Contractor
	2 Construction, 3 Maintenance	Any individual caught collecting plants shall be removed from the site for the duration of the contract.	Contractor, Project Manager
	2 Construction, 3 Maintenance	In some cases, such collection or removal of plants without permission of the relevant authority may lead to criminal proceedings being initiated against an individual and/or the contracting company.	Contractor, Project Manager Environmental Officer
	2 Construction, 3 Maintenance	The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed.	Contractor

Introduction of Weeds or Alien Species	2 Construction, 3 Maintenance	Grasses, seeds, roots or tree pods from somewhere other than the current operational site may not be disposed of at the camp or construction site or the surrounding areas. (Particular attention must be paid to imported material).	Contractor
	2 Construction, 3 Maintenance	Vehicles and staff should not carry grass, seeds, plants or pods across different environmental regions along the cable route. (Particular attention must be paid to imported material).	Contractor
	2 Construction, 3 Maintenance	The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed.	Contractor
	2 Construction	Issue internal land clearing permits and monitor compliance thereof	Environmental Officer
	2 Construction	Issue weed and seed inspection certificates for each piece of equipment used on the project and monitor compliance thereof	Environmental Officer

11.5. VEGETATION MONITORING PROGRAMME

A photographic record (showing the area before and after cable installation) of all vegetation clearing and cutting of branches or removal of trees must be provided to the Environmental Officer, and if necessary to MET.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed.

12. FAUNA RELOCATION AND PROTECTION MANAGEMENT PLAN

12.1. INTRODUCTION

It is important to protect native flora and fauna to ensure the sustainability and balance of the natural environment. This Fauna Relocation and Protection Management Plan aims to protect game and wildlife, particularly avifauna, along the length of the cable route. Bird species known to nest on pylons, that are consequently viewed as problematic owing to nest-related faults, are also expected to use the aerial fibre optic cable structures for nesting, although possibly with fewer resultant problems (Cunningham, 2017). These include:

- Cape crow
- Pied crow
- Sociable weaver
- Red-billed buffalo-weaver
- Eagles, herons and vultures

12.2. OBJECTIVES

This Fauna Relocation and Protection Management Plan has been prepared to minimise the potential for injury and loss of habitat for nesting birds. The protection of native fauna is also evaluated. Disturbance to birds, animals and Reptiles and their habitats should be minimized wherever possible.

12.3. ROLES AND RESPONSIBILITIES

Contractor - required to ensure that there is no poaching of animals; required to ensure the safe relocation of birds and nests where the construction necessitates the destruction of a nesting site or removal of a tree in which birds are roosting.

Environmental Officer - verify the safe relocation of any avifauna whose current habitat is affected by the construction.

12.4. FAUNA RELOCATION AND PROTECTION MANAGEMENT MEASURES

Activities that may potentially harm and or displace native fauna include:

- Harvesting of firewood and grasses by campsite staff.
- Removal of trees for the installation of poles.
- Cutting of branches for the cable installation.
- Catching local wildlife.
- Introduction of wildlife from other areas.

The Contractor will minimise the potential for change in and damage to the natural vegetation by adhering to the following management measures:

- No catching or poaching of wildlife from around the campsites.
- No wildlife allowed to be brought onto the construction or campsite.
- All trees must be checked for nesting or roosting birds prior to cutting or removal.
- If possible, nests must be relocated to nearby trees, but only after consultation with the Environmental Officer.

- Prior to cutting or removing trees, permission must be granted from the relevant authority (permits may be required).
- Where trees need to be cut for the safe installation and proper functioning of the fibre optic cable, a photographic record of “before” and “after” must be kept.
- Where nest are relocated to other trees a photographic record of “before” and “after” must be kept.
- Dummy structures can be installed to provide safe alternate nesting facilities.

Table 11 - Fauna Relocation and protection mitigation measures for the construction and maintenance phases

Aspect	Phase	Mitigation Measure	Responsibility
Removing or cutting trees	1 Survey	Permit for removal of protected and unique species.	Ministry of Agriculture, Water and Forestry
	2 Construction, 3 Maintenance	A photographic record shall be kept of “before” and “after” removal and/or cutting or any trees	Contractor, Project Manager
	2 Construction, 3 Maintenance	As far as possible, Contractors are advised to avoid removing any trees along the routes. They should rather trim them. Only where trees are directly obstructing the line and there is no alternative, should they be cut down completely.	Contractor, Project Manager Environmental Officer
Relocation of nests	1 Survey. 2 Construction, 3 Maintenance	The clearing of vegetation may not be undertaken without the prior permission of the local authority.	Contractor, Project Manager Environmental Officer
	2 Construction, 3 Maintenance	Any relocation of nests must be discussed with the Environmental Officer.	Contractor, Project Manager Environmental Officer
	2 Construction, 3 Maintenance	A photographic record shall be kept of “before” and “after” any relocation.	Contractor, Project Manager Environmental Officer
	Post-installation	Dummy structures can be installed to provide safe alternate nesting facilities.	Environmental Officer, Project Manager & Contractor
Fauna on Site	2 Construction, 3 Maintenance	No animals or birds may be collected, caught, consumed or removed from site by the Contractor or their personnel along the route.	Contractor
	2 Construction, 3 Maintenance	Snares and traps on site and in surrounding areas are strictly forbidden.	Contractor
	2 Construction, 3 Maintenance	Any individual caught catching animals or birds shall be removed from the site for the duration of the contract.	Contractor, Project Manager
	2 Construction, 3 Maintenance	In some cases, such collection or capture of animals, reptiles or birds without permission of the relevant authority may lead to criminal proceedings being initiated against an individual and/or the contracting company.	Contractor, Project Manager Environmental Officer
	2 Construction, 3 Maintenance	No animals or birds may be brought onto the site from other areas.	Contractor
	2 Construction, 3 Maintenance	The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed.	Contractor

12.5. FAUNA MONITORING PROGRAMME

A photographic record (showing the area before and after cable installation) of all cutting of branches or removal of trees, and of all nest relocations, must be provided to the Environmental Officer, and if necessary to MET.

The Environmental Officer must keep record of fauna species relocated and /or influenced by the infrastructure installed. Dummy structures to provide alternate nesting sites could be used to alleviate such problems should these be encountered after construction.

13. WASTE MANAGEMENT PLAN

13.1. INTRODUCTION

The activities at the roadside camps and during installation of the fibre optics cable will generate both solid and liquid waste. The potential types of waste generated at the campsites are typical for domestic home operations. Construction waste will include chemical waste that must be handled by registered waste disposal units.

13.2. OBJECTIVES

This Waste Management Plan has been prepared to ensure the proper storage, transport, treatment and disposal of waste and where possible will follow the waste hierarchy, which encourages waste avoidance and waste reduction followed by reuse, recycling and reclamation, before waste treatment and waste disposal.

13.3. ROLES AND RESPONSIBILITIES

Contractor

- Required to ensure that all waste generated during construction activities is removed from site and disposed of accordingly including providing evidence in the form of waste transfer receipts for the waste moved off site.
- Ensure no windblown rubbish pollutes the environment.
- Remove waste on a regular basis to prevent vermin.

Environmental Officer

- Required to inspect receipts and evidence of correct waste handling.
- Review waste management practices regularly during operations.

13.4. WASTE MITIGATION AND MANAGEMENT MEASURES

Waste will be controlled through prevention and mitigation measures as follows:

- Reduce, reuse and recycle where possible.
- Storage of domestic waste on site may result in the attraction of unwanted scavengers and should be removed as soon as is feasible.
- Solid waste shall be stored in an appointed area in covered, tip-proof metal drums/skips for collection and disposal.
- Hydrocarbon and chemical contaminated solids have the potential to cause contamination to the soil, ground and/or surface water, thus correct storage and disposal methods are required.
- Large quantities of solid waste may result in the reduced capacity of the local landfill.

Table 12 - Waste mitigation measures for the construction and maintenance phases

Aspect	Phase	Mitigation Measure	Responsibility
Environmental Contamination from liquid waste	2 Construction, 3 Maintenance	Hydrocarbon and chemical contaminated solids must be storage correctly and disposed of by registered companies.	Contractor
	Post-installation	Safe disposal certificates must be kept and provided to the Project manager on request.	Contractor & Project Manager
Littering and Environmental Contamination from waste	2 Construction, 3 Maintenance	No littering by construction workers shall be allowed.	Contractor
	2 Construction, 3 Maintenance	All litter throughout the site and along the route should be picked up and placed in the bins provided.	Contractor
	2 Construction, 3 Maintenance	The construction site should be kept tidy and free of litter at all times. All domestic and general construction waste produced on a daily basis should be cleaned and contained daily. If necessary, the Contractor must hire someone to clear the site of litter every day.	Contractor
	2 Construction, 3 Maintenance	No solid waste landfill will be established at the site. Designated solid waste storage areas should be established and maintained.	Contractor & Project Manager
	2 Construction, 3 Maintenance	No waste shall be burned or buried anywhere unless when advised to do so by the local Municipality.	Contractor
	2 Construction, 3 Maintenance	Recycling bins will be provided in appropriate areas to enable waste and refuse to be sorted for recycling and re-use. Bins must be baboon proof.	Contractor & Project Manager
	Post-installation	All solid waste must be collected, recycled where possible, and otherwise disposed of by appropriately licensed disposal teams.	Contractor & Project Manager
	Post-installation	No waste may remain on site after the completion of the project.	Project Manager
	Post-installation	All rubble is to be removed from the site to an approved disposal site. Burying of rubble on site is prohibited.	Contractor Project Manager

13.5. WASTE DISPOSAL MONITORING PROGRAMME

Certificates proving the safe disposal of waste from a permitted waste disposal site must be provided to the Project Manager on request.

14. HERITAGE MANAGEMENT PLAN

14.1. INTRODUCTION

Any construction involving earthworks has the potential to impact on ethnographic sites, sub-surface artefacts, and/or skeletal material. Heritage sites are protected by legislature and require permission to be disturbed. Failure to comply with legislature may result in regulatory fines.

No cultural heritage or archaeological surveys have been undertaken for the cable route.

14.2. OBJECTIVES

This Heritage Management Plan has been prepared in order to minimise the impact of the works on the heritage values of the site and surrounding areas. The following management strategies will be implemented.

14.3. ROLES AND RESPONSIBILITIES

Contractor

- All finds and evidence of archaeological material will result in suspension of land disturbance activities until verified by an archaeologist and clearance is obtained.
- Compliance to chance find procedure.

14.4. HERITAGE MITIGATION AND MANAGEMENT MEASURES

To ensure protection of potential sites or heritage sites during construction the following controls measures will be put in place:

Table 13 - Heritage mitigation measures for the construction phase

Aspect	Phase	Mitigation Measure	Responsibility
Prevent and avoid impacts to heritage values	Construction	All finds or evidence of archaeological material will result in suspension of land disturbance activities until verified by an archaeologist and clearance is obtained.	Contractor Project Manager
	Construction	Ensure all personnel are inducted regarding their heritage responsibilities under the relevant legislation.	Contractor
	Construction	Avoid disturbance of all areas outside the installation site and campsite.	Contractor Project Manager
	Construction	Inspect surfaces for evidence of archaeological material prior to land disturbance activities.	Project Manager
		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 shown below: – Stop operating machinery or equipment; – Demarcate the site with danger tape; – Determine GPS position if possible; – Report findings to Project Manager; – Project Manager to determine whether work can proceed without damage to findings; – Site location and details to be added to the	Contractor Project Manager

		project's Geographic Information System (GIS) for field confirmation by archaeologist; – Inspect site and confirm addition to project GIS; – Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and – Recovery, packaging and labelling of findings for transfer to National Museum.	
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15. NOISE MANAGEMENT PLAN

15.1. INTRODUCTION

There are generally no sensitive receptors within close proximity to the site. Nevertheless, measures to manage noise generated during construction activities are as follows:

- Scheduling of works to avoid disturbance between the hours of 6 pm and 5 am.
- Saturday construction period from 8am – 12 noon, when near residential areas.
- Procedures for receiving complaints from nearby land users or residents to be in place and mitigation measures to be implemented should construction generate excessive noise, which is unexpected.

16. DOCUMENT LIMITATIONS

This Environmental Management Plan (EMP):

- A. Has been prepared pursuant to a contract with Paratus Telecommunications;
- B. Has been prepared on the basis of information provided to ECC up to April 2017;
- C. Is for the sole use of Paratus Telecommunications, for the sole purpose of an EMP;
- D. Must not be used (1) by any person other than Paratus Telecommunications, or (2) for a purpose other than an EMP; and
- E. Must not be copied without the prior written permission of ECC.

Neither ECC, its employees, nor officers accept responsibility to any person in connection with the document.

ECC has prepared the EMP on the basis of information provided by Paratus Telecommunications, and on the Scoping Report by Dr P Cunningham, which ECC have not independently verified or checked.

17. REFERENCES

Cunningham, P.L., 2017. Vertebrate fauna and flora associated with the proposed Fibre Optic Cable developments between Buitepos and Walvis Bay [Desktop Study – Baseline/Scoping].

- Appendix 1 – Ecological desktop study**
- Appendix 2 - Monthly Internal EMP Checklist**
- Appendix 3 - Monthly Internal Compliance Certificate**
- Appendix 4 - Weekly Checklist**
- Appendix 5 - Weed and Seed Clearance Certificate**
- Appendix 6 - Internal Land Clearing Certificate**