



B2Gold Namibia (Pty) Ltd
Otjikoto Gold Mine

Environmental Management Plan (EMP)
Construction and Operations EMP
Upgrade of Existing Power Generation Facility by 10.8 MW

20 April 2017

Project Name:

Upgrade of the Existing Power Generation Facility at the Otjikoto Gold Mine by a 10.8 MW Photovoltaic (PV) Solar Plant

Stage of Report

Amendment Application – Submission to Authorities

Client

B2GOLD Namibia (Pty) Ltd

Date of Release:

20th April 2017

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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



SIGNATURE

30th March 2016

DATE

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Definitions and Abbreviations

CSR	Corporate Social Responsibility
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
EPL	Exclusive Prospecting Licence
Ha	Hectares
HAZMAT	Hazardous Material
HFO	Heavy Fuel Oil
I&AP	Interested and affected parties
IUCN	International Union for Conservation of Nature
kV	Kilo volt
kWhr	Kilowatt hours
MAWF	Ministry of Agriculture Water and Forestry
MET	Ministry of Environment and Tourism
ML	Mining Licence
MSDS	Material Safety Data Sheet
MW	Megawatts
Otjikoto	Otjikoto Gold Mine Project (Otjikoto Project)
PV	Photovoltaic Solar Plant
ROM	Run of Mine Pad
ToR	Terms of Reference
TSF	Tailings Storage Facility
WRD	Waste Rock Dump

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 B2Gold Namibia (Pty) Ltd (B2Gold). The purpose of this EMP is to support the request for amendment encompassing a 10.8MW Solar PV Plant upgrade to the existing power plant approved through the Otjikoto environmental clearance certificate dated 26th January 2015.

B2Gold has identified a sustainable opportunity to improve the site's ability to generate power for the Otjikoto operations. This improvement opportunity includes enhancing the existing HFO power plant through the introduction of a Photovoltaic (PV) solar plant to supplement the site's energy demand with a renewable and green energy source.

Renewable energy is recognised internationally as a major contributor in diminishing the negative effects of climate change, as well as providing a wide range of biophysical environmental, economic and social benefits that can contribute towards long-term sustainability. These impacts include:

- A reduction of greenhouses gases emitted per unit of electricity;
- Reduced reliance on fossil fuelled power stations,
- Employment benefits and associated social upliftment;
- Improvement in electricity security and diversity; and
- Expenditure in local economy.

The proposed solar energy facility is therefore expected to contribute positively towards climate change mitigation. The proposed change will include an upgrade to the existing power plant through the addition of 10.8 Mega Watts (MW) power generation capacity via a Photovoltaic (PV) solar plant by means of a three-phased operation as described below:

Phase 1: Upgrade the existing CAT HFO Power Station, encompassing the construction of a CAT 5.8MW Photovoltaic Solar Plant that feeds to the CAT HFO Power Station. This upgrade will reduce HFO (Heavy Fuel Oil) consumption as well as significantly reducing the sites carbon footprint through reduction of harmful emissions from the CAT HFO Power Station. This phase requires bush clearing of 11ha.

Phase 2: Link-in with the Nampower Grid – this will reduce HFO (Heavy Fuel Oil) consumption even further, as the mine will be able to make use of off peak tariffs. This will also lead to further significant reductions of the carbon footprint through reduction of harmful emissions from the CAT HFO Power Station.

Phase 3: Upgrade of the 5.8 MW Photovoltaic Power Plant to approximately 10.8 MW. This phase requires bush clearing of approximately 11ha. (22ha total for the project).

At the end of Life of Mine, the intention is to generate revenue from the sale of electricity to Nampower/Regional Electricity Distributors. This revenue will be used to sustain and expand the company's ongoing corporate social responsibility (CSR) projects in the region as well as support the Otjikoto Nature Reserve and education centre.

The proposed upgrade will be constructed within the current and approved Mining Licence Boundary.

This document represents the Environmental Management Plan (EMP) for the proposed Construction and Operations of the proposed upgrade of existing power generation facility at the Otjikoto Mine.

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 the Otjikoto Gold Mine 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 construction, 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

B2Gold has identified a sustainable opportunity to improve the sites ability to generate power for the Otjikoto operations. This improvement opportunity includes enhancing the existing HFO power plant through the introduction of a Photovoltaic (PV) solar plant to supplement the site's energy demand with a renewable and green energy source.

B2Gold uphold strong values associated with continuous improvement. B2Gold has identified that this improvement will:

- Reduce the operations dependence on Heavy Fuel Oil (HFO) thereby reducing energy generation costs;
- Reduce the operations carbon footprint through reduced emissions; and
- Build on B2Golds reputation as a responsible Mining company through the introduction of Green Energy to its energy portfolio.

The proposed upgrade will be constructed within the current and approved Mining Licence Boundary (Fig. 2).

Phase 1: Upgrade the existing CAT HFO Power Station, encompassing the construction of a CAT 5.8MW Photovoltaic Solar Plant that feeds to the CAT HFO Power Station. This upgrade will reduce HFO (Heavy Fuel Oil) consumption as well as significantly reducing the sites carbon footprint through reduction of harmful emissions from the CAT HFO Power Station. This phase requires bush clearing of 11ha.

The CAT PV Plant and its Microgrid Controller will achieve these savings through the reduction of engine speed and engine run-hours as Solar Power is fed to the sites Power Station.

Phase 2: Link-in with the Nampower Grid – this will reduce HFO (Heavy Fuel Oil) consumption even further, as the mine will be able to make use of off peak tariffs. This will also lead to further significant reductions of the carbon footprint through reduction of harmful emissions from the CAT HFO Power Station.

Phase 3: Upgrade of the 5.8 MW Photovoltaic Power Plant to approximately 10.8 MW. This phase requires bush clearing of approximately 11ha. (22ha total for the project).

At the end of Life of Mine, the intention is to generate revenue from the sale of electricity to Nampower/Regional Electricity Distributors. This revenue will be used to sustain and expand the company’s ongoing corporate social responsibility (CSR) projects in the region as well as support the Otjikoto Nature Reserve and education centre.

1.5. SITE DESCRIPTION

The proposed upgrade will be constructed within the current and approved Mining Licence Boundary, ML 169 (Fig. 1). The proposed upgrade will be located east of the existing Otjikoto Gold Mine Processing Plant and directly south of the Otjikoto airstrip. The proposed upgrade does not traverse any pristine areas (Cunningham, 2017). The Otjikoto Gold Mine has already impacted the areas within which it has been constructed, and the activities and infrastructure associated with the proposed upgrading of the existing Power plant (e.g. tracks, vegetation clearing, installation of infrastructure) will continue to impact the adjacent environment. However, any additional potential environmental impact resulting from this project will be minimised by environmental management.

None of vertebrate fauna or flora found throughout the proposed upgrade is associated exclusively with, or is unique to, the various habitats (and associated vegetation types) throughout the proposed project (Cunningham, 2017).



Figure 1 - Locality of Otjikoto Gold Mine



Figure 2 - Proposed Upgrade to Otjikoto Power Plant Facility

The following categories of Vertebrate fauna and flora have been identified within the vicinity of the proposed Power Plant upgrade as important (Cunningham, 2017):

Vertebrate fauna

- Ephemeral pans;
- Drainage lines;

Flora

- Protected Species;
- Ephemeral pans;
- Drainage lines;

Although these important areas do not fall directly within the footprint of the proposed upgrade, it is important to consider any activity to minimize potential impacts that may affect these areas (Fig. 3).



Figure 3 - Blue circles = ephemeral pans; yellow oblong = drainage area; White arrow = indicates drainage route/flow towards drainage area and pan system south of ML (Cunningham, 2017).

2. ENVIRONMENTAL MANAGEMENT FRAMEWORK

2.1. ROLES AND RESPONSIBILITIES

B2Gold Namibia (Pty) Ltd and the Otjikoto Gold Mine environmental management structure for construction and operations for the upgrade is outlined below:

2.2. PROJECT MANAGER

A Project Manager will be appointed by B2Gold Namibia (Pty) Ltd will be available throughout construction and operations of the PV plant. 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 annually to assess the proponents level of compliance to the EMP;
- Ensuring all employees and contractors participate in a site induction process prior to commencing work on the project; and
- Liaising with the Otjikoto Gold Mine Environmental Manager.

2.3. ENVIRONMENTAL CONTROL OFFICER

An Environmental Control Officer (ECO) will be appointed or nominated responsible for the project. The ECO will be available, as required, throughout construction and operation of the project. The ECO 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 EMP to monitor compliance (Appendices 2-4).
 - Weekly Checklist must be completed by the ECO and findings submitted to the Project Manager and Otjikoto Environmental Manager.
 - Monthly EMP Checklist must be completed monthly by the ECO. Findings are to be submitted to the Project Manager and Otjikoto Environmental Manager.
 - Internal Compliance Certificate must be completed monthly by the ECO incorporating the checklist' findings. This certificate must be submitted to the Project Manager and Otjikoto Environmental Manager.

In addition, the ECO 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 Otjikoto Gold Mine Environmental Manager as well as 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 Otjikoto 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 proposed upgrade, certain situations may arise that will necessitate action on the part of the contractors for which permits may be required. The proposed activities will take place within the existing mining licence boundary of which various permits have already been obtained. It is important that the proponent ensures compliance with these permits.

The following is a list of permits that may potentially be required, but should be in place at Otjikoto Gold Mine prior to construction commencing.

Table 1 - Permits that should already be in place for Otjikoto Gold Mine

ACTION	PERMIT	AUTHORITY
Ground compaction, dust suppression and washing of PV modules.	Water abstraction and water use licence	Ministry Agriculture, Water and Forestry

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 2 - Permits that may be required during the construction and/or operation phases of the proposed upgrade

ACTION	PERMIT	AUTHORITY
Cutting or removing trees or branches	Permit for removal of protected and unique species.	Ministry Agriculture, Water and Forestry
Supplying of electricity Nampower/Regional Electricity Distributors	Supplying of electricity (Phase 2)	Ministry of Mines and Energy

2.6. B2GOLD NAMIBIA CONTRACTORS

During the construction, installation and operational 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 Control 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 Otjikoto Gold Mine has a detailed Environmental Emergency Response Plan. This Plan must incorporate the proposed project into their system from construction to operations. With specific reference to the PV plant the following should be implemented:

The Environmental Control Officer will be the primary contact person in the event of an environmental emergency. As discussed under Section 2.3, the Environmental Control 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 3 - Emergency Services contact telephone numbers

PLACE	AMBULANCE	POLICE	FIRE BRIGADE
OTJIWARONGO	+264 67 300 900	+264 67 300 600	+264 67 304 777 or +264 61 211 111
OTJIKOTO GOLD MINE	+264 81 150 0840		

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 Control 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 the ECO.

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 construction and operational phase. These can be divided into 3 sections: (1) Pre-installation/Survey; (2) Installation/Construction and (3) Operational/Maintenance Phases. Potential impacts included:

Table 4 - 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 PV panels, poles and cables. 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.

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 Control 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 proposed site and surrounding area is expected of the team working on this project. The Contractor will minimise the potential for harm and/or injury during the construction activities by undertaking the following management measures, as required:

- Vehicle movements will be restricted to pre-existing designated roads only.
- 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 5 - General procedures and restrictions for the construction and maintenance phases

Aspect	Phase	Restriction / Action	Responsibility
On Site Accommodation	1 Survey, 2 Construction, 3 Maintenance	Trespassing on properties adjoining the allocated site 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	Accommodation must be kept clean to minimise the visual impact of the site and minimise vermin and pests. Litter and waste management measures must be adhered to at all times.	Contractor
	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
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 to the laydown areas 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. Otjikoto Gold Mine Waste Management Plan must be implemented.	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, on site 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, have the potential to affect amenity, safety, the environment and human health. A general regard for the social and ecological well-being of the site and adjacent areas, as well as the safety of the workers and the surrounding communities, is expected of the team working on this project.

Otjikoto Gold Mine has a dedicated Health and Safety Department that manage the Health and Safety of all those on the Otjikoto site. The team implement the health and safety plan through a dedicated and detailed health and safety management system.

The Otjikoto Health and Safety department must incorporate the proposed project into their system from construction to operations to ensure the highest level of safety and monitoring. It is recommended that a site-specific safety management plan is developed and implemented prior to construction commencing.

6.2. OBJECTIVES

The main objective of the Health and Safety Management Plan is to ensure the safety of all those involved in the project 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 removal.
- Installation of PV plant and associated infrastructure.
- General activities around the construction site.

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 6 – 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: <ul style="list-style-type: none"> • Safety hat • Safety footwear with steel toe protection • Safety glasses with side shields <ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> • Hard hats with fixed side knobs • Impact Spectacles & Welding Hood • Spats/Apron/Yoke/Respirator • Welding gloves • Knee pads for welders kneeling 	Contractor

		<ul style="list-style-type: none"> • Steel toe cap Safety Boots / Shoes 	
Specific PPE - Gas Cutting, Reaming	2 Construction, 3 Maintenance General work	<ul style="list-style-type: none"> • Hard hats with fixed side knobs • Impact Spectacles & Full Face Visor (reaming) • Front flip goggles (gas cutting) • Spats and Apron • Cutting/Welding gloves • Steel toe cap Safety Boots / Shoes 	Contractor
Specific PPE - Grinding	2 Construction, 3 Maintenance General work	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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, land clearing, 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 land clearing. 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-adjointing 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 Control 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
- Ground preparation and compaction

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.
- Vegetation clearing will be conducted in phases and vegetation will only be removed for the immediate construction area as per land clearing permit system (refer appendix 6)
- Dust suppression to be carried out

- Vehicles and machinery will be maintained so as to limit exhaust fume emissions.

Table 7 - 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 to minimise exhaust emissions.	Contractor
	2 Construction, 3 Maintenance	Dust suppression should be done on a regular basis to avoid producing excessive dust.	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. Where possible integration into the sites air quality management plan should be adhered to, for example the installation of a dust fall out bucket/s to monitor dust generation from the site.

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 construction and operation.

8.2. OBJECTIVES

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

Environmental Control 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 and operational 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 trenching, operations must be temporarily stopped, the hole (with the water) must be photographed and further instruction sought from the Project Manager and the Environmental Control Officer.
- Vegetation is to be cleared in stages in order to reduce exposed earth which would result in high turbidity surface water run off.
- Where possible the contractor should landscape the land to shed surface water away from the site.
- If required the use of sediment traps should be in place to prevent sediment laden surface water runoff.

Table 8 - 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 construction.	Contractor
	2 Construction, 3 Maintenance	Visual monitoring during rainfall events for runoff of polluted water	Contractor
	2 Construction, 3 Maintenance	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 workers.	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
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 construction and operation. 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 project area.

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 manage and issue land clearing permits 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:

- Waste water runoff is to be controlled by intercepting it appropriately.
- Vegetation clearing must be conducted in accordance with the MAWF issued vegetation removal permit. Furthermore this Government issued permit is to be supported by the use of an on site land clearing permit

system that manages the vegetation and soil removal process. A photographic record should be kept of “before” and “after” clearing and installation.

- If any groundwater is intersected during trenching operations must be temporarily stopped, the hole (with the water) must be photographed and further instruction sought from the Project Manager and the Environmental Control 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.
- Compacted soils should be ripped upon completion of construction.
- All exposed soils should be immediately rehabilitated through the replanting of indigenous vegetation.

Table 9 - 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 necessary for the immediate site.	Contractor & Project Manager
	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any surface disturbance and clearing construction.	Contractor & Project Manager
	Post-installation	Soils that have been compacted at camps, by bulk storage and by machinery, should be ripped upon completion of construction.	Contractor
	Post-installation	Exposed soils should be immediately rehabilitated upon completion of the construction phase. 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	Avoid mixing of top soil and subsoil.	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:

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

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

1. Spills are to be stopped at source as soon as possible (e.g. close valve or upright drum).
2. Spilt material is to be contained to the smallest area possible using a combination of absorbent material, earthen bunds or other containment methods.
3. 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.
4. All contaminated materials recovered subsequent to a spill, including soils, absorbent pads and sawdust, are to be disposed to appropriately licensed facilities.
5. The Environmental Control Officer and Project Manager are to be informed as soon as possible in the event of a spill.
6. A written Incident Report must be submitted to the Project Manager.

Table 10 - 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 that can hold 110% capacity of its contents.	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	Water contained in bund areas must be removed/emptied.	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.	Contractor

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 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 Control 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:

- Off-road driving
- Clearing of vegetation and topsoil.
- Mixing of subsoils and tops soils.
- Introduction of alien and/or invasive species from other regions from earth moving equipment.

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

- Vehicles and staff should not carry grass, seeds, plants or pods across different environmental regions.
- Prior to cutting or removing trees, permission must be granted from the relevant authority (permits may be required).
- Ensure all vehicles are cleaned and free of weeds and seeds prior to arrival on site. Ensure each piece of equipment has a valid weed and seed clearance certificate issued by the ECO (appendix 5)
- Obtaining land clearing permits from ECO (appendix 6).

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 unnecessarily removing any trees on and around the site.	Contractor, Project Manager Environmental Control 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 Control Officer
	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 Control Officer, Project Manager, Contractor
Stock piles	2 Construction, 3 Maintenance	Laydown areas should not cause damage to 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 on site.	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 Control 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 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 region. (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, 3 Maintenance	Ensure all vehicles are cleaned and free of weeds and seeds prior to arrival on site. Ensure each piece of equipment has a valid weed and seed clearance certificate issued by the ECO	Contractor
	2 Construction, 3 Maintenance	Obtain and compile with the internal land clearing permit to be issued for each area by the ECO	Contractor
	2 Construction	Issue internal land clearing permits and monitor compliance thereof	Environmental Control Officer
	2 Construction	Issue weed and seed inspection certificates for each piece of equipment used on the project and monitor compliance thereof	Environmental Control Officer

11.5. VEGETATION MONITORING PROGRAMME

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.

Vegetative matter can be utilised for slope stability and organic compost on waste rock dumps. Care must be taken to separated unwanted and invader species to avoid replanting of unwanted vegetation.

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, on site and along cable ways. 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 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 Control 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 vegetation for construction.
- 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.
- No wildlife allowed to be brought onto the construction site.
- If possible, nests must be relocated to nearby trees, but only after consultation with the Environmental Control Officer.

- Prior to cutting or removing trees, permission must be granted from the relevant authority (permits may be required).
- 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
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 Control Officer
	2 Construction, 3 Maintenance	Any relocation of nests must be discussed with the Environmental Control Officer.	Contractor, Project Manager Environmental Control Officer
	2 Construction, 3 Maintenance	A photographic record shall be kept of “before” and “after” any relocation.	Contractor, Project Manager Environmental Control Officer
	Powerline Post-installation	Future Powerlines associated with the project should include bird avoidance measures. Dummy structures can be installed to provide safe alternate nesting facilities.	Environmental Control 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 on site.	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 Control 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

The Environmental Control 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 of the proposed earth works and during installation of the PV plant will generate both solid and liquid waste. The potential types of waste generated on the site includes hazardous waste from servicing machinery, general waste from construction and packaging.

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. This Waste Management Plan is project specific and must be implemented along with Otjikoto Gold Mine Waste Management Plan to ensure the highest level of compliance.

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 Control 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 on site 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 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 authority.	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.

Pervious scoping studies for ML 169 have included archeologically and heritage studies. The PV site is considered to have little to no archeologically or heritage significance. Should a chance find occur, this Heritage Management Plan, along with Otjikoto Gold Mine Heritage Plan must be implemented.

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 as set out in the Otjikoto EMP.

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: <ul style="list-style-type: none"> - Stop operating machinery or equipment; - Demarcate the site with danger tape; - Determine GPS position if possible; 	Contractor Project Manager

		<ul style="list-style-type: none"> - 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 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 B2Gold Namibia;
- B. Has been prepared on the basis of information provided to ECC up to April 2017;
- C. Is for the sole use of B2Gold Namibia, for the sole purpose of an EMP;
- D. Must not be used (1) by any person other than B2Gold Namibia. 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 B2Gold Namibia, and on the Specialist 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 Upgrade of existing Power Plant Facility [Desktop Study – Baseline/Scoping].



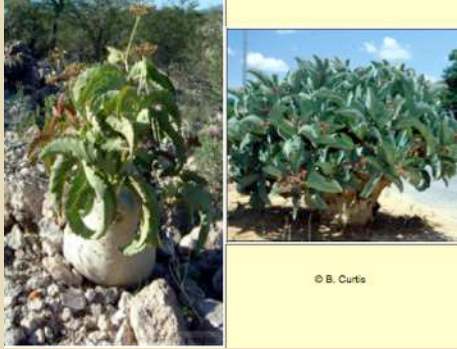




- Appendix 1 –Protected Tree Species**
- Appendix 2 –Monthly Internal EMP Checklist**
- Appendix 3 - Monthly Internal Compliance Certificate**
- Appendix 4 - Weekly Checklist**
- Appendix 5 - Weed and Seed Clearance Certificate**
- Appendix 6 - Internal Land Clearing Certificate**



















Environmental Management Plan (EMP)
Appendix 1 - Protected Tree Lists



Protected Tree Species

Scientific name	Common Name	Photos (Source Tree Atlas of Namibia)
<i>Acacia erioloba</i>	Camel-thorn	 
<i>Adenium boehmianum</i>	Ouzuwo	
<i>Albizia anthelmintica</i>	Worm-cure Albizia	
<i>Aloe litoralis</i>	Windhoek Aloe	
<i>Berchemia discolor</i>	Bird Plum	  
<i>Boscia albitrunca</i>	Witgat	

<i>Burkea africana</i>	Omutundungu	
<i>Combretum imberbe</i>	Omumborongbonga	
<i>Cyphostemma juttae</i>	Blue Kobas	
<i>Elaeodendron transvallense</i>	Transvaal Saffron	
<i>Erythrina decora</i>	Namib Coral-tree	
<i>Faidherbia albida</i>	Anaboom	
<i>Ficus burkei</i>	Strangler Fig	

<i>Ficus cordata</i>	Herzfeige	
<i>Ficus sycomorus</i>	Sycamore Fig	
<i>Gyrocarpus americanus</i>	Propeller Tree	  
<i>Maerua schinzii</i>	Lammerdrol	
<i>Moringa ovalifolia</i>	Sprokiesboom	
<i>Ochna pulchra</i>	Lekkerbreek	  

<i>Olea europaea</i>	Wild Olive	
<i>Ozoroa crassinervia</i>	Namibian Resin-tree	
<i>Peltophorum africanum</i>	Muparara	
<i>Philenoptera nelsii</i>	Kalahari Omupanda	
<i>Searsia lancea</i>	Karee	
<i>Securidaca longepedunculata</i>	Violet-tree	

<p><i>Spirostachys africana</i></p>	<p>Tamboti</p>	
<p><i>Ziziphus mucronata</i></p>	<p>Buffalo-thorn</p>	



Environmental Management Plan (EMP)
Appendix 2 - Monthly Internal EMP Checklist

INSPECTION DATE: ____ / ____ / ____

INSPECTION COMPLETED BY: _____

ACTIVITIES ON SITE DETAILS:

CONTRACTORS ON SITE:

	Aspect	Phase	Restriction / Action	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
General Management Procedures	On Site Accommodation	1 Survey, 2 Construction, 3 Maintenance	Workers may not bring pets onto the construction site.	Project Manager, Contractor				
		1 Survey, 2 Construction, 3 Maintenance	Trespassing on properties adjoining the allocated site 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	Accommodation must be kept clean to minimise the visual impact of the site and minimise vermin and pests. Litter and waste management	Contractor				

		measures must 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				
	Rehabilitation	2 Construction, 3 Maintenance	The contractor should repair any damage that the construction works have caused to neighboring 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	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. Otjikoto Gold Mine Waste Management Plan must be implemented.	Contractor, Project Manager				

Surface and Groundwater Management Measures	Air Quality Management Procedures							
	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	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 to minimise exhaust emissions.	Contractor				
		2 Construction, 3 Maintenance	Dust suppression should be done on a regular basis to avoid producing excessive dust.	Contractor				
	Rehabilitation	Post-installation	Progressively revegetate areas disturbed during construction	Project Manager, Contractor				
	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	Pollution control measures.	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any surface and/or groundwater intersected during construction and operations	Contractor				
		2 Construction, 3 Maintenance	Visual monitoring during rainfall events for runoff of polluted water	Contractor				
		2 Construction, 3 Maintenance	Chemically laden water must not be disposed of into surface water sources or into	Contractor				

and Contaminatio			the bush					
		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				
	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				
	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	Soil erosion	2 Construction,	Vegetation must not be cleared unless absolutely	Contractor, Project Manager				

	3 Maintenance	necessary for the safe completion of the project						
	2 Construction, 3 Maintenance	Visual monitoring and photographic record of any surface disturbance and clearing during construction and 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 construction.	Contractor					
	Post-installation	Exposed soils should be immediately rehabilitated upon completion construction 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	Avoid mixing of topsoils and subsoils.	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				
Spill Prevention Measures	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	Stored Hazardous Chemicals	2 Construction, 3 Maintenance	Hazardous chemicals are to be stored in bunded areas that can contain 110% capacity of contents.	Contractor, Project Manager				
		2 Construction, 3 Maintenance	Water (e.g. rainwater) must be emptied from bunded areas on a regular basis.	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,	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				
Vegetation Management Procedures	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	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 unnecessarily removing any trees on and around the site. They should rather trim them. Only where trees are directly obstructing the line and there is no alternative, should they	Contractor, Project Manager Environmental Officer				

		be cut down completely.					
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				
	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	Laydown areas should be placed only on areas already disturbed 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 not be collected, consumed or removed from site by the Contractor or their personnel on site.	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	Contractor,				

		permission of the relevant authority may lead to criminal proceedings being initiated against an individual and/or the contracting company.	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 region. (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				

Fauna Relocation and Protection Management Measures	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
	Removing or cutting trees	1 Survey	Permit for removal of protected and unique species.	Ministry of Agriculture, Water & 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	Only where vegetation is directly obstructin construction 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,				

Waste Mitigation and Management Measures	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 on site.	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,	No animals or birds may be brought onto the site from other areas.	Contractor				
	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
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	Contractor,					

		Project manager on request.	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 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 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				

Heritage Mitigation and Management Measures	Aspect	Phase	Mitigation Measure	Responsibility	Compliant (Yes/No)	Notes/action Taken/Corrective Action Required	Expected dates Completed	Actual Date Completed
		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				
	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 construction site.	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: <ul style="list-style-type: none"> - Stop operating machinery or equipment; - Demarcate the site with danger tape; 	Contractor Project Manager				

		<ul style="list-style-type: none"> - 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 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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Environmental Officer Name:

Signature:

Project Manager Name:

Signature:



B2Gold Namibia (Pty) Ltd
Otjikoto Gold Mine

Environmental Management Plan (EMP)
Appendix 3 - Monthly Internal Compliance Certificate



SECTION 1 - ENVIRONMENTAL OFFICER TO COMPLETE EACH MONTH

FOR THE PERIOD TO

CONTRACT:	
CLIENTS REPRESENTATIVE:	SIGN:
ENVIRONMENTAL OFFICER:	SIGN:

DATE OF SUBMISSION: ____ / ____ / ____

Key activities on site during the month:

Corrective action taken:

Intended follow up:

NON-CONFORMANCE:

Area of activity:

Reason:

GOOD PERFORMANCE

Description of activity or action in which contract went beyond compliance towards responsible care for the environment:

Responsible Party:

ADDITIONAL COMMENTS

Result:



ECC-36-70-REP-08-A

B2Gold Namibia (Pty) Ltd
Otjikoto Gold Mine

Environmental Management Plan (EMP)
Appendix 4 - EMP Weekly Checklist

INSPECTION DATE: ____ / ____ / ____

INSPECTION COMPLETED BY: _____

ACTIVITIES ON SITE DETAILS:

CONTRACTORS ON SITE:

	Item	Compliant	Notes / Action Taken / Corrective Action Required	Responsibility	Date Completed	
					Expected	Actual
1.COMPLIANCE WITH LAWS AND LEGAL FRAMEWORK						
1	Contractor's accommodation is neat and tidy and the labourers facilities are of an acceptable standard	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
2	Waste control and removal system is being maintained.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
3	Sufficient fire-fighting equipment is available on Site and is in good working order.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
4	Boundary and other fences are being maintained.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
5	All hazardous materials are stored in bunds that are impermeable and has the capacity to contain 110% of the contents.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				

	Item	Compliant	Notes / Action Taken / Corrective Action Required	Responsibility	Date Completed	
					Expected	Actual
6	Bunds/drip trays are being emptied on a regular basis (especially after rain).	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
7	All construction vehicles and machinery are in good working order and no leakages are visible.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
8	Powerline Poles include bird avoidance measures to avoid collisions.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
9	No go areas, remaining natural features and trees have not been damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
10	Dust control measures (if necessary) are in place and are effectively controlling dust.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
11	Noise control measures (if necessary) are in place are working effectively.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
12	Erosion control measures (if necessary) are in place and are effective in controlling erosion.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
13	Stockpiles of topsoil are located within the boundary of the site and do not exceed 2m in height.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				
14	Vertebrate fauna (snakes etc.) are removed when encountered on site.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>				

Environmental Officer Name:

Signature:

Project Manager Name:

Signature:



B2Gold Namibia (Pty) Ltd

Otjikoto Gold Mine

Environmental Management Plan (EMP)

Appendix 5 - Weed and Seed Clearance Certificate

WEED AND SEED CLEARANCE CERTIFICATE
ECC-36-70-FOR-09-A

SECTION 1 – PROJECT MANAGER TO COMPLETE (AT LEAST 2 DAYS PRIOR TO EQUIPMENT ARRIVING)

Project Manager or responsible person bringing equipment to site:

Name:		Department:	
Site:		Equipment Arrival Date:	

Details of the owner of the equipment:

Equipment owner:		Company Name:	
Equipment type:		Equipment ID:	
Date Equipment was washed:		Inspected By:	
Where was the equipment last used:			

SECTION 2 - ENVIRONMENTAL CONTROL OFFICER TO COMPLETE PRIOR TO ANY GROUND WORKS COMMENCING

Inspection area	Requirements	Compliance		
		Yes	No	NA
Body works	Free of all soil and vegetation?			
Bumpers	Hollow sections and attachment points free of dirt			
Tyres	Free of all soil and vegetation			
Dual Wheels	Free of all soil and vegetation			
Canopy	Free of all soil and vegetation			
Radiator	Free of all soil and vegetation – specifically look for seed heads			
Interior	Free of soil and vegetation – specifically look for seed heads in upholstery and under mats			
Storage compartments	Free of all soil and vegetation			
Jack and tool kit	Check tool roll and spare wheel are clean			
Racks and bull bars	Free of all soil and vegetation			
Ropes/ Straps/ Cages	Free of all soil and vegetation? Carefully check Velcro and tensioning devices			
Tracks	Carefully check tracks are clean of soil and vegetation			

Actions required:	Accountability	Complete By:	Completed?

On inspection of the aforementioned equipment it has been found to be in a clean and weed seed free state, and has been approved for use on the _____ project.

Please ensure a copy of this certificate remains with the equipment for the operator while completing the site works.

SECTION 3 – BOTH PARTIES TO COMPLETE

Approval / Sign Off		Signature	Date
Environmental Officer: _____	I certify that the equipment meets the company standards		
Project Manager: _____	I understand the condition applicable to this certificate and will ensure the equipment will arrive on site in the state in which it was inspected		
Operator/Company Rep: _____	I certify that the equipment has been cleaned prior to being sent to site. The equipment will arrive on site as it was inspected or will arrive on site in a state that will meet the expectations of this permit.		

Records office use only:

(Please Tick)

(Please Tick)

Actions forward to project manager:		Copies of certificates forwarded to project manager:	
Certificate filed:		Signature	



B2Gold Namibia (Pty) Ltd
Otjikoto Gold Mine

Environmental Management Plan (EMP)
Appendix 6 - Internal Land Clearing Certificate



EMP SUPPORT FORMS AND TOOLS

INTERNAL LAND CLEARING CERTIFICATE
ECC-36-70-FOR-10-A

SECTION 1 – PROJECT MANAGER TO COMPLETE

Submit to the Project Environmental Officer 7 DAYS PRIOR to ground disturbing works

Site:			
Project Manager:		Department:	
Commencement date:		Estimated completion date:	
Size of area to clear:		Date of application:	
Map <i>(must be attached)</i> <input type="checkbox"/>	Photos: Yes <input type="checkbox"/> No <input type="checkbox"/>	Est. No. Trees to be removed	
Equipment to be Used:		Mining Licence Number:	

Purpose of clearing

Map showing area to be cleared

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INTERNAL LAND CLEARING CERTIFICATE
ECC-36-70-FOR-10-A

SECTION 2 – ENVIRONMENTAL OFFICER TO COMPLETE PRIOR TO ANY GROUND WORKS COMMENCING

Permits required and in place:

<input type="checkbox"/> Forestry Act Permit	<input type="checkbox"/> Permit to remove protected species	<input type="checkbox"/> Heritage
<input type="checkbox"/> Licence to Take Rare Flora	<input type="checkbox"/> Other (<i>state which</i>)	

Area approved to clear under:

<input type="checkbox"/> Environmental Assessment.	<input type="checkbox"/> EIA Approval No.	<input type="checkbox"/> Previous approval
<input type="checkbox"/> Exemption from permit (<i>state reason</i>)		

Other considerations:

Depth of topsoil to be recovered:	
Location identified for topsoil and vegetation stockpiles:	
Is there known equipment/infrastructure in place, which could get damaged?	
Any known boreholes?	
Heritage register checked?	

Environmental conditions of clearing:

INTERNAL LAND CLEARING CERTIFICATE
ECC-36-70-FOR-10-A

SECTION 3 – ALL PARTIES TO COMPLETE

This permit to clear or disturb land must be signed by the three parties below or their nominated representative for it to take effect. Clearing can not commence until the permit is signed and a copy of taken for the operator completing the works. The operator completing the works is to carry the permit with them during all clearing works.

Approval / Sign Off		Signature	Date
Environmental Officer:	I certify that the equipment meets the company standards		
Project Manager:	I understand the environmental conditions applicable to this permit to clear land, and will ensure all persons associated with the clearing will comply.		
Operator/Company Rep:	I certify that a copy of the permit will be kept with me in the cab of the equipment I am operating to clear land. I understand the conditions of this permit.		
General Manager:	I approve the land clearing to occur on site as per the conditions outlined in this permit. If a change is required you must amend your approved permit.		

Post clearing inspection: (To be completed by the Environmental Officer and Project Manager <1 month post clearing)

Issue	Yes	No	Comments
Correct area cleared (size and location)	<input type="checkbox"/>	<input type="checkbox"/>	
Minimal damage to vegetation outside of area	<input type="checkbox"/>	<input type="checkbox"/>	
Topsoil and cleared vegetation stockpiled in correct location	<input type="checkbox"/>	<input type="checkbox"/>	
Topsoil stockpiled < 2m high	<input type="checkbox"/>	<input type="checkbox"/>	

Records office use only:

<input type="checkbox"/> Clearance entered in database	<input type="checkbox"/> Copy of approval/conditions forwarded to Project Manager
<input type="checkbox"/> Approval documents filed	<input type="checkbox"/> Actions forwarded to Project Manager