ENVIRONMENTAL
COMPLIANCE CONSULTANCY






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OTJIKOTO MINE, WOLFSHAG PIT UNDERGROUND AMENDMENT - ML 169

PREPARED FOR

B2GOLD
NAMIBIA

DECEMBER 2019

TITLE AND APPROVAL PAGE

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ABBREVIATIONS

B2Gold	B2Gold Namibia Pty Ltd
CIA	Cumulative Impact Assessment
CRF	cemented rock fill
DEA	Department of Environmental Affairs
ECC	Environmental Compliance Consultancy
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPRP	Emergency Preparedness and Response Plan
FTP	Fan Total Pressure
Ha	Hectare
HFO	Heavy Fuel Oil
I&AP	Interested and or affected parties
IFC	International Finance Corporation
Km	Kilometres
kW	Kilowatts
MET	Ministry of Environment and Tourism
ML	Mining Licence
MME	Ministry of Mines and Energy
NDP	National Development Plan
OGM	Otjikoto Gold Mine
T	Tonnes
TPA	Tonnes per annum
TPD	Tonnes per day
TSF	Tailings Storage Facility
WRD	Waste Rock Dump

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Otjikoto Gold Mine (OGM) is an operating gold mine owned and operated by B2Gold Namibia Pty Ltd, a subsidiary of B2Gold a Canadian owned Company. OGM is located in north-central Namibia in the Otjozondjupa Region, north of Otjiwarongo. B2Gold is an internationally recognised Canadian based gold exploration, development and mining company listed on the Toronto, Namibian and New York Stock Exchanges. It was founded in 2007 and has five operating gold mines and numerous exploration and development projects in various countries. Through its subsidiary B2Gold Mining Investments Limited, B2Gold Corporation holds 90% of B2Gold Namibia; the remaining 10% is held by EVI Mining Company Limited, a Namibian broad-based economic empowerment company. The properties on which the mine is located are owned by B2Gold Namibia.

1.2 AMENDMENT APPLICATION SCOPE

Environmental Compliance Consultancy was engaged by B2Gold Namibia to undertake an Environmental Scoping Report plus Environmental Impact Assessment (referred to as an EIA herein) for the proposed underground extension to the B2Gold Otjikoto Gold Mine (referred to as the 'Project' herein).

The Project is located approximately 70 km northwest of the town of Otjiwarongo in the province of Otjozondjupa in the central-north part of the Republic of Namibia Figure 1. The existing and approved Otjikoto mine is an open pit operation, with gold production from two open pits; Otjikoto Pit and Wolfshag Pit. In addition to the current operations B2Gold intends to include underground mining as a method to extract ore at depth. This will be done with the portal to the underground operation located in the Otjikoto Pit. B2Gold acquired the OGM in 2011 and poured its first gold in December 2014.

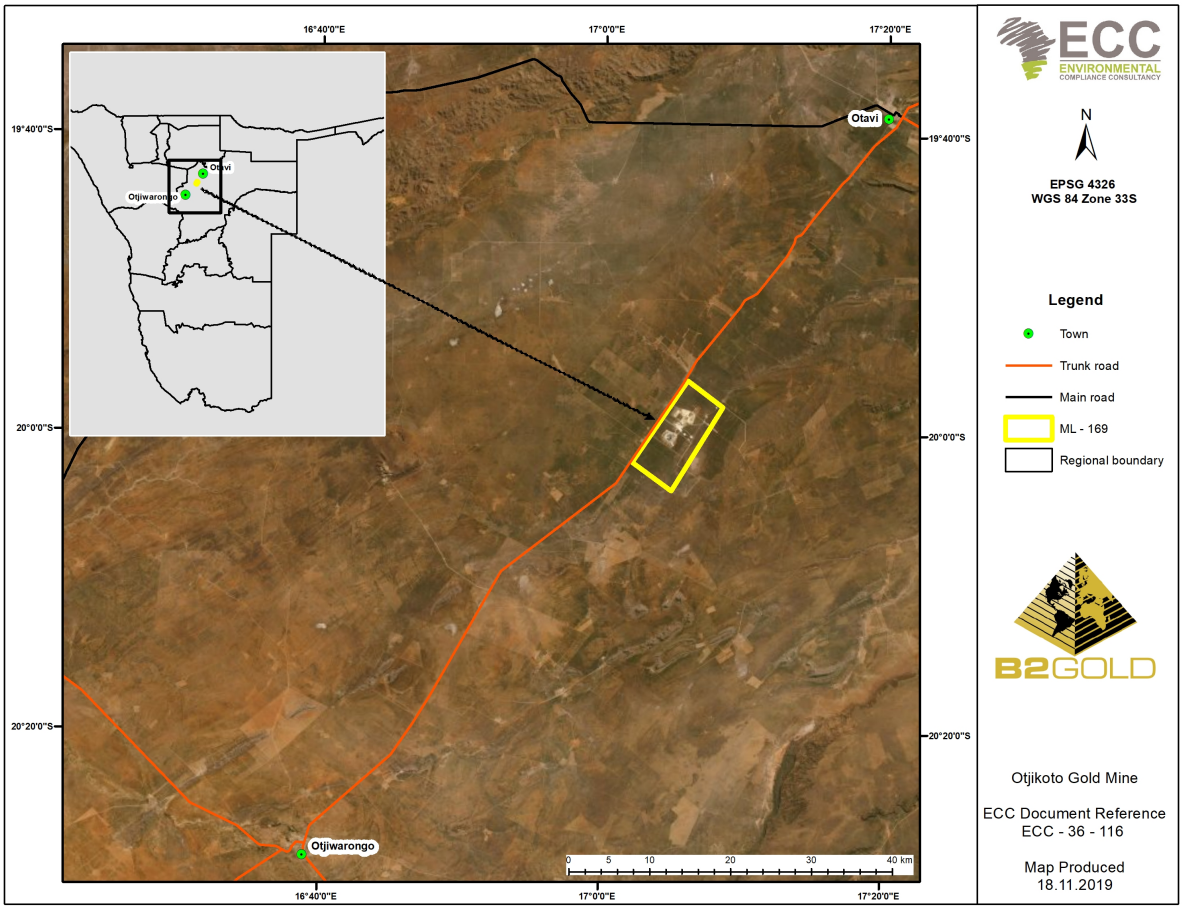

FIGURE 1 - A SATELITE IMAGE INDICATING THE LOCAL SETTING OF ML 169 - OTJIKOTO GOLD MINE

1.3 ENVIRONMENTAL COMPLIANCE CONSULTANCY

ECC, a Namibian consultancy (registration number Close Corporation2013/11401), has prepared this report and impact assessment on behalf of the proponent. ECC operates exclusively in the environmental, social, health and safety fields for clients across Southern Africa, in both the public and private sectors. ECC is independent of the proponent and has no vested or financial interest in the proposed project, except for fair remuneration for professional services rendered.

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1.4 STRUCTURE OF THIS DOCUMENT

The report is structured as per the contents set out in Table 1.

TABLE 1 – ENVIRONMENTAL SCOPING REPORT SECTIONS

SECTION	TITLE	CONTENT
-	Executive Summary	Executive summary of the report
-	Definitions and Acronyms	A list of acronyms used during the report
1	Introduction	This section introduces the EIA and provides background information on the proposed project, proponent and purpose of the report
2	Approach to the assessment	This chapter presents the approach applied to the report
3	Regulatory Framework	This chapter describes the Namibian environmental regulatory framework applicable to the project and how it has been considered in the assessment and EMP.
4	Project Description	Presents a description of the proposed project and how the proposed project will be operated.
5	Environmental and social baseline	This chapter presents the current environment and social baseline used in the assessment.
6	Scoping Report plus EIA Method	This chapter provides the framework as to how impacts as assessed and the thresholds applied to determine significance.
7	Environmental Assessment findings	This chapter identifies the potential environmental and social impacts arising from the project, the assessment of impacts including residual impact This chapter also outlines the proposed management strategies for monitoring commitments to ensure the actual and potential impacts on the environment are minimised to "As Low As Reasonably Practicable" (ALARP) this informs the EMP
8	Environmental Management Plan	This chapter provides a short description of the EMP used to take pro-active action by addressing potential problems before they occur and outline mitigation measures for each impact
9	Stakeholder feedback	This chapter presents the feedback and responses from stakeholder engagements.
9	Conclusions	Conclude the findings of the report
Appendix	Appendices	A list of appendices used for this report – Appendix A: Environmental Management Plan – Appendix B: I&APS and Adverts

2 APPROACH TO THE IMPACT ASSESSMENT

2.1 PURPOSE AND SCOPE OF THE ASSESSMENT

The aim of this assessment is to determine which impacts are likely to be significant (the main focus of the assessment); scope the available data and any gaps which need to be filled; determine the spatial and temporal scope; and identify the assessment methodology.

Subsequently, scoping of the EIA was undertaken by the EIA team. The scope of the assessment was determined through undertaking a preliminary assessment of the proposed project against the receiving environment obtained through a desk-top review, available site specific literature, monitoring data and site reports.

2.2 THE ASSESSMENT PROCESS

The EIA methodology applied to this EIA has been developed using the International Finance Corporation (IFC) standards and models, in particular Performance Standard 1, 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017) (International Finance Corporation, 2012); Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008); international and national best practice; and over 25 years of combined EIA experience.

ECCs methodology for environmental impact assessments is adopted and based on models for environmental and social impact assessments set out by the International Finance Corporation (IFC) Performance Standard 1 'Assessment and management of environmental and social risks and impacts. Furthermore, this impact assessment was undertaken for B2Gold in accordance with Namibian legal requirements.

This impact assessment is a formal process in which the potential effects of the project on the biophysical, social and economic environments are identified, assessed and reported, so that the significance of potential impacts can be taken into account when considering whether to grant approval, consent or support for the proposed project.

Final mitigation measures and recommendations are based on the cumulative experience of the consulting team and the client, taking into consideration the potential environmental and social impacts. The process followed through the basic assessment is illustrated in figure 2 and detailed further in the following sections.

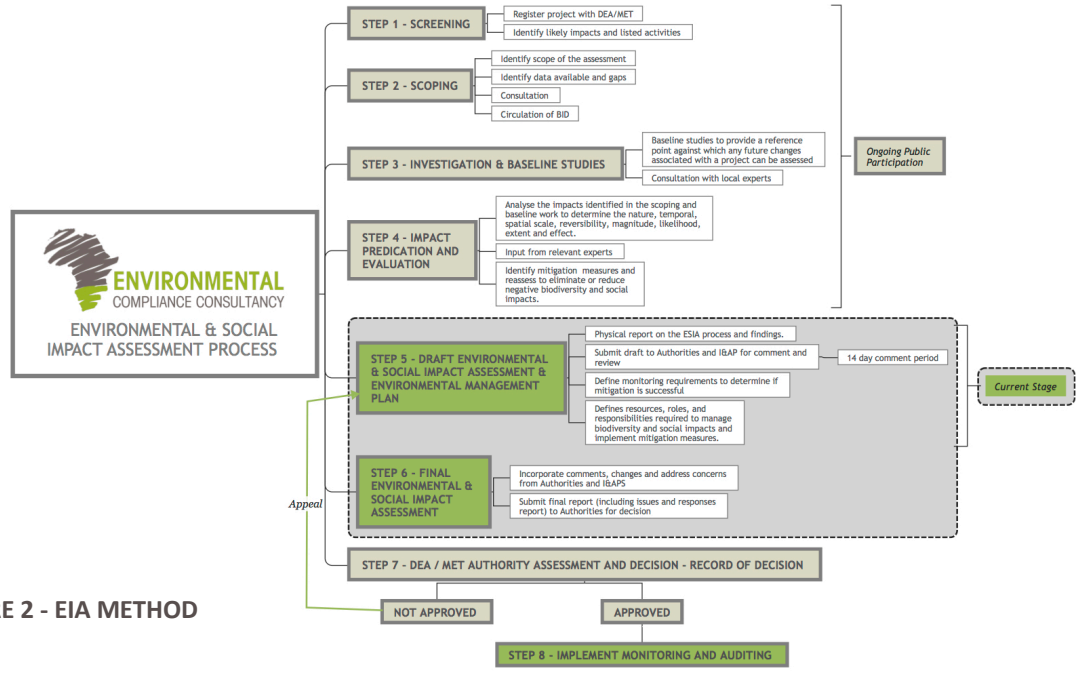

FIGURE 2 - EIA METHOD

2.2.1 STEP 1 - SCREENING OF THE PROJECT

STATUS: COMPLETE

The first stages in the EIA process is to undertake a screening exercise to determine whether the changes to the project triggers any new or additional listed activity under the Environmental Management Act, 2007 and associated Regulations and if any potentially significant impacts could arise from the project changes that they are assessed. The location, scale and duration of project activities will be considered against the receiving environment.

The screening phase of the project is a preliminary analysis to determine ways which the project may interact with the biophysical, social and economic environment. Impacts that are identified as potentially significant during the screening and scoping phase are taken forward for further assessment in the EIA process. The details and outcome of the screening process are discussed further in sections 6 and 7.

2.2.2 STEP 2 – SCOPING

STATUS: COMPLETE

SCOPE OF ASSESSMENT

Where an EIA is required, the second stage is to scope the assessment. The main aims of this stage are to determine which impacts are likely to be significant (the main focus of the assessment); scope the available data and any gaps which need to be filled; determine the spatial and temporal scope; and identify the assessment methodology.

In response to the request from B2Gold and in terms of the Environmental Management Act, 2007 an application for amendment to the sites current and approved environmental clearance certificate is to be applied for by means of an assessment and amendment application (this report).

Subsequently, scoping of the EIA was undertaken by the EIA team. The scope of the assessment was determined through undertaking a preliminary assessment of the proposed project against the receiving environment obtained through a high-level desktop review. Feedback from consultation with the client and stakeholders also informed this process. The following environmental and social topics and subtopics were scoped into the assessment, as there was potential for significant impacts to occur:

SOCIO-ECONOMIC ENVIRONMENT

- Employment
- Local businesses
- Underground safety for example emergency response and preparedness and ground stability

BIOPHYSICAL ENVIRONMENT

- Air quality
- Dust emissions
- Aerial pollution (air emissions e.g. oxides of nitrogen; nitrogen dioxide, particulate matter; sulphur dioxide and carbon monoxide)
- Vibration
- Groundwater
- Mineral mine drainage

The following topics were scoped out of the EIA, as no likely significant impacts are predicted as the proposed project poses little to no change from the current baseline, therefore are not discussed further in this report.

- **Soil and geology:** the surrounding soils and geology are common and have no significant value. The proposed project amendment will not generate new or additional impacts to surface soil or geology.
- **Terrestrial ecology:** The amendment proposed will not have any new or additional impacts on terrestrial ecology aside from potential inactions with trucks and surface working machinery which already exists and is managed as part of the open pit mining operations.

An assessment of high level safety impacts or risks associated with developing an underground mine has been included in this Report. The operation currently has in place a robust safety management system and this system will be modified in detail to manage health and safety risks to the workforce. Modifications to the safety management system will be reported separately to the relevant authorities.

2.2.3 STUDY AREA

This EIA study area has been defined according to the geographic scope of the receiving environment and potential impacts that could arise as a result of the proposed project. The study area is presented in Figure 3.

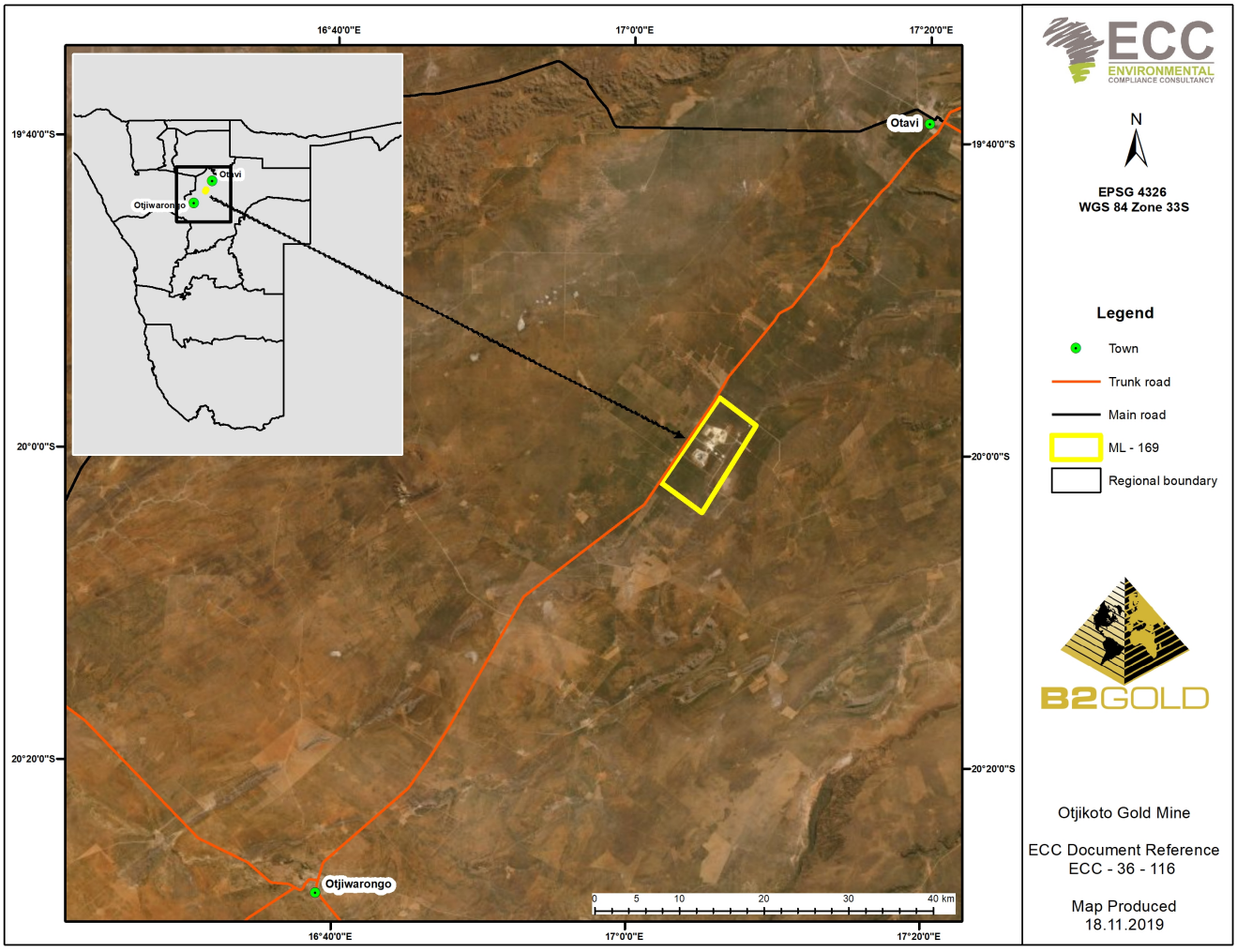

FIGURE 3 - STUDY AREA

2.2.4 CONSULTATION

STATUS: COMPLETE AND ONGOING

Public participation and consultation are a requirement stipulated in Section 21 of the Environmental Management Act, 2007 and associated regulations for a project that needs an environmental clearance certificate. Consultation is a compulsory and critical component in the EIA process in achieving transparent decision-making and can provide many benefits.

The objectives of the stakeholder engagement process are to:

- Provide information on the project, introduce the overall concept and plan
- Clarify responsibility and regulating authorities
- Listen and understand community issues, concerns and questions
- Explain the process of the EIA and timeframes, and
- Establish a platform for ongoing consultation.

2.2.5 INTERESTED AND AFFECTED PARTIES

Appendix B provides a list of interested and affected parties, and evidence of newspaper consultation for the amendment application. B2Gold advertised the amendment in two national newspapers.

2.2.6 SUMMARY OF ISSUES RAISED

During the compilation of this assessment several stakeholders were engaged to seek potential issues or concerns regarding the amendment to include underground mining as a method for ore extraction. One interested party registered for the project, however no specific concerns were raised or noted. In order to ensure all potential interested and affected parties have the opportunity to comment and provided feedback on this assessment the completed report will be circulated to all neighbouring farmers, and potential interested and affected parties even though there were no registered I&APs for the project. Should stakeholders have comments or questions, or areas that require further assessment that concern them, ECC will address these through an addendum report to the final document.

2.2.7 STEP 3 - BASELINE STUDIES

STATUS: COMPLETE

A robust baseline is required in order to provide a reference point against which any future changes associated with a project can be assessed and allow suitable mitigation and monitoring to be identified. The site has been extensively studied in previous EIAs and site specific scientific studies and reports complied and conducted over the mine life. This information has been referenced throughout this report. Furthermore, the following was conducted as part of this assessment:

- Field survey conducted 5th – 7th August 2019;
- Desk-top studies;
- Consultation with stakeholders through direct communication

The environmental and social baseline is provided in Chapter 5, focussing on the topics that have been scoped into the EIA, as listed in 2.2.2.

2.2.8 STEP 4 - IMPACT IDENTIFICATION AND EVALUATION

STATUS: COMPLETE

The key stage of the EIA process is the impact identification and evaluation stage. This stage is the process of bringing together project characteristics with the baseline environmental characteristics and ensuring all potentially significant environmental and social impacts are identified and assessed. It is an iterative process that commences at project inception to the final design and project implementation. The impact identification and evaluation stage were undertaken in September 2019.

The final design of the proposed project has been assessed, as well as alternatives considered during the design process in accordance with the Environmental Management Act, 2007. Refer to chapter 7 for the findings of the assessment.

Chapter 6 in this report sets out the assessment methodology used to assess the project against the environmental and social baseline that would be affected. Chapter 7 presents the findings of the assessment, focussing on the significant impacts or those considered sensitive to the community.

2.2.9 STEP 5 - DRAFT EIA REPORT AND EMP

STATUS: COMPLETE

This report and EMP for the Otjikoto Gold Mine's environmental clearance amendment includes an assessment of the biophysical and social environment which satisfies the requirements of Step 5.

The EIA report documents the findings of the assessment process, provides stakeholders with opportunity to comment and continued consultation and forms part of the environmental clearance amendment application. The EMP provides measures to manage the environmental and social impacts of the proposed project and outlines specific roles and responsibilities to fulfil the plan.

This EIA report focuses on the significant impacts that may arise from the proposed project as described in Step 4. These impacts are discussed in Chapter 7.

This EIA report will be issued to stakeholders and I&APs for consultation for a period of 14 days, meeting the mandatory requirement of 14 days as set out in the Environmental Management Act and associated Regulations. The aim of this stage was to ensure all stakeholders and I&APs have the opportunity to provide final comments on the assessment process and findings and register their concerns.

2.2.10 STEP 6 – FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

STATUS: COMPLETE AND ONGOING

All comments received during the I&AP public review period will be collated in an Addendum report which will accompany this EIA report when submitted to the DEA. All comments will be responded to either through providing an explanation or further information in the response table, or sign posting where information exists, or new information has been included in the EIA report or Appendices. Comments will be considered and where they are deemed to be material to the decision making or enhanced the EIA and EIA report will be incorporated into this EIA report.

The final EIA report and associated appendices, and the Addendum report will be available to all stakeholders on the ECC website www.eccenvironmental.com All I&APs will be informed via email.

The EIA report, appendices and Addendum will be formally submitted to the Office of the Environmental Commissioner, DEA as part of the application to amend the current environmental clearance certificate.

2.2.11 STEP 7 – AUTHORITY ASSESSMENT AND DECISION MAKING

STATUS: FUTURE STAGE

The Environmental Commissioner in consultation with other relevant authorities will assess if the findings of the EIA presented in the EIA report and Addendum report are acceptable. If deemed acceptable, the Environmental Commissioner will revert to the proponent with a record of decision and any recommendations.

2.2.12 STEP 8 – MONITORING AND AUDITING

STATUS: FUTURE STAGE

In addition to the EMP being implemented by the proponent, a monitoring strategy and audit procedure will be determined by the proponent and competent authority. This will ensure key environmental receptors are monitored over time to establish any significant changes from the baseline environmental conditions caused by project activities.

3 REGULATORY FRAMEWORK

An environmental clearance is required for any activity listed as per Government Notice No 29 of 2012 of the EMA. The proponent holds several environmental clearance certificates for the project that includes the listed activities as detailed in the regulations. The proposed amendment does not trigger any new listed activities for the operations of the Otjikoto mine site.

The project area is located outside of any national parks, heritage listed areas or areas of significance. The area between Otavi and Otjiwarongo is located within the groundwater controlled areas regulated under the Water Management Act of 1956. The Otjikoto site is located within Grootfontein Subterranean Water Control Area as per Government Notice 36 of 1962.

A thorough review of relevant legal legislation has been conducted for the proposed amendment; the table below identifies relevant legal requirements specific for the project. This chapter outlines the regulatory framework applicable to the proposed project.

3.1 CURRENT PROJECT APPROVALS

- The site is fully permitted in terms of the Minerals Act 1992, the Environmental Management Act, 2007 and the Water Resource Act 1956.
- The site operates in accordance with its current and approved environmental clearance certificates issued in terms of environmental management act 2007 by the Ministry of Environment and Tourism.
- The site has a valid water abstraction permit issued under the Water Act 1956.
- The site remains compliant with all Namibian laws and policies and relevant permits or approval are available upon request.

3.2 NATIONAL REGULATORY REGIME

TABLE 2 – LEGAL COMPLIANCE

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Minerals (Prospecting and Mining) Act No 33 of 1992	Section 50 (i) requires *"an environmental impact assessment indicating the extent of any pollution of the environment before any mining operations are being carried out and an estimate of any pollution, if any, likely to be caused by such prospecting operations or mining operations"* Section 50 sets out that in addition to any term and condition contained in a mineral agreement and any term and condition contained in any mineral licence, it shall be a term and condition of any mineral licence that the holder of such mineral licence shall: Exercise any right granted to him or her in terms of the provisions of this Act	The proposed amendment to include underground mining requires amendment to the approved environmental clearance certificate therefore triggers the Environmental Management Act and its regulations. This report presents the findings of the EIA. The proponent will ensure the mine plans are approved by the inspector of mines.
Environmental Management Act, 2007 (Act No. 7 of 2007) and associated regulations,	The Environmental Management Act (EMA) (7 of 2007) has been compiled and is regulated by the Ministry of Environment and Tourism (MET). This Act was gazetted on 27 December 2007 (Government Gazette No. 3966) and the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 (Government	The certificate holder B2Gold requests an amendment to the certificate to incorporate underground mining operations.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
including the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011)	Gazette No. 4878) were promulgated on 6 February 2012. Section 39 of the Environmental management Act, 2007 states the Environmental Commissioner may amend a condition of an environmental clearance certificate; – If the certificate holder consents to or requests amendment or – At the initiative of the Environmental Commissioner, by giving written notice to the holder of the certificate The Environmental Commissioner may require the holder of the environmental clearance certificate to make an application in the prescribed form and manner to the Environmental Commissioner for the proposed amendment. Requires that projects with significant environmental impact be subject to an environmental assessment process (Section 27). In terms of this legal framework certain identified activities may not commence without an Environmental Clearance - a certificate that is issued by MET. This environmental clearance can only be granted after consideration of an EIA.	The proponent makes the application for amendment in the prescribed form (this amendment report to address potential impacts) accompanied by the prescribed form (Form 2) in accordance with the Act. This Act and its regulations have informed and guided this amendment process. Impacts identified through this amendment assessment application have been addressed throughout this report (and relevant studies) and project specific EMP. Environmental Clearance has been issued for the operations on Otjikoto Gold Mine via the consideration of four EIAs processes.
Water Act, 1956	The Water Resources Management Act 24 of 2004 is presently without regulations; therefore the Water Act No 54 of 1956 is still in force: A permit application in terms of Sections 21(1) and 21(2) of the Water Act is required for the disposal of industrial or domestic wastewater and effluent. Prohibits the pollution of underground and surface water bodies (S23(1). Liability of clean-up costs after closure/ abandonment of an activity (S23(2)). Protection from surface and underground water pollution	Groundwater abstraction and relevant permits are in place and upheld by the Mining Operation. The use of water will be required for the underground operations, the mine will utilise excess water from the mining operations in the processing plant. The area between Otavi and Otjiwarongo is located within the groundwater controlled areas regulated under the Water Management Act of 1956. The Otjikoto site is located within Grootfontein Subterranean Water Control Area as per Government Notice 36 of 1962.
National Heritage Act, No. 27 of 2004.	The Act provides for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. It also makes provision for archaeological 'impact assessments. If applicable, the relevant permits must be obtained before disturbing or destroying a heritage site as set out in the Act.	Any heritage resources discovered would require a permit from the NHC for relocation. The site has conducted previous and extensive heritage assessments therefore sites are already known for the project area and non are located within the proposed project footprint therefore impacts not likely to occur.

3.3 NATIONAL POLICIES

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Vision 2030	Vision 2030 sets out the nation's development programmes and strategies to achieve its national objectives. It sets out eight themes to realise the country's long-term vision. Vision 2030 states that the overall goal of the vision is to improve the quality of life of the Namibian people to a level in line with the developed world.	The planned project shall meet the objectives of Vision 2030 and shall contribute to the overall development of the country through continued employment opportunities.
Fifth National Development Plan (NDP5)	The NDP5 is the fifth in the series of seven five-year national development plans that outline the objectives and aspiration of Namibia's long-term vision as expressed in Vision 2030. The NDP5 is structure on five pillars: economic progression, social transformation, environmental sustainability and good governance. Under the social transformation pillar is the goal of improved education. A desired outcome of NDP5 is to have a diversified and competitive tourism sector with increased number of tourists from 1.4 million in 2015 to 1.8 million.	The planned project supports meeting the objectives of the NDP5 through creating opportunities for continued employment by extending the mine life.
Minerals Policy	The Minerals Policy was adopted in 2002 and sets guiding principles and direction for the development of the Namibian mining sector while communicating the values of the Namibian people. It sets out to achieve several objectives in line with the sustainable development of Namibia's natural resources. The policy strives to create an enabling environment for local and foreign investments in the mining sector and seeks to maximise the benefits for the Namibian people from the mining sector while encouraging local participation, amongst others. The objectives of the Minerals Policy are in line with the objectives of the Fifth National Development Plan that include reduction of poverty, employment creation and economic empowerment in Namibia.	The proposed project conforms with the Policy, which has been considered through the EIA process and the production of this report. OGM supports local spending and procurement and implements an extensive portfolio of CSIR projects supported by an approved budget and funding.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Labour Act, No. 11 of 2007	The Labour Act, No. 11 of 2007 (Regulations relating to the Occupational Health & Safety provisions of Employees at Work promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 - GN156, GG 1617 of 1 August 1997)	The proposed project will comply to stringent health and safety policies, including the compulsory use of specific PPE in designated areas to ensure adequate protection against health and safety risks. Proper storage and labelling of hazardous substances are required. The project will ensure employees in charge of and working with hazardous substances need to be aware of the specific hazardous substances in order not to compromise worker and environmental safety.

3.4 PERMITS AND LICENCES

3.4.1 MINING LICENCE

B2Gold Namibia holds the mining licence for the Otjikoto project (ML 169). The mining licence was granted by the Ministry of Mines and Energy on 5/12/2012 and expires on the 4/12/2032; beyond the expected life of mine for the current open pit and proposed underground mining operations. ML 169 is granted for mining of base and rare metals, industrials minerals and precious metals on an area of close to 7000 ha.

3.5 WORLD BANK STANDARDS

B2Gold Namibia (Pty) Ltd complies with all Namibian legislation, and where legislation is lacking aligns with international best practice procedures, i.e. the International Finance Corporation (IFC) Performance Standards.

The International Finance Corporation (IFC) is a member of the World Bank Group and is the largest global development institution focusing on the private sector in developing countries. Its standards have become a global benchmark for environmental and social performance. They form the basis for the Equator Principles (IFC, 2013), a voluntary environmental and social risk-management framework used by 77 financial institutions worldwide. The Equator Principles are a framework and set of guidelines for evaluating social and environmental risks in project finance activities and apply to all new projects with a total capital cost of US$10 million or more, no matter what industry sectors, without geographic requirement.

4 PROJECT DESCRIPTION AND PROPOSED PROJECT CHANGES

4.1 NEED FOR THE PROJECT

In January 2019, B2Gold commenced a new study re-evaluating the potential of an underground mine due to new information that became available after the initial concept study in 2017, weakening open-pit economics, and opportunities identified, such as:

- Reduced mine water inflows (following a groundwater model update)
- Design improvements and optimizations (portal, vent circuit, escapeway, orebody initiation point)
- Operational/schedule improvements

It was found that B2Gold can extend the life of its Namibian operations at Otjikoto Mine to the year 2026 (from 2024 without the extension) by economically accessing some ore resources through underground mining. These resources are extensions to the existing mineralization of the Wolfshag pit, plunging south wards and located on the edge of the current Wolfshag Pit. Accessing these resources will not be possible through opencast mining due to ground stability and stripping ratio economics. With the extension, a positive impact is created on job retention as well as creating very specific jobs associated with underground mining. There is also the possibility of extending the resource base through continued underground exploration, the extents of which can only be confirmed once results from exploration drilling is available.

In essence the project is needed for a short life extension of the mine and maximizing resource utilization by extracting an additional 250 000 to 300 000 ounces of gold.

4.2 CURRENT OPERATIONS

The Ministry of Environment and Tourism (MET) issued an Environmental Clearance Certificate (ECC) in August 2012 after an environmental impact assessment (EIA) was conducted (between 2007 and 2012) for the Otjikoto Project. A Mining Licence (ML 169) was subsequently issued by the Ministry of Mines and Energy. The mine has been in operation since these approvals were received and has ramped up to its peak production. In 2013 B2Gold received another ECC for an onsite Heavy Fuel Oil (HFO) power plant and landfill facility, after another EIA process was conducted (SLR, 2014).

A further EIA Scoping process, which included the assessment of proposed amendments to the Otjikoto Project (i.e. new Wolfshag pit and associated infrastructure and activities; increase of the plant's processing throughput and a new, (higher) telecommunications tower and the re-assessment of cumulative impacts associated with the Otjikoto Project, was conducted in 2014.

The mine is currently mining from two open pits, being Otjikoto Pit and Wolfshag Pit respectively. Gold production varying between 145.7 and 191.5 thousand ounces per year has been achieved since 2015 from the processing of 3.4 Mt of ore per year. All mining is being conducted through truck and shovel operations, ramping up from 18.8 Mt in 2015 to 42.9Mt by 2019, averaging 3.5 Mt material per month with 28 trucks (inclusive of 5 contractor trucks). Over burden is placed on a waste rock dump (WRD) to the west of the current pits, while low grade ore is stockpiled close to the pit edges just to the north west thereof. Ore is taken to the plant for processing. After processing, the gold is produced as gold bars and shipped as final product. Tailings forms the final waste stream from the plant and is deposited as a slurry on the TSF at a rate of 283 300 tons per month. A lined ring dyke tailings storage facility (TSF), with the starter wall constructed of compacted calcrete followed by an upstream self-raised lift of 23m is currently in place. On-wall cyclone deposition is used as the deposition method. A storm water dam returns water from the TSF to the plant (Epoch, 2013).

Water supply to the operations is from ground water abstraction boreholes and power is generated from HFO generators and a solar farm. Detailed descriptions of the current operations can be found in the original EMPs for the mine.

4.3 PROPOSED PROJECT CHANGES

The current underground mining project looks at accessing the ore body via a portal in the Otjikoto Pit high wall and a development decline, which will be used for the main haulage and ventilation exhaust. The decline links up to the stoping areas in the ore body. A primary ventilation intake raise will be raise-bored to ensure adequate ventilation is supplied underground (Figure 4)

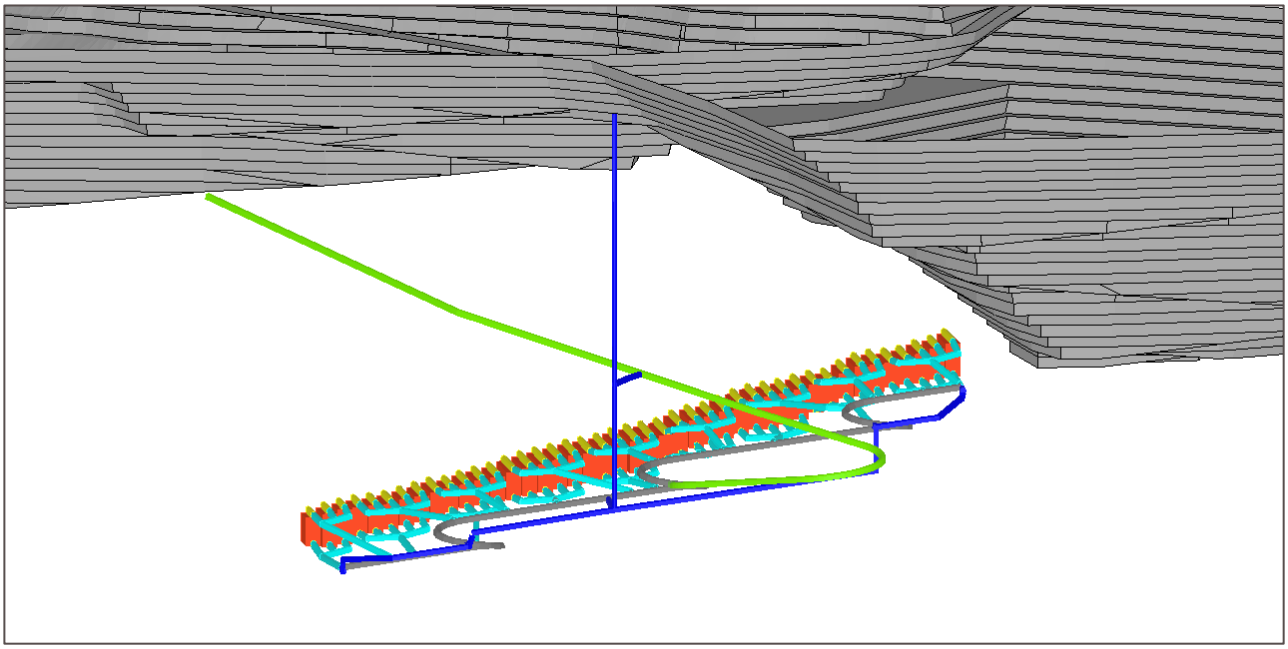

FIGURE 4 - A THREE DIMENSIONAL MODEL OF THE PROPOSED UNDERGROUND WORKINGS WITH THE DECLINE (GREEN), THE PRIMARY VENTILATION INTAKE RAISE (NAVY BLUE), STOPES (RED AND YELLOW) AND THE PLANNED PITS (GREY) INDICATED (B2GOLD, 2019).

Mine dewatering will be completed through pumping from existing dewatering boreholes as well as developing one or more extra dewatering borehole(s) to the north east of the planned mining area. These are the material changes to the current open pit mining method being conducted, although open pit mining will run concurrently with the underground developments.

4.4 UNDERGROUND MINING, INFRASTRUCTURE AND SERVICES

The underground operations will be undertaken through the use of diesel-powered machines. A standard underground mining fleet will be used, the currently-envisioned fleet consists of 6 x 30T class haul trucks; 3 x 10T class (loader hauler dumper) LHDs; 2 x Development Jumbos; 2 x Development Bolters; 2 x Longhole drills; 1 x Shotcrete sprayer; 1 x Transmixer; 1 x Explosives Loader; and miscellaneous support equipment including telehandlers, boom trucks, crew trucks, etc.

The haul truck and LHDs will be used for moving ore and waste mineral material. Mechanized equipment will be utilized to ensure working areas are scaled and supported. The underground production rate will be 1 200 tpd of ore, made up from 1 000tpd of stoping and 200tpd ore in ore development. Decline development is planned to be 120m per month with one blast per day, with the total development running at 330m/month maximum. Developing the underground mine can be achieved in two distinct phases, phase 1 portal and decline development in order to access the mining areas and the second phase being underground mine production. Therefore, it is currently planned to use contractors for the development phase with the strategy for the production phase still under evaluation. Steady-state production is expected to be achieved in early 2022. Thereafter, gold production of 60,000 – 80,000 oz/year is expected (B2Gold, 2019).

Longhole stoping operations are planned with conventional ring drilling and a modified transverse stoping method with a primary/secondary sequence. Backfilling will be completed as both cemented and uncemented rock backfill. Cable bolting will be used for stope support, installed by a mechanical roof bolter.

The ventilation raise will be raise-bored from the relevant development sections to surface and will be used as a down cast raise, exhausting air via the decline and the portal into the mine pit.

Some surface infrastructure such as ventilation fans, surface batch plant, and transformers will be required. The existing WRD will maintain its designed footprint size as the underground operation will be a net consumer of waste. Total waste rock generated from underground is expected to be approximately 800,000 tonnes, though mine backfill is expected to consume approximately 1,200,000 tonnes of mine waste.

The current processing plant infrastructure and TSF tipping space remains adequate to handle the production from the planned underground operations.

Basic services to the underground area will be electricity, water, and compressed air for production purposes. Water will be sourced from inflows into the underground workings and water pumped from the mine water supply and dewatering boreholes. It will be pumped underground and secondary recirculation with water treatment where needed will be used to optimise water use efficiency. Electricity will be supplied from the current generating capacity on site, and future supply augmented from NamPower by a planned power line linking to the main grid. Compressed air will be supplied via surface compressors and distributed with an underground reticulation system.

4.4.1 Ore Body

The targeted ore body dips at 15° away from the current Wolfshag open pit in a southerly direction. Part of the ore body is intersected by weak ground interpreted as a karst breccia. This weak ground is currently shown as impacting the planned underground workings, with the current definition of the breccia zone terminating on the 7900 fault. However, examination of drill traces for low RQD, high oxide zones shows the potential for the ground to extend beyond this fault (see Figure 5). The mine is conducting additional analysis to ascertain this potential (Carvill, 2019). This feature will influence the support design and mining method to some extent.

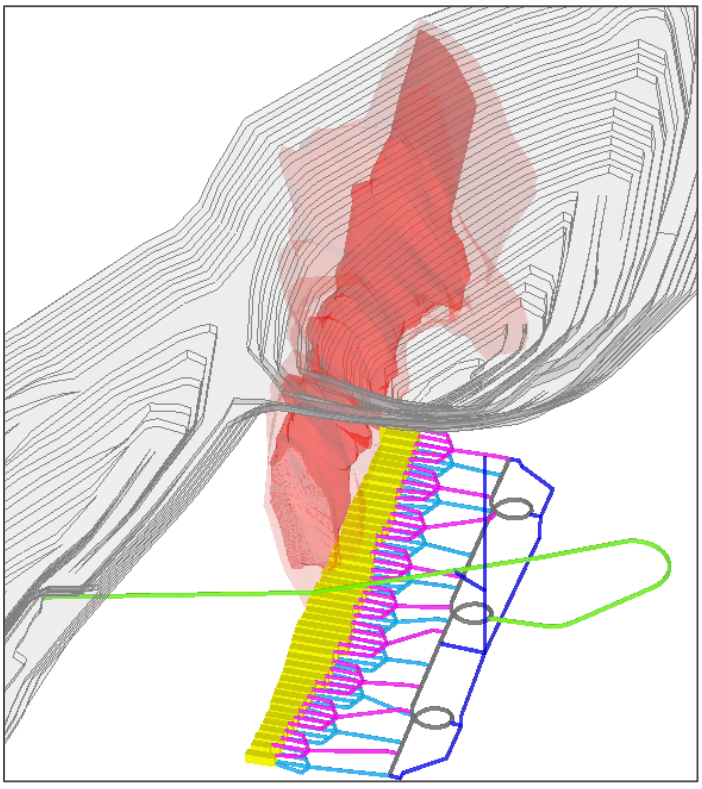

FIGURE 5: A THREE DIMENSIONAL DEPICTION OF THE MINING PLAN SHOWING THE EXTENT TO WHICH THE BRECCIA WILL INTERSECT WITH THE PLANNED STOPING (B2 GOLD, 2019).

4.4.2 MINING METHOD

Longhole stoping operations are planned with conventional ring drilling and a modified transverse stoping method with a primary/secondary sequence. Backfilling will be done as both cemented and uncemented rock backfill. Cable bolting will be used for stope support, installed by a mechanical roof bolter.

Blasting will utilize either an ANFO or emulsion-based product. Underground production blasts will not exceed 10,000 tonnes and vibrations will therefore be significantly less than from the surface blasts at the current open pit operations.

4.4.3 CHANGE TO THE MINE PLAN

The most significant change to the current planning will be from accessing ore from surface to using underground mining methods. The mine layout will change as shown in Figure 6, and potential future changes could be forthcoming based on the results of cover drilling and stope optimization studies.

4.4.4 VENTILATION

The design criteria are based off the Mine Health & Safety Regulations, 10th Draft, as issued by the Namibian Ministry of Mines and Energy. In the absence of regulatory guidance, industry best-practice was followed. This ventilation design relies on a single 4.0m diameter raise bored vertical excavation to supply fresh air to the mine via two (2) surface-mounted parallel primary ventilating fans, operating at approximately 1.1 kPa FTP (Fan Total Pressure). Air is distributed to the working areas by dedicated ventilation drifts and auxiliary ventilation systems utilizing ducts to supply air to active working areas and, lastly, exhausted to surface via the inner ramp and main decline portal, which is located within the Wolfshag pit. A schematic of the steady-state ventilation system is included as Figure 6 (B2Gold, 2019).

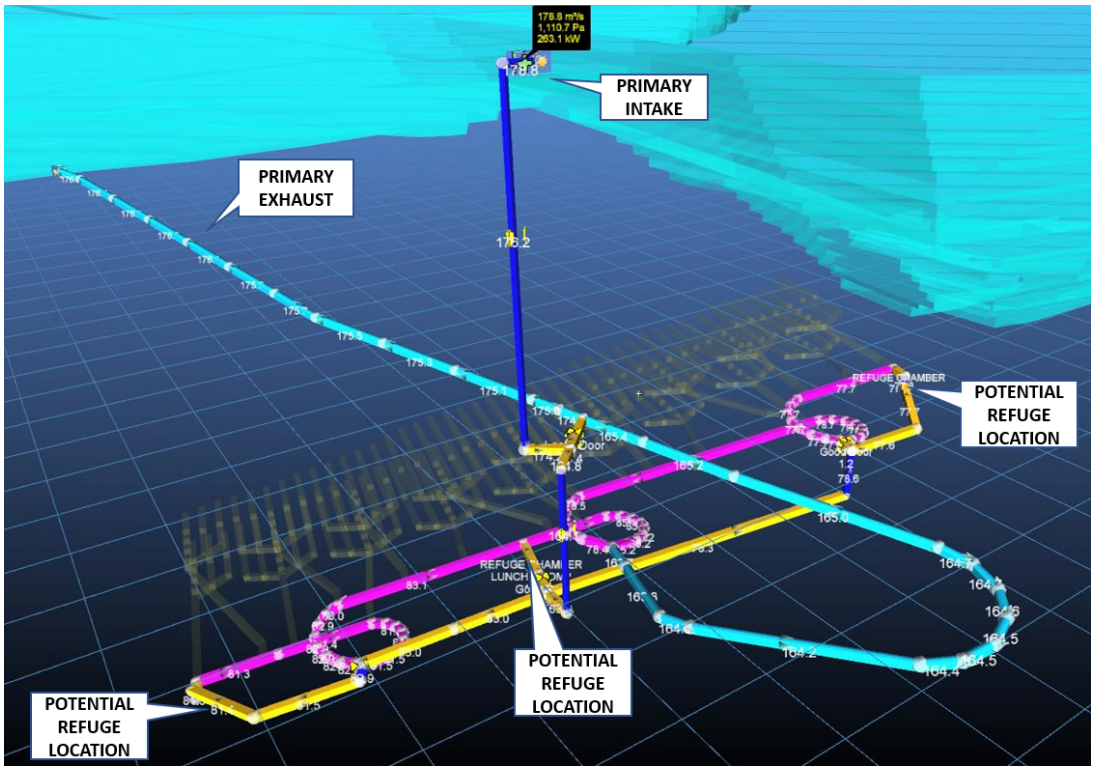

FIGURE 6: A DEPICTION OF THE VENTILATION SYSTEM PLANNED FOR THE UNDERGROUND MINING AREA (B2GOLD, 2019).

The auxiliary ventilation system will rely on fans ranging from 25 - 150kW and ventilation duct ranging from 0.8 – 1.5m diameter. Each auxiliary system will be engineered specifically for the current working situation in order to ensure sufficient airflow to working areas. Auxiliary fans will be located in the fresh air plenum (orange drift in Figure 6) whenever possible to ensure air being ventilated to the working areas has minimal contamination and heat loading. Ventilation ducting will be installed as close to the working face as reasonably practicable to ensure adequate dilution.

Total airflow quantity was estimated using a guideline of 3.8 m^3/min/kW per regulation 9.3 (2) (b) and applying availability and utilization factors, which is an industry-accepted methodology at this level of study. A conservative 20% contingency/instantaneous use factor was applied to arrive at a total estimated required airflow of 175 m3/s. This quantity was deemed acceptable by SRK Consulting during their review for diesel exhaust dilution (B2Gold, 2019).

The mine and its ventilation system will rely on a robust power supply system with three (3) source options per the current electrical design:

- Primary power supply from grid connection (NamPower) – full capacity
- Secondary power supply from HFO/diesel/solar microgrid at site – full capacity
- Tertiary power from phase-synced diesel generators located at portal
- Note that the tertiary power supply would only have partial capacity, powering critical ventilation and dewatering loads only

TABLE 3: A LIST OF PERMISSIBLE GAS LEVELS (B2GOLD, 2019).

Gas	Limit
Oxygen	>19%
Carbon Dioxide	5,000 ppm
Carbon Monoxide	100 ppm
Oxides of Nitrogen	5 ppm
Hydrogen Sulphide	20 ppm
Sulphur Dioxide	2 ppm
Ammonia	25 ppm
Aldehydes	5 ppm

Ventilation monitoring will be conducted in accordance with Namibian Mine Regulation 9.14:

- The mine manager shall cause at any workings
    - the quantity and quality of air circulating in any ventilating district
    - head and humidity; and
    - the amount of respirable dust in the air at places fixed by him or her in the main airways and the workplaces
- The measurements referred to in table 3 shall be made during the main working shift at intervals not exceeding three (3) months or at such shorter periods as may be determined by the Chief Inspector in writing
- A record of the measurements taken, and samples analyzed shall be kept
- The chief inspector may verify the measurements

In addition to the above:

- Designated supervisors and engineers will carry gas monitors to ensure verify gas concentrations in the air in all active working areas and to ensure any problematic areas can receive corrective attention immediately
- B2Gold will maintain an as-built ventilation model of the underground mine with industry-leading software in order to support ventilation design
- OGM will complete specialized pressure surveys of the ventilation system on appropriate intervals to ensure the above-mentioned model is well-calibrated (B2Gold, 2019)

A secondary egress system was included in the design in accordance with Part VII Outlets, Travelling Ways, and Ladderways of the Namibian Mine Regulations. The secondary egress system is currently envisioned as utilizing the dedicated ventilation drifts and a ladderway system to ascend the primary ventilation intake shaft raise to surface, which is approximately 300m in length.

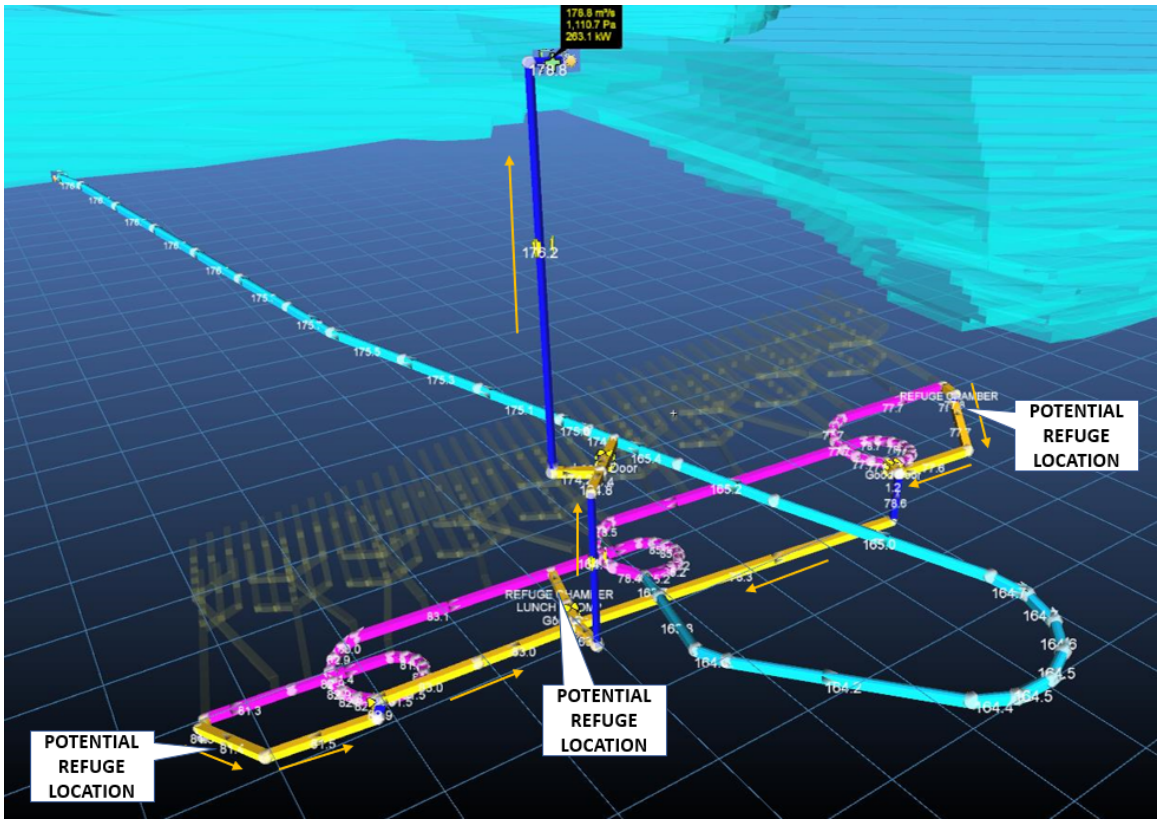

FIGURE 7: A SCHEMATIC INDICATING THE REFUGE AREAS IN THE SYSTEM (B2GOLD, 2019).

The proposed secondary egress system presents a number of important benefits, namely:

- Numerous entrance points into the secondary egress system or refuge chambers ensures travel time into the egress system can occur quickly and with relative ease during a mine emergency
- The entirety of the secondary egress system will be in fresh air with no mobile equipment, meaning the potential risk for fire in this egress system is extremely low. Should a fire start on surface or nearby to the vent intake, and the potential for smoke to be drawn into the underground mine, the UG can be evacuated via the main portal through standard procedures.
- In the event of a surface fire nearby that resulted in smoke being drawn into the main fans, the underground mine could be evacuated via the main portal through standard emergency procedures and the main fans could be reversed to provide fresh air to the decline if required
- The ladderway system will be self-contained for worker safety and with rest platforms no more than every 9m per regulation 7.3 (h)
- A mine fire in the inner ramp or main decline would not compromise the secondary egress system, allowing for safe ascent of underground workers (B2Gold, 2019).

4.4.5 POWER SUPPLY

A power generation facility comprising of four heavy fuel oil (HFO) engine driven generators, a solar plant and backup power generators are in place for current power supply.

The electrical reticulation system for the underground section will rely on a primary 6.6kV feed cable that will be located in the main decline to bring power underground to a switch room. From the switch room, power will be distributed to four (4) 1,250 kVa mobile transformers that will reduce voltage to 525V and power mobile mining equipment, fans, pumps, and other underground loads. Primary power will be supplied to the mine via an electrical powerline connected to the site solar/HFO micro-grid with future plans to connect this micro-grid to the national NamPower grid. Back-up power will be supplied by 3 x 266 kVA phase-synced generators that would be able to power critical dewatering and ventilation loads in the unlikely event the primary power source is unavailable (B2Gold, 2019).

Future electricity will be supplied from the current generating capacity on site and future supply augmented from NamPower by a planned power line linking to the main grid. Main sources of power supply:

- Primary power supply from grid connection (NamPower) – full capacity
- Secondary power supply from HFO/diesel/solar microgrid at site – full capacity
- Tertiary power from phase-synced diesel generators located at portal
- Note that the tertiary power supply would only have partial capacity, powering critical ventilation and dewatering loads only (B2Gold, 2019)

4.4.6 FUEL SUPPLY

No significant change to the supply of diesel is expected and the current bulk supply facilities will be used. Refuelling is planned to occur on surface with no fuel storage in the underground workings.

4.4.7 WATER SUPPLY

Water will be sourced from inflows underground and water pumped from the mine water supply and dewatering boreholes. It will be pumped underground and secondary recirculation with water treatment where needed used to optimise water use efficiency.

The current dewatering plan considers use of both underground pumping systems and surface dewatering boreholes. Hydrogeological modelling indicates that peak mining inflow rates ranging between 650 - 670m^3/hr are expected. Dewatering boreholes will be installed and sized with the intention that most mine inflow is dewatered from surface. Residual water will be pumped from the underground workings via a pumping system to surface. The sizes and specifications of these pumps are to be determined based on actual encountered inflows, though the current system is costed as two separate banks of 3 x 300hp pumps installed in series. This system will have full redundancy and emergency capacity in the event of high-inflow events and water storage capacity in the event of power outages (B2Gold, 2019).

4.4.8 COMMUNICATION

All verbal communication will be via leaky feeder radio system in vehicles and hand-held radios issued to key personnel. Written communication will follow the mine's normal procedures. Refuge chambers will be equipped with a secondary communications system, which will be VOIP phone, FEMCO phone or equivalent (B2Gold, 2019).

Emergency situations will be communicated by sounding the agreed alarms for specific situations and using radio communication where feasible.

4.4.9 BACKFILLING

Backfilling will be done as both cemented and uncemented rock backfill. The backfill operations will occur concurrent to the mining production to improve stability in the underground environment. The following method of backfill will be used:

- The primary backfill system will rely on a cemented rock fill (CRF) product whereby run-of-mine waste is mixed with a water and cement mixture (slurry) at surface using a slurry plant. The product will be mixed to achieve a consistent mixture with a specific water and cement content to meet strength requirements. The CRF is then loaded into a truck and back-hauled into the mine where it is subsequently dumped into open stopes and allowed time to cure.
- Uncemented rock fill will be used only when a stope has no future wall exposures, which is expected only in the eastern-most stope of each secondary panel. This backfill will consist only of run-of-mine waste with no additives (B2Gold, 2019).

4.5 WASTE

4.5.1 MINERAL WASTE (ROCK AND TAILINGS)

Waste rock will be hauled to an in-pit location initially for construction of a haul road in the bridge area between the two pits. Once the tipping area is filled up, the rock will be hauled to the WRD to be tipped in accordance with the WRD design and tipping plan. Total waste rock generated from underground is expected to be approximately 800,000 tonnes, though mine backfill is expected to consume approximately 1,200,000 tonnes of mine waste, meaning the underground mine will be a net consumer of mineral rock waste.

Tailings will still be disposed onto the TSF as slurry forming part of the overall production waste from the open pit mining. Enough storage space is available for both the waste rock and the tailings arising from the underground production and no extra capacity needs to be created.

4.5.2 NON MINERAL WASTE

Extra solid waste streams that would be associated with the new mining development is poly pipes, ventilation bags, scrap metal, tyres, hazardous waste associated with machines, packaging material for various consumables and electrical components such as batteries. All of the waste can currently be handled by waste management systems in place on the mine.

4.5.3 WASTEWATER EFFLUENT

Water will be recirculated underground for a long as possible with conditioning treatment done to prevent scaling and corrosion. Dilution of salinity in the water will occur as make-up water enters the system from underground inflows and through addition of water from raw water supplies. Excess water will be pumped to surface and form part of the wider water circuit on the mine. Contaminated water and sludge from wash down of rock surfaces and haulages will be collected in designated traps and pumped from underground to be blended into the mill feed stream.

4.5.4 HUMAN EFFLUENT WASTE

Sanitation will be provided by placement of chemical toilets underground. These will be serviced in line with the procedures for the same toilets currently placed at strategic locations on surface. The effluent will be pumped out, as required, by a waste contractor and will be disposed of at a registered municipal waste site in Otavi or Otjiwarongo.

4.6 SOCIAL

4.6.1 EMPLOYMENT

A total of 150-250 jobs will be created by developing the underground extension. These jobs will be filled by local labour as far as possible. Some jobs in the open pit mining operations will start becoming redundant as the two pits reach the end of their productive life, and some people in these redundant positions will be retrained to work in the underground operations.

4.6.2 OCCUPATIONAL HEALTH AND SAFETY

Safety is always the number one concern in all B2Gold mining operations. Some changes to the safety risk profile of the mine will occur as part of changing to underground mining. In anticipation of transitioning mining operations from open

pit to underground, B2Gold will develop a strategic plan to evaluate the current skillset of employees in relation to the scope of work and jobs that will be available within the underground operations. It is anticipated that the initial decline development will be supported by an external resource and our initial plan will be to identify strong candidates whom can be trained through the resource. In addition, B2Gold will look at establishing training partnerships with other Namibian underground mine operations whereby selected employees will receive underground training through an apprenticeship mole to train for key underground positions (B2Gold, 2019).

There will be a manual scaling and survival mine rescue course that will be mandatory for all personnel working underground at Otjikoto Mine. Majority of the scaling will be machine scaling, and ground control will be a combination of working from a working platform (scissor deck), which will include working at heights training, and standing on firm ground.

A baseline gas exposure audit will be conducted and based on the results, an appropriate gas monitoring procedure will be compiled and implemented. Based on the outcome, this may include daily/weekly/monthly requirements for shift captains to carry out and log in their daily shift logs certain gas levels, either through calibrated monitors (gas detectors) or Draeger tubes. On a monthly to quarterly basis this will be audited as part of the occupational hygiene program as well as part of the ventilation management program.

Typically, the following gases are present in an underground mine

- Carbon Monoxide
- Hydrogen Sulphide
- Sulphur Dioxide
- Methane
- Nitrogen Dioxide
- Ammonia

Standard re-entry procedures will be in place after each and every blast. Additional gas monitoring will be evaluated based on risk assessment following a baseline gas exposure audit.

Personnel monitoring will be carried out to keep record of and manage exposure levels. The following will be monitored:

- Dust sampling and for substances such as silica
- Noise measurement to determine the noise output of machinery and the daily noise exposure levels
- Water sampling
- Standard underground monitoring would typically include:
- Air Quality Monitoring (personal)
- Air Flow/Ventilation Monitoring (personal)
- Hazardous gas monitoring (personal)
- Noise Surveys (personal)
- Ground Control Monitoring
- Occupational Hygiene Monitoring (personal)
- Sanitary Hygiene management/monitoring (personal)
- And if necessary, ground pressure/movement monitoring (based on ground pressures and seismicity in the area)

4.6.3 EMERGENCY PREPAREDNESS AND RESPONSE

The mine currently maintains an Emergency Preparedness and Response Plan (EPRP) including a highly trained Mine Rescue Services team. This is in line with all legal requirements for mining in Namibia and international best practice. The methodology for identifying potential emergencies are captured in the mine's internal risk management system. An update of the mine's risk assessment to include the underground operations is planned for January 2020, well ahead of the initiation of underground mining operations. The emergency preparedness and response procedures, plans, training and etc. will be updated to incorporate risks associated with the underground operation.

4.7 ALTERNATIVES CONSIDERED

4.7.1 OTHER MINING OPTIONS

The mine investigated the option of extending Wolfshag open pit, but ground stability and stripping ratios are proving this option economically unviable. Thus, with extension of Wolfshag open-pit (phase 4 and phase 5) not being feasible mining operations will terminate by early 2024 should the underground project not continue, based on current market conditions.

Other underground mining methods including cut and fill (drift and fill), longhole stoping, and room and pillar have been investigated and continue to be investigated for potential use in areas of poor ground, where the primary mining method is not possible. Longhole stoping with backfill was chosen as the primary mining method where ground conditions allow, as it demonstrates the best economics, productivity, and overall resource recovery while maintaining safe working conditions (B2Gold, 2019).

4.7.2 VENTILATION ALTERNATIVES

The option to use the portal and the decline as the ventilation intake was discarded due to safety concerns in case of an underground fire. Should this option have been selected, the escape way could potentially be filled with smoke due to facilitation of the ventilation system moving contaminated air into it. The current selected option will allow for fresh air to keep flowing into the escape ways (B2Gold, 2019).

The current underground mine plan envisions the use of emulsion for all blasting underground due to the expected presence of water. This type of blasting system is common for underground mines for both lateral development and longhole production blasting. The type of explosives and detonation systems will be re-evaluated in more detail at a later date when underground conditions are better understood (B2Gold, 2019).

4.7.3 PROCEED WITH CURRENT PLAN

The only alternatives to the underground mining is to either continue with extension of the Wolfshag open pit (Phase 4 and 5), which is financially not feasible and has potential high risk due to stability concerns caused by a karst breccia identified during 2019 , or to not continue mining and closing the mining side of operations in 2024.

4.8 REHABILITATION AND CLOSURE

The underground extension will increase the life of mine and extend mining operations by about 2 years. No changes are envisaged to the existing closure plan for surface infrastructure. At closure, all equipment and cables will be reclaimed from the workings before the decline and ventilation shafts will be sealed. A monitoring casing will be installed in the vent shaft seal to monitor the rebounding water table and water quality in the workings. The potential to use the accumulated water in the underground workings (e.g., for crop irrigation) will be investigated.

5 CURRENT ENVIRONMENT

Initial baseline specialist studies of relevance to the Otjikoto Project were conducted between April 2007 and February 2008 and site monitoring data since this time has continued to build on the dataset from these baseline studies. An Environmental Impact Assessment scoping report was finalised and submitted to the Ministry of Environment and Tourism in August 2008. Further work was done in 2010 as part of the Preliminary Environmental and Social Impact Assessment of the proposed Otjikoto Gold Mine Project. Additional specialist studies were conducted and submitted to regulatory authorities as part of its revised 2014 Environmental Management Plans.[1]

The Otjikoto Project is located in an area that receives about 350 – 450 mm of rain per year, with a variation coefficient of about 30%, meaning that rainfall is fairly unpredictable. Rainfall events are limited to the summer months, mainly between December and March, in the form of sudden thunderstorms often associated with heavy downpours. Evaporation is approximately 2,000 mm per year. Relative humidity is low, rarely exceeding 20% in winter but may reach 85% in summer before or after thunderstorm build-up. Maximum temperatures average around 32 - 34°C, mainly recorded during the afternoons between December and February, while minimum temperatures are around 4 - 6°C and are normally recorded during nights in June and July. Occasional frost can occur.

The entire site is covered with aeolian sand that varies in thickness between 0.1 and 1.1 m, underlain by a near-surface hardpan to boulder-calcrete unit. The surface cover is of a dark yellow brown colour, loose and with an open texture. It is normally fine and silty, occasionally containing coarse, medium and fine grained sub-rounded calcrete nodules. The hardpan is underlain by nodular or powder calcrete that varies in thickness between 0.4 and 3.65 m.[2] Topography of the area is flat, varying between 1,500 and 1,510 m above mean sea level.

Vegetation of the area is described as semi-arid Thornbush Shrubland of the Acacia Tree-and-shrub Savanna Biome. The dense tree and bush savanna is dominated by Acacia species and annual and perennial grasses. Micro habitat conditions and rangeland management practices determine bush density and grass composition. Large parts of the surrounding areas are marked by bush encroachment, mainly as a result of long continuous periods of selective grazing by livestock.

Biodiversity features are described in the specialist's studies conducted as part of the Environmental Impact Assessment report in 2012 and is not repeated here.

5.1 SURFACE WATER

Surface water flow is in a northwest direction following the gradient towards the Platveld basin away from the divide to the Omatako basin. The local surface drainage system is however poorly developed due to the flat topography and no permanent or seasonal drainage channels are present.

Surface water may however collect and form temporary puddles in depressions, or cause sheet flows and small channel flows as a result of heavy downpours during the short rainy season. Site topography gradually slopes to the west and a system of diversion channels, ponds and culverts are in place to drain the operational areas. Excess water from the operational areas is stored in a smaller stormwater dam. A larger stormwater dam is prepared for containing the runoff during 1:50 year 7 day rainfall event[3]. Both dams have spillways and silt traps. Water in these impoundments is used in the mining and processing facilities.

[1] SLR, 2014: Environmental Management Plan – Otjikoto Gold Mine (for B2 Gold)
[2] SRK, 2012: Geotechnical investigation for Otjikoto Gold Mine bankable feasibility study (draft report for Auryx Gold Namibia)
[3] Epoch, 2013: Detailed Design of the Otjikoto Mine Residue Disposal Facility – Namibia.

Two water storage dams are present – one to store reclaimed process water from the tailings facility in a HDPE lined pond, and one to store water pumped from the pit sump and dewatering boreholes. Water from the latter is used for dust suppression and mineral processing.

In line with proposed mitigation measures a precautionary approach is applied with the result that contaminated surface water from the mine is contained, re-used and / or treated and through the necessary design, construction and operational considerations. Run-off from the waste rock dumps, tailings facility and landfill is prevented as far as reasonably practical. By containing dirty water and diverting clean water as far as possible, the surface water drainage scheme ensures that clean surface water flow is directed around structures such as the waste rock dumps, landfill and tailings facility. Furthermore the current EMP stipulates mitigation measures with regard to hydrocarbon, reagent, domestic and industrial effluent spills and managing of the landfill. Management components focus on altering of drainage patterns, pollution, industrial and domestic effluents and spills.[4] Storm water interventions are designed in such a way that surface water can bypass the major structures such as the two open pits, the tailings facility, the waste rock dumps and the low-grade ore stockpiles and to direct contaminated water from the processing areas to the return water dam for storage and re-use.[5]

In 2018 a technical review on acid rock drainage and metal leaching at the mine was conducted. Overall, the acid based accounting results confirm that the overwhelming majority of the waste rock materials have moderate total sulfur content, excess acid neutralising capacity, a high factor of safety and a low risk of generating acid rock drainage. Less than 0.5 % of the 2,163 samples tested have an increased risk of acid generation and a reduced factor of safety with respect to potential for acid rock drainage.[6]

5.2 HYDROGEOLOGY

The Otjikoto Project is underlain by intra-cratonic sediments of the Damara Supergroup. The Swakop Subgroup strata comprises of mica schists of the Kuiseb Formation that overlies marble of the Karibib Formation intruded by Salem Suite granites. The Karibib Formation is bordered by relatively impervious rock units and underlain by Okonguarri schists, predominantly composed of quartz-biotite with calcareous and quartzitic intercalations. Intruded by Salem Suite granites, the marble is coarse grained, light grey to white with occasional graphite, biotite and calc-silicate layers and minor dolomitic horizons present.[7]

The marble forms a fractured porous aquifer with a high permeability. In the Okonguarri Formation, permeable zones are formed by faulting. The calcrete layer on top of the Okonguarri Formation contains a discontinuous perched aquifer, not directly connected due to the impermeable layers beneath. It is assumed that flow from the marble in the east to the biotite schist in the west is limited. The discrete aquifers in the calcrete are fed by recent rainfall. The general direction of groundwater flow is from the Marble Aquifer in the south-east to the Schist and Platveld Aquifer in the north-west, following the topographic gradient. To determine the potential volumes and impacts of inflows to the pit and borehole pumping on the local and regional water resources, a numerical groundwater model was developed by SLR in 2011 and 2012. Since this time, Itasca has reviewed and updated the model extensively on an annual basis. The outcomes of the Itasca modelling were applied to the design of the mine dewatering system and were referred to for the various permits required.[8]

[4] SLR, 2014: Environmental Management Plan – Otjikoto Gold Mine (for B2 Gold)
[5] SLR, 2012: Environmental Impact Assessment for the proposed Otjikoto gold mine project (for Auryx Gold Namibia)
[6] ECC, 2018: Acid Rock Drainage and Metal Leaching Technical Review. (Unpublished report for Otjikoto Gold Mine)
[7] Meyer, W.J. and Hansen, R.N. (2012) quoted in ECC, 2018
[8] SLR, 2012: Environmental Impact Assessment for the proposed Otjikoto gold mine project (for Auryx Gold Namibia)

Water supply for operations is provided from the dewatering wells and the water supply wells in the Karibib Fomation. Faults and fractures form conduits for groundwater flow and were important considerations for the placement of the tailings facility and mine dewatering. Water that is recharged through the marble and the calcrete units has high alkalinity and a high total hardness. A geo-hydrological and geochemical investigation was completed for the Otjikoto Project in 2012. Follow-up studies into the geochemical characteristics of tailings material were recommended to better quantify potential leachate and acid possibilities, this work is currently ongoing.[9]

Hydrogeological management components focus on water supply and dewatering of the pit and the potential contamination of groundwater. An annual groundwater monitoring report is compiled and submitted to the authorities, in line with the requirements of the permit (No. 10971) to manage and minimize impacts, abstraction of groundwater for mining purposes and dewatering of the pit. In 2017, 23 of the 28 compliance monitoring boreholes were sampled for this purpose. Five holes were not sampled due to access restrictions. Water quality is described as excellent, characterized by neutral pH and low dissolved salts. The concentration of sulfate, chloride and nitrate (general indicators of contamination) were low.[10]

To reduce the local phreatic levels in the pit walls and to increase pit stability, vertical and / or horizontal wells are used for dewatering to ensure safe mining continues. Groundwater collects in the pit and it is anticipated that a pit lake, mainly fed by groundwater, will form and remain after mining ceases.

In 2012 the modelled radius of influence of the pit was determined as between 4 and 4.5 km to the west, east and south and 7.5 km to the north.[11] Based on the potential inflow from small fissures below 40 m, the dewatering system of the pit has been sized to pump at least 6,000m^3 per day.[12] The existing permit was amended in May 2018 to include pit dewatering abstraction, which increases the groundwater allowance to 4 Mm^3.

Recent water-related studies include a numerical solute transport model in 2018 to simulate the pit dewatering scenario and a predicted drawdown cone created by mining and a contaminant transport model. The drawdown cone is approximately 2 km along the length of the Otjikoto and Wolfshag pits in a NE-SW direction, on the southeast side of the Otjikoto pit the drawdown is <1 km and on the northwest side of the pits a maximum drawdown of 200 m was predicted for the current pits. The greater drawdown on the southeast side is due to the abstraction from the Karibib Marbles.[13]

Contaminants from the tailings facility and the waste rock dumps indicated a migration towards the main pit, which acts as a sump due to dewatering, and confirming that potential contaminants from the operational areas drain towards the pit.[14] A technical review on acid rock drainage and metal leaching in 2018 recommended that the quality of water in the pit sump is monitored regularly to assist in modelling water quality.[15] Potential contaminants include pollution from spillages of chemicals, fuel and sanitation and seepage from the tailings facility and the waste rock dumps.

Measures in place to mitigate potential impacts to groundwater include water saving measures in mining, operational and tailings deposition processes to reduce the use of groundwater resources, and the monitoring of groundwater levels and groundwater quality as stated in the relevant permits.

[9] Meyer, W.J. and Hansen, R.N. (2012) quoted in ECC, 2018
[10] Sourced from Itasca in ECC, 2018: Acid Rock Drainage and Metal Leaching Technical Review. (Unpublished report for Otjikoto Gold Mine)
[11] AGES, 2012: Otjikoto Gold Mine: Geohydrological and geochemical specialist investigation. Prepared for Auryx Gold Namibia, Technical Report G12/056_21-05-12
[12] SLR, 2012: Environmental Impact Assessment for the proposed Otjikoto gold mine project (for Auryx Gold Namibia)
[13] ECC, 2018: Acid Rock Drainage and Metal Leaching Technical Review. (Unpublished report for Otjikoto Gold Mine)
[14] ECC, 2018: Acid Rock Drainage and Metal Leaching Technical Review. (Unpublished report for Otjikoto Gold Mine)
[15] ECC, 2018: Acid Rock Drainage and Metal Leaching Technical Review. (Unpublished report for Otjikoto Gold Mine)

5.3 AIR QUALITY

During the initial Environmental Impact Assessment of 2012, the air quality assessment focused on airborne particulates (PM_{10} emissions and total suspended particles). Gaseous pollutants (such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc.) deriving from mine vehicles and equipment and from the gold smelting operations were regarded as potentially negligible in comparison to particulate emissions.[16]

Background dust deposition and PM_{10} ambient concentrations measured over one year were used to provide an indication of the conditions prior to the commencement of mining operations. Existing sources of air pollution in the region were identified and qualitatively described based on the associated pollutants and potential to contribute to the background ambient concentrations and dust fallout levels at the project area. Factors such as average wind speed, wind direction, temperature and rainfall data measured over the period June 2007 to November 2011 were used to inform the local dispersion potential of the site.

Key pollution sources of PM_{10} and $PM_{2.5}$ identified are transport, dust entrainment on unpaved roads, mining operations (materials handling), land clearing and controlled burning on agricultural land and windblown dust. Sources of sulphur dioxide, oxides of nitrogen, carbon monoxide and ozone and emissions of benzene and lead are identified as mining operations, traffic and burning.

Pollution concentration levels fluctuate in response to changes in atmospheric stability. Prevailing wind is from the east and east-south-east and east, with occasional airflow from the southeast, northeast and southwest. Wind speeds are generally low with more than two-thirds of the time lower than 2 m/s. From the dust fallout monitoring network fallout rates were generally below the SANS residential limit of 600 mg/m^2/day. The highest dust fallout recording was related to dust entrainment from the unpaved roads.

To limit the mine's contribution to air pollution impacts, recommendations made during the environmental impact assessment process of 2012 stated that efforts should be made to minimise dust generation (suppression of dust from the unpaved roads, revegetation of cleared surfaces, etc.) and to implement an air quality monitor network.

In 2019 Airshed was appointed to review the management performance and air quality practices of the mine. As part of the review, the operation's greenhouse gas (GHG) emissions were quantified as well. On average dust fall-out rates have decreased during 2018, which may be an indication that the mitigation measures applied are effective. Exceedances of the recommended daily limits and general increases in concentrations during 2018 indicated elevated PM_{10} levels, presumably as a result of additional activities at and around the mine. Passive gaseous sampling indicated fairly elevated SO_2 and NO_2 concentrations over the short term, but without stack sampling, an updated emissions inventory and dispersal modelling it is not clear what the reason for the elevated concentrations is. Information available to quantify GHG emissions is comprehensive and sufficient to provide a Tier 1 and Tier 2 missions inventory.[17]

5.4 SOCIO-ECONOMIC ENVIRONMENT

It is estimated that Namibia's population has increased from about 2.1 million in 2011 (when the last census was held) to about 2.5 million in 2019. The national population density is estimated at about 3 persons per km^2 and the population growth rate at 2%, slightly lower than most African countries[18]. The population density of the Otjozondjupa Region, where the Otjkoto Project is located, is much lower at about 1.5 persons per km^2 and the current total population of the region is projected at 160,000[19]. Otjiwarongo, the regional capital, is about 70 km and Otavi about 50 km away from

[16] SLR, 2012: Environmental Impact Assessment for the proposed Otjikoto gold mine project (for Auryx Gold Namibia)
[17] Airshed, 2019: Air quality management program review for B2 Gold Otjikoto Gold Mine, Namibia (Report No. 18B2G01)
[18] (retrieved from www.worldpopulationreview.com)
[19] (retrieved from www.citypopulation.de)

the Otjikoto Project. In 2011 the population of Otjiwarongo was 28,249 and with a growth rate of 3.0 % the current estimated population is more than 35,000 residents. Otavi is smaller, recording only 5,200 residents in 2011 and an estimated population of 6,500 in 2019. Most of the employees at the Otjikoto Project reside in Otjiwarongo.

The presence of the Otjikoto Project has brought employment and skills development at the local and regional level, which had a knock-on effect in terms of reducing income inequality, increasing job creation and economic growth. As the last national census was conducted in 2011, there is good reason to believe that the demographics of the Otjozondjupa Region, and more particularly Otavi and Otjiwarongo has changed markedly, not only as a result of the establishment of the Otjikoto Project, but also as a result of other mining projects such as Okuruso and Okanjande and the Whale Rock cement factory of Cheetah Cement near Otjiwarongo and Ohorongo Cement near Otavi. Several new government offices have been established in Otjiwarongo as part of an effort to accentuate the town as regional capital. Other factors that influenced the socio-economy of the region, and in particular Otjiwarongo and Otavi, is the continuous growth of the tourism industry as well as the growing importance of the charcoal industry. Combined, all these factors had a cumulative role in the changing socio-economic landscape of the region (and the two towns), which can only be quantified when comparisons from the next national census with the 2011 census are possible. Put differently, the socio-economic prominence of the Otjikoto Project in the Otjozondjupa Region has been blurred by the combined economic and population growth in the region since 2011.

From examples elsewhere in Namibia, the sudden influx of people (in-migration) to neighbouring towns is a direct result of the development phase of a big project (the most recent case of Husab Mine near Swakopmund serves as a reminder). After a big project is established and operational, the process of in-migration slows down as vacancies are filled and construction activities come to an end. For this reason it is not expected that the presence of the Otjikoto Project will maintain ongoing in-migration, neither will expanding developments of the Project result in-migration comparable to the construction phase.

The more permanent economic spin-offs as a result of the Otjikoto Project include empowerment opportunities in a range of skills and activities, while employment provides incomes to the employees, their immediate household members and to others living elsewhere in Namibia who depend on cash remittances. Overall the work experience and skills gained through the opportunities that the mine brings have lasting benefits at a national level. Procurement and the supply chain of mines generate many benefits on a local, regional and national level. As a major source of revenue, the fiscal contribution of the Otjikoto Project to the national economy is of note.

Management components focus on economic impacts, in-migration and resulting community needs and the changes in land use and neighbouring communities. Commitments include preference of local procurement, prioritised training and recruitment policies, emphasis on skills development and upgrading, support and promotion of continuous learning programs, training on personal financial management, promotion of home ownership, support of the local economies of Otavi and Otjiwarongo and supporting initiatives to combat social ills.

5.5 EMPLOYMENT

The economy of the Otjozondjupa Region is predominantly agriculture-based. Extensive livestock farming forms the livelihood of many people and is one of the reasons for the low intensity land use over much of the 105,460 km^2 the region covers, the low total population (142,400 in 2011, projected at 160,000 in 2019) as well as the low population density (about 1.5 persons per km^2). More than 60 % of the population is over 15 years of age and about one-third of the total population can be regarded as part of the labour force. The unemployment rate in the Otjozondjupa region is 35.9%.[20]

[20] Namibia Statistics Agency, 2017. Namibia Labour Force Survey 2016 Report. Namibia Statistics Agency, Windhoek.

Otjozondjupa's labour force participation rate was more than 71% in 2010, compared to the average of 55% for Namibia. Hereof, more than half of the people were employed in the private sector and about one-quarter by the State. At the time of the initial EIA report, Agriculture was the economic sector with the most employees – about 30%, while 40% of those employed fell in the occupational group of general labourers and other unskilled occupations. Wages and salaries represented the income source of 54 % of households. As a whole the region was marked by low education levels, which affected employability and prevented many households to earn a decent income.[21]

By mid-2019 the Otjikoto Project employed 925 persons, of which 98.5% were Namibian. It is calculated that for every job created by a mine in Namibia, a further additional 1.5 job opportunities are created by suppliers and contractors[22]. Most of the workers at Otjikoto reside in Otjiwarongo, and to a lesser extent in Otavi. In both towns the employees provide additional buying power and broadens the base of rate payers. As the next national census will only be held in 2021, it is hard to quantify changes in labour force participation, employment rates in the region and other socio-economic indicators since 2011. Moreover, updated quantified information about demographic indicators such as access to housing, schools, health facilities, potable water and sanitation is absent, and the 2021-census will provide important insight in this regard – also to determine and to quantify the exact socio-economic footprint of the Otjikoto Project and to compare its role to other main employers of the region.

[21] SLR, 2012: Environmental Impact Assessment for the proposed Otjikoto gold mine project (for Auryx Gold Namibia)
[22] B2Gold Corp. Otjikoto Gold Project, 2013. Technical Report Feasibility Study. Namibia.

6 IDENTIFICATION AND EVALUATION OF IMPACTS METHODOLOGY

6.1 INTRODUCTION

Chapter 2 provides an overview of the approach used in this EIA process and details each of the steps undertaken to date. Predication and evaluation of impacts is a key step in the EIA process. This chapters outlines the methods followed to identify and evaluate the impacts arising from the proposed project. The findings of the assessment are presented in this chapter.

This chapter provides the following:

- Details on the assessment guidance used to assess impacts
- Lists the limitations, uncertainties and assumptions with regards to the assessment methodology
- Details how impacts were identified and evaluated, and how the level of significance was derived
- Details how mitigation was applied in the assessment and how additional mitigation was identified, and
- Details the CIA method.

6.2 ASSESSMENT GUIDANCE

The principal documents used to inform the assessment method are:

- International Finance Corporation standards and models, in particular Performance Standard 1, 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017) (International Finance Corporation, 2012);
- International Finance Corporation Cumulative Impact Assessment (CIA) and Management Good Practice Handbook (International Finance Corporation, 2013) and,
- Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008);

6.3 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

The following limitations and uncertainties associated with the assessment methodology were observed:

- Topic specific assessment guidance has not been developed in Namibia. A generic assessment methodology was applied to all topics using IFC guidance and professional judgement;
- Guidance for CIA has not been developed in Namibia, and a single accepted state of global practice has been established. The IFC's guidance document (International Finance Corporation, 2013) has been used for the CIA.

6.4 DETERMINATION OF SIGNIFICANCE

The evaluation and identification of the environmental and social impacts require the assessment of the project characteristics against the baseline characteristics, ensuring all potentially significant impacts are identified and assessed. The significance of an impact is determined by taking into consideration the combination of the sensitivity and importance/value of environmental and social receptors that may be affected by the proposed project, the nature and characteristics of the impact, and the magnitude of potential change. The magnitude of change (the impact) is the identifiable changes to the existing environment which may be negligible, low, minor, moderate, high, or very high; temporary/short term, long-term or permanent; and either beneficial or adverse.

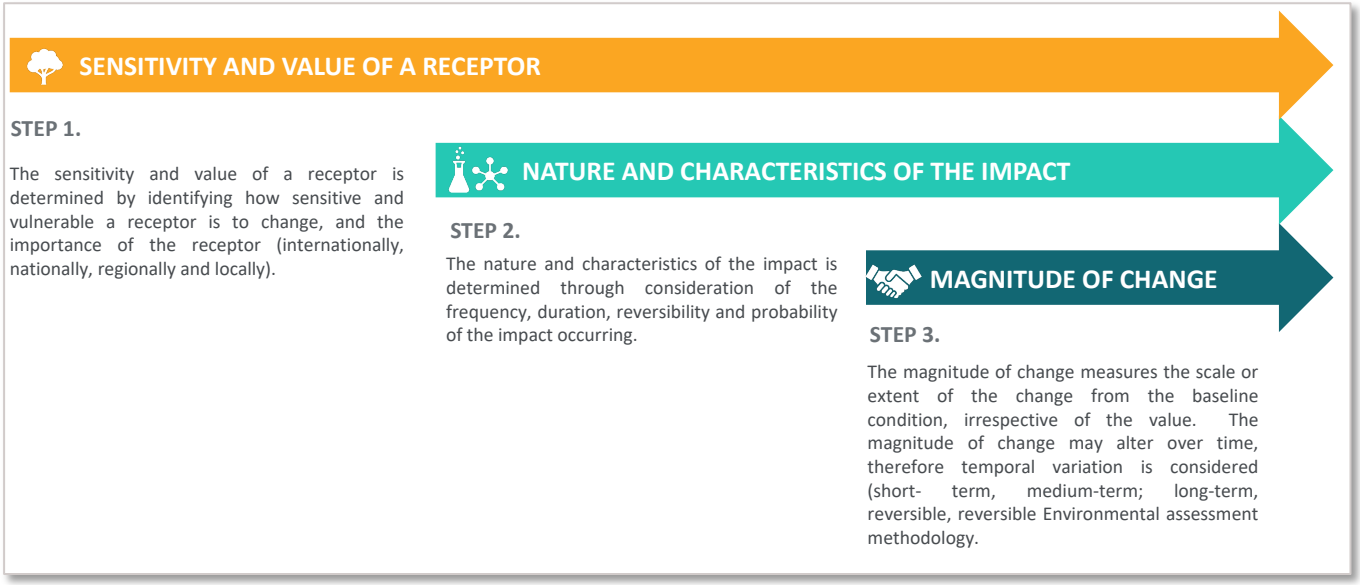

FIGURE 8 - DETERMINATION OF SIGNIFICANCE

The tables provided below set the description and thresholds used in determining impact significance.

TABLE 4 – NATURE OF IMPACT

NATURE	
Term	**Description**
Beneficial (Positive)	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse (Negative)	An impact that is considered to represent an adverse change from the baseline or introduces a new undesirable factor.

TABLE 5 – TYPE OF IMPACT

TYPE	
Term	**Description**
Direct	Impacts causing an impact through direct interaction between a planned project activity and the receiving environment/receptors.
Indirect	Impacts that result from other activities that are encouraged to happen as a result / consequence of the Project. Associated with the project and may occur at a later time or wider area
Cumulative	Impacts that arise as a result of an impact and effect from the project interacting with those from another activity to create an additional impact and effect

TABLE 6 - REVERSIBILITY OF IMPACT

REVERSIBILITY	
Term	**Description**
Reversible	Impacts are reversible and recoverable in the future
Partly Reversible	Some parts of the impact can be reversed while others remain
Irreversible	Impacts which are not reversible and are permanent

TABLE 7 – MAGNITUDE OF CHANGE

MAGNITUDE OF CHANGE	
Term	**Description**
None / negligible	Very minor loss or detrimental alteration to one (or maybe more) characteristic, feature or element; or Very minor benefit to, or positive addition of, one (or maybe more) characteristic, feature or element.
Low / Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (or maybe more) key characteristic, feature or element; or Minor benefit to, or addition of, one (or maybe more) key characteristic, feature or element; some beneficial effect on attribute quality or a reduced risk of a negative effect occurring.
Moderate	Loss of resource, but not adversely affecting its integrity; partial loss of/damage to key characteristics, features or elements; or Benefit to, or addition of, key characteristics, features or elements; improvements of attribute quality.
High / Major	Loss of resource, and quality and integrity of resource; severe damage to key characteristics, features or elements; or Large scale or major improvement of resources quality; extensive restoration or enhancement; major improvement of attribute quality.
Very high / unknown	Loss of resource, significantly affecting the long term quality and integrity of a resource; irreparable damage or loss of key characteristics, features or elements; or the magnitude is too great to quantify as it is unknown.

TABLE 8 - DURATION OF IMPACT

DURATION	
Term	**Description**
Temporary	Transient; a period of less than 1 year
Short term	Impacts that are likely to last for the duration of the activity causing the impact and are recoverable (1-5 years)
Medium term	Impacts that are likely to continue after the activity causing the impact and are recoverable (5-15 years)
Long term	Impacts that are likely to last far beyond the end of the activity causing the damage (greater than 15 years with impact ceasing after decommissioning of the project)
Permanent	Permanent

TABLE 9 - SCALE OF CHANGE

SCALE OF CHANGE - EXTENT / GEOGRAPHIC SCALE	
Term	**Description**
On-site	Impacts that are limited to the boundaries of the proposed project site
Local	Impacts that occur in the local area of influence, including around the proposed site and within the wider community
Regional	Impacts that affect a receptor that is regionally important by virtue of scale, designation, quality or rarity.
National	Impacts that affect a receptor that is nationally important by virtue of scale, designation, quality or rarity.
International	Impacts that affect a receptor that is internationally important by virtue of scale, designation, quality or rarity.

TABLE 10 - PROBABILITY OF CHANGE

PROBABILITY	
Term	**Description**
Improbably (Rare)	The event may occur in exceptional circumstances yet, rarely occurs in the industry. The event could occur once every 100 years
Low probability (Unlikely)	The event has happened elsewhere yet, is unlikely to occur. The event could occur once every 10 years
Medium Probability (Possible)	The event could occur under some circumstances. The event could occur once every 5 years.
High Probability (Likely)	The event is expected to occur. The event could occur twice per year
Definite (Almost certain)	The event will occur. The event could occur once per month

TABLE 11 - SIGNIFICANCE DESCRIPTION

SIGNIFICANCE OF IMPACT	DESCRIPTION
Low – Major (Beneficial) All scores	Impacts are considered to be beneficial to the environment and society:
Low (negative) 0 - 25	Impacts are considered to be local factors that are unlikely to be critical to decision-making.
Minor (negative) 25 - 50	Impacts are considered to be important factors but are unlikely to be key decision-making factors. The impact will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value. Impacts are considered to be short-term, reversible and/or localized in extent.
Moderate (negative) 50 - 75	Impacts are considered within acceptable limits and standards. Impacts are long-term, but reversible and/or have regional significance. These are generally (but not exclusively) associated with sites and features of national importance and resources/features that are unique and which, if lost, cannot be replaced or relocated.
Major (negative) 75 - 100	Impacts are considered to be key factors in the decision-making process that may have an impact of major significance, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.

TABLE 12 - SENSITIVITY AND VALUE OF RECEPTOR

SENSITIVITY AND VALUE	DESCRIPTION
Low	Of value, importance or rarity on a local scale; and/or not particularly sensitive to change or has considerable capacity to accommodate a change.
Medium	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or moderate sensitivity to change, or moderate capacity to accommodate a change.
High	Of value, importance or rarity on an international and national scale, and with very limited potential for substitution; and/or very sensitive to change or has little capacity to accommodate a change.

TABLE 13 – SIGNIFICANCE OF IMAPCT

				Signifance of Impact			
			Signifance of Impact	Impacts are considered to be local factors that are unlikely to be critical to decision-making.	Impacts are considered to be important factors but are unlikely to be key decision-making factors. The impact will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value. Impacts are considered to be short-term, reversible and/or localized in extent.	Impacts are considered within acceptable limits and standards. Impacts are long-term, but reversible and/or have regional significance. These are generally (but not exclusively) associated with sites and features of national importance and resources/features that are unique and which, if lost, cannot be replaced or relocated.	Impacts are considered to be key factors in the decision-making process that may have an impact of major significance, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.
	Biophysical	Social		Low	Minor (2)	Moderate (3)	Major (4)
Sensitivity	A biophysical recepeotr that is protected under legislation or internaiton conventions (CITES) listed as rare, threatened or endangered IUCN specidices. Highly valued/sensitive resource/receptors	Those affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.	High (3)	Minor (3)	Moderate (6)	Major (9)	Major (12)
	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or Not protected or listed (gloabbally) but may be a rare or threatened species in coutnry; with little reslisence to ecosystem changes, imporant to ecosystem functions, or one under threat or popultion declinet.	Able to adapt with some difficulty and maintain preimpact status but only with a degree of support	Medium (2)	Low (2)	Minor (4)	Moderate (6)	Major (8)
	Not protected or listed as common / abundant; or not crtical to other ecosystems functions	Those affected are able to adapt with relative ease and maintain preimpacrt status. There is no perceptible change to people's livelihood.	Low (1)	Low (1)	Low (2)	Minor (3)	Moderate (4)

To ensure the beneficial impacts are brought out in the assessment, green has been applied to ensure the different type of impact is clear. The description for each level of significance presented in Table 11 was also followed when determining the level of significance of a beneficial impact.

The significance of impacts has been derived by applying the identified thresholds for receptor sensitivity and magnitude of change, as well as the definition of significance. Moderate and major adverse impacts are considered as significant. The following thresholds were therefore used to double check the assessment of significance had been applied appropriately; a significant impact would meet at least one of the following criteria:

- It exceeds widely recognized levels of acceptable change;
- It threatens or enhances the viability or integrity of a receptor or receptor group of concern; and
- It is likely to be material to the ultimate decision about whether or not the environmental clearance certificate is granted.

6.5 MITIGATION

Mitigation comprises a hierarchy of measures ranging from preventative environmental impacts by avoidance, to measures that provide opportunities for environmental enhancement. The mitigation hierarchy is avoidance; reduction at source; reduction at receptor level; repairing and correcting; compensation; remediation; and enhancement.

Mitigation measures can be split into three distinct categories, broadly defined as:

1. Actions undertaken by the EIA process that influence the design process, through implementing design measures that would entirely avoid or eliminate an impact or modifying the design through the inclusion of environmental features to reduce the magnitude of change. These are considered as embedded mitigation.
2. Standard practices and other best practice measures for avoiding and minimizing environmental impacts. These are considered as good practice measures.

3. Specified additional measures or follow-up action to be implemented to further reduce adverse impacts that remain after the incorporation of embedded mitigation. These are considered as additional mitigation.

The EIA is an iterative process whereby the outcomes of the environmental assessments inform the project. Considerable mitigation has been built into the proposed project as potentially significant adverse environmental impacts have been identified and design changes have been identified to overcome or reduce them. The EMP (Appendix A) provides the good practice measures and specified additional measures or follow-up action.

Embedded mitigation and good practice mitigation have been taken into account in the assessment. Additional mitigation measures have been identified when the significance of impact requires it and causes the impact to be further reduced. Where additional mitigation has been identified, a final assessment of the significance of impacts (residual impacts) was carried out taking into consideration the additional mitigation.

6.5.1 Cumulative Impacts

6.5.2 Cumulative Impact Assessment Method

Cumulative impacts may arise as a result of other project activities or the combination of two or more projects in the project area. The Cumulative Impact Assessment (CIA) has been undertaken by applying the IFC CIA Good Practice Handbook (International Finance Corporation, 2013) which recommended a rapid CIA is undertaken. A rapid CIA takes into consideration the challenges associated with a good CIA process, which includes lack of basic baseline data, uncertainty associated with anticipated development, limited government capacity, and absence of strategic regional, sectoral or integrated resource planning schemes.

The five-step rapid CIA process has been followed:

- Step 1: Scoping - Determine spatial and temporal boundaries
- Step 2: Scoping - Identify valued environmental and social receptors and identify reasonably foreseeable developments
- Step 3: Determine present condition of valued environmental and social receptors (the baseline)
- Step 4: Evaluation of the significance of the cumulative impacts
- Step 5: Identification of mitigation measures to avoid or reduce cumulative impacts

The following information has been applied to the assessment in line with the above steps and IFC Guidance:

- The spatial and temporal boundaries of the CIA are the extent of the ML boundaries and the duration of the decline development and operation phases of the proposed project (up to 7 years from the date of commencement);
- Valued environmental and social receptors that may be affected are those presented in Chapter 5. No additional ones have been identified through this CIA;
- A review of existing and reasonable anticipated and/or planned developments has been undertaken which is based on the information presented in chapter 4.
- The predicted future conditions of sensitive and common environmental and social receptors have been taken into consideration in the assessment;
- The assessment findings presented in Chapter 7 have been applied to the CIA in combination with professional judgment and published environmental assessment reports; and
- A review of mitigation and monitoring measures have been undertaken, with any additional ones identified.

7 IMPACT ASSESSMENT FINDINGS AND PROPOSED MITIGATION MANAGEMENT MEASURES

7.1 INTRODUCTION

This chapter presents the findings of the EIA for the proposed project as per the EIA process, scope and methodology set out in Chapter 2 and Chapter 6. A range of potential impacts have been identified that may arise as a result of the proposed project. The aim of this EIA report is to focus on the significant impacts that may arise as a result of the proposed project. This chapter therefore only considers the significant impacts and or those that may have specific interest to the community and stakeholders. A summary of impacts that are not considered significant is discussed in section 7.3.

Impacts that are considered significant or are those of interest to the community and stakeholders are as follows:

- Socio-economic: employment
- Socio-economic: employee occupational health and safety
- Environment: groundwater quality and quantity
- Environment: air quality Impacts

For each potential significant or sensitive impact, a summary is provided which includes the activity that would cause an impact; the potential impacts; embedded or best practice mitigation (stated where required / available); the sensitivity of receptor that would be impacted; the severity, duration and probability of impacts; the significance of impacts before mitigation and after mitigation measures are applied.

7.2 IMPACTS NOT CONSIDERED AS SIGNIFICANT

As a result of an iterative development process, mitigation has been incorporated and embedded into the project, thereby designing out potential environmental and social impacts or reducing the potential impact so that it is not significant. Best practice has also played a role in avoiding or reducing potential impacts. The EMP provides best practice measures, management and monitoring for all impacts.

Impacts that have been assessed as not being significant are summarised in Table 14 and not discussed further.

TABLE 14 - IMPACTS NOT CONSIDERED SIGNIFICANT

ENVIRONMENT OR SOCIAL TOPIC	POTENTIAL IMPACT	SUMMARY OF ASSESSMENT FINDINGS
Cultural heritage	Potential to uncover heritage remains during project activities.	Findings are unlikely as the site has been studied and known heritage sites are already mapped and protected for the project area. The site also has a tried and tested chance find procedure in place in the very unlikely event a heritage item is discovered.
Climate change – adaptation	The potential for climate change impacts to impact the proposed project, for example, extreme fire, heat or storm events	The proposed project will not be significantly impacted by the impacts of climate change as the design has considered management measures in the event of increasing temperatures, emergency response plans will be in place in the event of a fire and sufficient dewatering systems will be in place for managing potential water inflows into the underground workings.

ENVIRONMENT OR SOCIAL TOPIC	POTENTIAL IMPACT	SUMMARY OF ASSESSMENT FINDINGS
Climate change – cause / contribute to	The proposed project contributing to climate change through the discharge of greenhouse gas emissions	The proposed project will generate emissions contributing to greenhouse gas however the underground amendment will not alter significantly from the emissions from the current open pit mining operations, it is possible that the underground amendment may in future reduce emissions from the site with a smaller fleet of machinery.
Non Mineralised Waste	Potential to generate excessive volumes of solid waste or new solid waste streams	The underground operations is unlikely to generate excessive volumes of waste nor new waste streams that cannot be managed by the on-site waste management facility. Negligible change to current operations.
Mineralised Waste	Potential to generate mineralised waste that is significantly different to the mineralised waste being produced by open pit mining	As the ore body and general geology is the same as the existing operation this is unlikely. Furthermore advance drilling has been conducted to understand the geology and no significate changes are anticipated. Should mineralised waste containing sulphides or waste that has the potential to generate acid or mine drainage this waste will be managed in accordance with the well-established site procedures and encapsulated within the mine mineral waste dump. Furthermore waste will be cemented backfill underground resulting in a reduction in mineral waste coming to surface and therefore the risk associated with mine drainage on surface minimised.
Ecology	Potential impacts to flora and fauna from underground mining operations.	Due to the nature of underground mining this risk is limited. The potential interactions with fauna would occur when hauling material to the surface on surface haul roads, which is an existing risk for the open pit mine. The site is fenced and wildlife occurrence and interactions with mining equipment to date has been limited. Negligible change to current operations.
Noise and Vibration	Potential for vibrations from underground to follow fault paths and cause vibration on surface and distance. Noise impacts to neighbours.	The potential for the underground mine to generate noise that will impact neighbours is extremely unlikely given the distance from the underground operations to the nearest sensitive receptor. Underground mining operations are quieter than open pit mining and therefore the addition of the underground mining method is unlikely to cause any noise concern for neighbours. Vibrations from underground mining are orders of magnitude smaller than open pit mining, furthermore the vibration pattern and methods for underground blasting are such that smaller blasts are required. As with open pit mining there is the potential for vibration to follow fault lines and sometimes

ENVIRONMENT OR SOCIAL TOPIC	POTENTIAL IMPACT	SUMMARY OF ASSESSMENT FINDINGS
		vibrations can be felt some distance away from the operation. The site will continue to monitor vibrations and ensure vibrations are below allowable limits. Negligible change to current operations.
Landscape and visual amenity	Potential changes to the landscape by introducing underground mining	The portal entrance into the underground mine will be within the existing open pit mine, no significant infrastructure will be required on surface and the underground will produce less volumes of waste rock to be transported to the surface. Given the limited impacts on surface there will be no notable change in the landscape or visual amenity to the site.
Rehabilitation and Decommissioning	Potential changes to the rehabilitation and decommissioning plan with the introduction of underground mining.	Typically at closure underground portals are sealed, plugged and made safe so that entry into the underground workings isn't possible. Any associated surface infrastructure at closure will be assessed in the closure plan, alternative uses evaluated and if not suitable alternative use identified infrastructure would be removed and remediated. Negligible change to current operations.

7.3 POTENTIAL PROJECT IMPACTS AND ASSESSMENT: SOCIOECONOMIC ENVIRONMENT

7.3.1 EMPLOYMENT

Whilst Namibia has a generally high unemployment rate, the Otjozondjupa Region is one of the regions with a moderately high unemployment rate in Namibia. In the region, the majority of employment is through the agriculture section and private enterprise. The value and sensitivity of employment is considered to be high as it is of importance to the country.

7.3.2 DIRECT EMPLOYMENT: DECLINE DEVELOPMENT

Approximately 100 jobs will be generated during the decline development phase. The proponent will employ the specialised services of a contract mining company to develop the underground portal and decline. This phase of the project is likely to last approximately 24 months, during this contactor engagement underground specific safety and training procedures will be implemented by the contractor and will be carried over by means of a training process to the B2Gold workforce who will commence with phase 2 of the underground operations when underground mining commences.

A potential impact associated with the use on a contractor mining company will be the influx of workers and potential families to the area, this is considered beneficial as it stimulates the economic as an indirect impact. The sensitivity of the economy is considered to be medium as economic development is an important regional issue. The magnitude of change will be minor as local spends from the families of workers will attribute to the economy but is unlikely to result in medium scale improvements.

Another potential impact as a result of the influx of workers and their families is the potential impacts on community cohesion. The demographics of the workers that will fill the skilled roles during the decline development phase of the proposed project, is diverse. The community where workers would live are accustomed to change with the inflow and outflow of workers depending on the regional needs. Diverse communities are used to change and therefore are not considered as sensitive, however there is potential that there may be a reduction in community safety and cohesion as a result of the influx of contract workers to the area.

Therefore the beneficial impact of creating 100 jobs in the development stage will result in a medium term impact with a moderate magnitude of change. A moderate beneficial impact on the community and economy is therefore expected.

7.3.3 DIRECT EMPLOYMENT: OPERATIONS

Approximately 150-250 jobs will be generated during the mining phase. The proponent will redeploy employees from the open pit mining operation into the underground mine when possible through a training and phased approach. This will enable the contractor miner with pre-existing training and safety system to progressively train some of the open pit mining personnel in order for them to transmission to underground mining when the open pits reach the end of their economic life. This will also provide extended employment opportunities which would have otherwise ended upon completion of the open pit mines. Therefore the magnitude of change during operations is consider as moderate having long term impacts thereby resulting in a major beneficial impact on the community and economy.

7.3.4 INDIRECT EMPLOYMENT IMPACTS

As with the current open pit mining operations there are various indirect employment impacts as a result of the mining operations. These impacts range from job creation through service providers, increase in skills, increase in population, increase in economic activities. With the increased mine life that is a result of this amendment indirect benefits will continue to flow into the neighbouring towns and the national economy.

7.3.5 SUMMARY OF EMPLOYMENT IMPACTS

TABLE 15 – IMPACTS ON EMPLOYMENT AND INFLUX OF CONTRACTOR TO NEIGHBOURING TOWNS.

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction works - general	– Community – Job seekers – Local economy	Creation of 100 jobs	Beneficial Direct Regional Short Term Reversible	High	Moderate	Beneficial Major (9)
Operations of the proposed project	– Community – Job seekers – Local economy	Creation of 150-250 jobs	Beneficial Direct Regional Long Term Reversible	High	Moderate	Beneficial Major (9)
Downstream job creation	– Community – Job seekers – Local economy	Creation of xx	Beneficial Indirect Local Long Term Reversible	High	Moderate	Beneficial Major (9)
Influx of workers & families	– Community – Local economy	Influx of contractor (workers and families) stimulating the local economy through increase spends	Beneficial Direct Local Long Term Reversible	Medium	Minor	Beneficial Minor (4)
Influx of workers & families	– Community	Changes to community cohesion	Adverse Direct Local Long Term Reversible	Low	Negligible	Adverse Low (1)

7.4 MAJOR HAZARD AND RISK: EMPLOYEE HEALTH AND SAFETY

Major mining hazards associated with underground mining include but are not limited to underground fires, ground control failures, inrush and subsidence. These hazards pose a unique risk that is specific to underground mining operations. While some elements of these risks can be mitigated through detailed planning often the management of these risks rely on strong operational management, safe working procedures and where possible the use of mechanical aids to reduce employee exposure.

The potential risks and associated mitigation measures is outline in the table below.

7.4.1 SUMMARY OF IMPACTS ON EMPLOYEE HEALTH AND SAFETY

TABLE 16 – POTENTIAL IMPACTS TO EMPLOYEE HEALTH AND SAFETY DURING UNDERGROUND MINING

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Mitigation Measures	Significance of impact (Post mitigation)
Ground control	– Employee Occupational Health and Safety	Underground ground control and ground support failures	Adverse Direct Partly Reversible High Medium Term Local	High	High / Major	Major (9)	> The Company's safety management plan will ensure that the SOP and golden rules include that no person is to go beyond supported ground (meaning no one can go into an area of unsupported ground). Supported ground is ground that has been controlled to an approved standard and made safe. > A Ground Control Coordinator will be appointed > A Ground Control Plan will be developed > B2Gold will ensure that the application of a rigorous mine design process is in place > Prior to mining, and refined as data becomes available B2Gold will ensure a ground conditions model is developed > Ensure that the evaluation of long term ground control requirements are incorporated into the sites technical plans and planning process > Ensure that there is a multi-tiered response plan for ground support > Ensure that all underground operators are trained in underground hazard identification > Ensure that the site has ground control monitoring systems in place to proactively measure potential ground movement > Ensure that the ground control requirements are incorporated into shift plans and work plans > Ensure that the site develops a quality assurance program for all areas of ground control/support.	Moderate (6)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Mitigation Measures	Significance of impact (Post mitigation)
Fire	– Employee Occupational Health and Safety	Underground fire incident	Adverse Direct Irreversible High Long Term Local	High	High / Major	Major (9)	> Develop a Fire Control Plan through the process of risk assessment > Develop a Maintenance System to prevent the deterioration of equipment condition and performance > Ensure no petrol is used underground > Design and control flammable substances use and storage > Ensure that the control of hot work through a hot work permit system is in place specifically for underground operations > Ensure the underground operators receive training to be able to identify and provide first response to fire emergencies > Ensure that the site has an operational and maintenance procedures for fire control > Ensure that the design requirements for underground mobile equipment factors in fire suppression > Ensure that the site has specific design requirements for fixed mechanical, electrical and compressor installations > In the event that associated infrastructure is required for underground operations such as workshops, lunch rooms, toilets and refuge chambers ensure these are planned and requirement designed for purpose	Moderate (6)
Mobile equipment	– Employee Occupational Health and Safety	Collision of underground mining equipment causing injury to people	Adverse Direct Partly Reversible Moderate Short Term On-site	High	Moderate	Moderate (6)	> Ensure that procedures are in place to minimise the instances where pedestrians and operating mobile equipment are in the same area at the same time > Ensure that operational Risk Assessments are part of the planning process > Develop equipment specifications which include minimum safety requirements and the identification of critical control systems for underground equipment	Minor (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Mitigation Measures	Significance of impact (Post mitigation)
							> Develop a maintenance system that identifies the maintenance requirements for critical safety systems > Design requirements of all underground roads to ensure good road conditions underground are maintained > Ensure ongoing maintenance of underground roads > Ensure suitable control of traffic through the development of Standard Working Procedures > Ensure the site makes provisions for the use of remote controlled equipment to ensure high standards of safety > Ensure all operators understand and are trained for emergency response	
Inrush and subsidence	– Employee Occupational Health and Safety	Inrush or subsidence event within the underground mine causing injury and harm to people and project feasibility	Adverse Direct Irreversible Very High Long Term Regional	High	Very high / unknown	Major (12)	> Ensure that due consideration of inrush and subsidence potential at each stage of a project is implemented at the planning phase > Ensure that the use of a risk assessment process is in place to identify specific hazards > Implement a systematic collection and analysis of data > Evaluate of climatic conditions > Identify risks of operating near water > Ensure that consideration of pathways for inrushes is evaluated at each phase > Develop, apply and monitor lead indicators > Develop and apply a response plan for lead indicators > Ensure the site has implemented contingency planning > Prior to the development of working areas ensure a Water Control Plan is developed and in place > Apply appropriate procedures for surface and underground drilling > Apply rigorous mine design process	Major (9)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Mitigation Measures	Significance of impact (Post mitigation)
							> Implement effective ore and waste fill design > Implement effective tailings and surface water storage > Implement effective backfill design and procedures > Implement effective underground and surface pumping and drainage systems > Ensure that there is a method for open and clear communication of experiences and outcomes of inrush and subsidence events	

7.5 POTENTIAL PROJECT IMPACTS AND ASSESSMENT: BIOPHYSICAL ENVIRONMENT

7.6 ODOUR AND AIR QUALITY

A potential impact to air quality is the deterioration in air quality from odour and particulate matter (i.e. total suspended particulate matter (TSP), PM10 and PM 2.3 (particulate matter of 2.5 micrometres or less in diameter) and dust deposition) generated from the underground operations.

The main pollutant of concern associated with the mining operations is particulates. Particulates are divided into different particle size categories with Total Suspended Particulates (TSP) associated with nuisance impacts and the finer fractions of PM10 (particulates with a diameter less than 10 µm) and PM2.5 (diameter less than 2.5 µm) linked with potential health impacts. Gaseous pollutants (such as sulphur dioxide, oxides of nitrogen, carbon monoxide etc.) will derive from vehicle exhausts and from the gold smelting operations but are regarded as negligible in comparison to particulate emissions[23].

The 2012 air quality assessment was limited to airborne particulates (including TSP and PM10). Mechanical operations associated with mining give rise to particles mainly in the TSP and PM10 fraction, whereas combustion sources (such as stack emissions) result in the finer PM2.5 fraction[24]. For this reason, the main focus of this study was on TSP and PM10 and remains relevant for the proposed underground development.

Air quality has been monitored on site using depositional dust monitoring stations and the PM10 fraction has been monitored using two Minivol Samplers, a filter-based, low volume sampler and a US EPA accredited method for PM10 sampling, to sample for PM10 concentrations in the ambient air. Sensitive receptors were mapped in the 2012 air quality assessment and monitoring of impacts on these receptors has been ongoing since the site implemented an air quality management programme per the management plan and recommendations set out in 2012/2014 Environmental Impact Assessment (EIA) studies ongoing since the 2012/2014 EIA[25].

The quality of air exhausting via the portal into the Otjikoto pit is estimated to be (175 m^3/s) and through the implementation of the proposed mitigation measures will not exceed acceptable dust or gas levels outlined in regulation 9.1 (2), except during blasting activities (B2Gold, 2019). This exhaust is unlikely to alter the emissions already being generated from the pit and, therefore, change to current conditions would not be material[26]. In regard to the predicted concentrations of air exhausting via the portal into the Otjikoto pit, it is likely that this will contain particulate matter (exhausted from machinery) and PM10 factions. Air quality will be managed in order to ensure potential occupational health risks are mitigated, furthermore it is unlikely that the underground operations will cause further negative impacts or cumulative impacts, to the current ambient air quality due to the scale and extend of the underground project.

As the exhaust of the underground air will be dissipated into the existing open pit mine, there will be limited change to the existing baseline. No new or additional impacts will be created in relation to air quality that do not already exist as part of the open pit mining operation. The scale of impact associated with the potential deterioration in air quality from odour and particulate matter is considered direct and limited to site, the nature of the potential impact is considered

[23] Airshed, 2012: Air Quality Impact Assessment for the Otjikoto Gold Project in Namibia, Namibia (Report No. APP/11/ASE-03B)
[24] Airshed, 2012: Air Quality Impact Assessment for the Otjikoto Gold Project in Namibia, Namibia (Report No. APP/11/ASE-03B)
[25] Airshed, 2019: Air quality management program review for B2 Gold Otjikoto Gold Mine, Namibia (Report No. 18B2G01)
[26] Airshed, 2019: Air quality management program review for B2 Gold Otjikoto Gold Mine, Namibia (Report No. 18B2G01)

short term and reversible, when operations cease the potential impact also ceases, therefore the magnitude of change is considered minor with limited change to existing conditions.

7.6.1 ODOUR

Odour can be generated from underground mining operations from gaseous emissions, poor ventilation, and poor ventilation management practices. Aside from the occupational health risks associated with poor ventilation practices there is potential to generate odour from underground ventilation exhausts that cause nuisance odours to sensitive receptors. The same sensitive receptors that were mapped for air quality, apply for odour with the addition of on-site receptors such as workers in the open pit operation.

To date from the existing mining operations, and several drilling campaigns, there have been no notable occurrences of natural gases reported by the site. Monitoring during the development of any underground project requires occupational health monitoring for gases, this will be completed by site on a frequency set by the health and safety management plan.

7.6.2 SUMMARY OF IMPACTS ON AIR QUALITY

TABLE 17 - IMPACTS TO COMMUNITY DUE TO DUST GENERATED DURING CONSTRUCTION

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Mitigation Measures	Significance of impact (Post mitigation)
Impacts to Air Quality	− Community − Neighboring farmers − Workers	Deterioration in air quality from odour and particulate matter (i.e. total suspended particulate matter (TSP), PM10 and PM 2.3 (particulate matter of 2.5 micrometres or less in diameter) and dust deposition) from the underground operations	Adverse Direct Local Short Term Reversible	Low	Minor	Adverse Low (1)	> Ensure mechanical equipment is maintained and serviced to ensure particulate matter is reduced > Ensure ventilation systems are providing fresh air to working headings and the underground workings are exhausted after each blast	Adverse Low (1)
Odour	− Community − Neighboring farmers − Workers	Ventilation discharged from the underground workings via the portal could contribute to offensive odours	Adverse Direct Local Short Term Reversible	Low	Minor	Adverse Low (1)	> Implement gas monitoring procedures as part of the daily operations of the underground mine > Ensure adequate ventilation to prevent the build-up of odours and gas within the underground mine	Adverse Low (1)
Impacts to Air Quality	− Community − Neighboring farmers − Workers	Air quality and GHG emissions from underground mining activities	Adverse Direct Local Short Term Reversible	Low	Minor	Adverse Low (1)	> Ensure mechanical equipment is maintained and serviced to ensure particulate matter is reduced > Ensure efficient waste handling such as backfilling to reduce haul distances and therefore reduce potential GHG emissions.	Adverse Low (1)

7.7 HYDROGEOLOGY

7.7.1 GROUNDWATER QUALITY AND QUANTITY

The proposed underground expansion, as with any underground mining operation, has the potential to interact with water in numerous ways. Interactions with water in the underground environment can include, groundwater, sediments in water pumped to surface, dewatering, inrush and perched water bodies, to name a few. In order to access the ore body for both the open pit and underground mining methods, dewatering is required. Dewatering for the operation was approved by the site's previous environmental assessments and valid water abstraction licences (No. 10971). The ongoing monitoring of dewatering activities is reported annually to authorities in line with permit conditions and requirements.

This assessment has considered the existing interactions with water, in particular dewatering, groundwater and potential aquifer interactions. As stated above, dewatering already occurs on site in order to ensure safe mining operations in the existing open pit mine, dewatering is required in both the open pit and underground mining method scenario.

Water to be used in the underground operation will be sourced from inflows underground and water pumped from the mine water supply and dewatering boreholes. It will be pumped underground and secondary recirculation with water treatment where needed used to optimise water use efficiency.

The current dewatering plan considers use of both underground pumping systems and surface dewatering boreholes. Hydrogeological modelling indicates that peak mining inflow rates range between 650 - 670m^3/hr are expected. The site will continue to install dewatering boreholes as required, with the intention that most mine inflow is dewatered through the boreholes in order to prevent unnecessary nuisance water to be dealt with during operations. Residual water will be pumped from the underground workings via a pumping system to surface. The sizes and specifications of these pumps are to be determined based on actual encountered inflows, though the current system is costed as two separate banks of 3 x 300hp pumps installed in series. This system will have full redundancy and emergency capacity in the event of high-inflow events and water storage capacity in the event of power outages (B2Gold, 2019).

Itasca Africa (Pty) Ltd (Itasca) were requested by B2Gold to perform a hydrogeological model update with regards to groundwater inflows to the new proposed underground development situated just south of the existing Wolfshag pit boundary. The scenario simulated by Itasca focused on the underground development extent with depth and associated groundwater inflows. The objective of the model was to predict potential passive groundwater inflow rates as the mine develops in extent and depth. The inflow rates and volume were required for the design of the dewatering system and also for effective water management including groundwater use and disposal if necessary, potential impacts on the groundwater system and water balance updates[27].

The findings of the updated model indicated that initially groundwater inflows will increase gradually as the decline is developed over the first 21 months with peak inflows at approximately 260 m3/Hr at the end of the decline development. During the first 12 months approximately 180 m3/Hr maximum can enter the decline development which is similar to the current abstraction of 150 m3/Hr from PD01[28].

Itasca found that the next 3 years will include three consecutive increases to inflows as the underground ramps and stopes are developed outwards from the centre of the underground layout. Cyclic increases and decrease can be observed due to yearly recharge to the aquifer system. Peak inflows will be observed at approximately 4.5 years into

[27] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.
[28] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.

the underground mining operations with estimates of 650 m^3/Hr to 670 m^3/Hr. At the end of Year 6, storage will be gradually less with expected inflows of approximately 620 m^3/Hr[29].

The water balance for the aquifer system from the modelled results takes into account all modelled outflows and inflows to the groundwater system over the 6 year period of mining. Cyclic spikes are indicated and relate to yearly rainfall, that recharges the aquifer system[30].

The outflows will include abstraction from water supply wells that are currently in use. The combined abstraction rate from all the abstraction wells totals approximately 6569 m^3/d (273 m^3/Hr). Other outflow factors include losses to surface drainages and mine dewatering from the underground[31].

The inflows would mainly be from recharge however some positive fluxes are from storage facilities including the tailings and waste rock facilities. The difference between outflows and inflows is reported as water coming from storage and water going to storage to the aquifer system[32].

The estimated water going to storage over the modelled area is approximately 3,7E+06 m^3/day and estimated water coming from storage is -3,2E+06 m3/day. This would imply that an on average 5,0E+05 m^3/day of water would be available from the aquifer system and the mining activities have limited impact on the aquifer system over the 6 years of operations[33].

Therefore the potential impacts associated with dewatering remain largely unchanged in either the open pit or underground mining method. Impacts that are specifically related to underground mining and water interactions largely focus on employee health and safety, and economic feasibility of the underground mining method.

7.7.2 INRUSH

The potential for groundwater inrush into an underground mining operation has the potential to cause major impacts and incidents. Inrush events have the potential to cause catastrophic harm to employee's health and safety as therefore the potential for inrush requires technical expertise and management in order to mitigate the risk of inrush events. Inrush is mitigated through sound dewatering practices, furthermore geological mapping, mine planning and ongoing geotechnical monitoring is required. The site will have in place a dewatering plan, accompanied by a geotechnical monitoring, and advanced cover drilling, this will ensure that early detection of potential intersections with faults bearing groundwater is identified. The site already has extensive knowledge and understanding of where faults and water intersections may occur, and the mine plan has been designed to avoid these features. Therefore following the mine plan and ensuring that ongoing monitoring including geotechnical monitoring is undertaken, in conjunction with following a detailed dewatering plan the risk of inrush events is mitigated. The site should continue to model groundwater and potential groundwater inflows to ensure that dewatering and the potential risks for inrush is well understood as the project develops.

[29] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.
[30] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.
[31] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.
[32] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.
[33] Itasca, 2019: Underground Groundwater Inflow Memo, B2Gold, Namibia.

7.7.3 SURFACE WATER

The interactions with surface water from underground mining operations are limited. Water that may accumulate in the underground mine will be pumped to the surface via a controlled pumping system, with water piped directly into the processing plant for reuse within the processing circuit. Potential impacts of underground mine wastewater on surface water are predominantly associated with sediment laden water that often requires treatment, such as increased retention time, flocculant dosing and settlement in order to reduce the sediment volumes prior to reuse. Should this be required this will be done within the processing plant, as sediment will be processed for ore. Therefore aside from the potential operational impacts associated with dealing with sediment laden water the potential impact on surface water would be an incident whereby the pipe and or pumping system leaks discharging water on surface. The impacts associated with potential leaks is considered temporary, reversible, short term with minor changes to the baseline environment, resulting in an impact of minor significance.

7.7.4 HUMAN WASTEWATER EFFLUENT

Human wastewater effluent from the underground operation will be contained within portal chemical toilets placed throughout the mine. The effluent from these toilets will be disposed of in the onsite wastewater treatment plant. The site has two wastewater treatment plants with adequate capacity to be able to cater for the effluent that would be generated from the underground mine. The magnitude of change associated with human effluent is considered negligible, and the extent limited to onsite, utilising existing infrastructure and services, the potential impacts of managing human effluent is minimised.

7.7.5 SUMMARY OF IMPACTS ON WATER

TABLE 18 - IMPACTS TO WATER

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact (pre mitigation)	Mitigation Measures	Significance of impact (Post mitigation)
Surface water discharge	– Surface Water Quality	Sediment loading of surface water from decline development activities	> Adverse > Direct > Reversible > Low > Medium Term > Local	Medium	Minor	Minor (4)	> Installation of diversion structures to divert non-contact surface water away and around the mining operations > Ensure wastewater produced during the construction of the decline development is directed into the open pit > If the volume of water is too large and cannot be handled concurrently with open pit mining operations ensure water is diverted to the processing plant for reuse or if not feasible ensure an adequately sized sedimentation pond is constructed for handling the waste water during the decline development phase, alternatively find a suitable reuse strategy for the water.	**Low (2)**
Discharge to surface water	– Surface Water Quality	Sediment loading of surface water from uncontrolled surface discharge of underground mine wastewater	> Adverse > Direct > Reversible > Moderate > Short Term > Local	Medium	Moderate	Minor (4)	> Ensure wastewater produced from underground mining activities is sent to the processing plant for reuse in the progressing plant. > If the volume of water is too large and cannot be handled by the processing plant for reuse ensure an adequately sized sedimentation pond is constructed for handling the wastewater from the	**Low (2)**

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact (pre mitigation)	Mitigation Measures	Significance of impact (Post mitigation)
							underground mining operations. Reuse of the water back into the underground mine should be investigated once operations commence and the water quality is better known and understood.	
Accidental spills	– Surface Water Quality	Discharges of chemicals to surface water	> Adverse > Direct > Partly Reversible > Negligible > Short Term > Local	Medium	Negligible	Low (2)	> Ensure correct chemical use and clean up procedures are in place and followed > Ensure chemical spills are cleaned up underground and prevent spills from entering the dewatering system that would be transferred to surface	**Low (2)**
Containment loss	– Surface Water Quality	Potential failure of containment dams that hold underground mine dewatering water	> Adverse > Direct > Partly Reversible > Moderate > Temporary > Local	Medium	Moderate	Low (2)	> Ensure water storage facilities are constructed and have capacity to hold the volume of water to be pumped from the underground workings	**Low (2)**
Groundwater contamination	– Groundwater Quality	Contamination of groundwater from underground mine operations including hydrocarbons, explosives	> Adverse > Direct > Irreversible > High > Long Term > National	High	Major	Moderate (6)	> Ensure correct chemical use and explosive charging practices are in place and followed for underground mining operations > Bulk fuel will not be stored underground and majority of fleet refuelling will occur on surface therefore risk is reduced > Refuelling of drills and equipment working at the face will be required,	**Moderate (6)**

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact (pre mitigation)	Mitigation Measures	Significance of impact (Post mitigation)
							although this equipment will be powered by electricity, they require fuel for tramming purposes, this will be done in a controlled manner following standard underground refuelling procedures.	
Groundwater alterations from dewatering	– Groundwater	Modification of hydrologic flow patterns from underground mining operations	> Adverse > Direct > Partly Reversible > High > Medium Term > National	High	Major	Major (9)	> This potential impact will occur irrespective if the ore is accessed by means of underground mining or open cast mining as currently approved. > The potential to alter hydraulic flow during operations exists as the very nature of mining requires dewatering for the safe access to mining areas, the potential impact associated with dewatering has been detailed in the ITASCA report.	**Moderate (6)**
Accidental spills	– Groundwater	Infiltration of potential spills or discharges of chemicals into groundwater	> Adverse > Direct > Partly Reversible > High > Medium Term > Regional	Medium	High / Major	Moderate (6)	> Ensure correct chemical and clean up procedures are in place and followed for underground mining operations. > Bulk fuel will not be stored underground and majority of fleet refuelling will occur on surface therefore risk is reduced. > Ensure all operators are trained on spill response for underground events.	**Minor (4)**

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact (pre mitigation)	Mitigation Measures	Significance of impact (Post mitigation)
Groundwater inflows	– Groundwater	Potential infiltration of groundwater from the Karibib Marble aquifer into the underground mining operation	> Adverse > Direct > Partly Reversible > High > Medium Term > Regional	Medium	Major	Major (8)	> Ensure that the mine plan is followed at all times. > Ensure known structures, and water bearing features are mapped and surveyed into the mine plans > Ensure monitoring systems are in place to detect potential inflows > Ensure the dewatering plan is followed and monitoring and reporting on the dewatering plan is undertaken	**Moderate (6)**
Contamination	– Groundwater	Potential runoff of seepage from the solid waste landfill site as a result of additional solid waste being disposed of in the on-site landfill	> Adverse > Direct > Partly Reversible > Negligible > Short Term > Local	Medium	Negligible	Low (2)	> Ensure the landfill is managed in accordance with site procedures and the landfill is covered and rehabilitated as required > Reduce the volume of material entering the landfill by continuing to implement the reduce, reuse and recycle principle installed on site.	**Low (2)**
Contamination	– Groundwater	Contamination of the Karibib Marble aquifer by the rebounding water table of potentially polluted water in the underground workings of the Karibib Marble	> Adverse > Direct > Partly reversible > Very High > Long Term > Regional	High	Very High	Major (9)	> The pit design allows for the groundwater level to be intersected and a pit lake to form. The pit will act as a sink of potentially contaminated water from various sources, including the rebounding water table in the underground workings > Evaporation should keep the free water in the pit from decanting and solute transport models indicated this to be an	**Moderate (6)**

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact (pre mitigation)	Mitigation Measures	Significance of impact (Post mitigation)
		aquifer after closure					acceptable closure option (to be confirmed and refined through ongoing modelling) > Using the water for irrigation after closure could be an option to investigate.	
Terrestrial and Ecology	–	Further reduction in the water table could affect deep rooted tree survival during droughts	> Adverse > Indirect > Partly reversible > Moderate > Medium Term > Regional	Medium	Moderate	Minor (4)	> Monitoring groundwater levels and physiological stress levels in trees to see if a correlation exists; > Mapping trees that might at risk using the ITASCA cone of depression maps; and > Determine feasibility for rescue of these trees.	**Minor (4)**
Inrush	– Groundwater, employees, project feasibility	Potential for inrush into the underground mine workings	> Adverse > Direct > Partly reversible > Very High > Long Term > Regional	High	Very High	Major (12)	> Ensure the dewatering plan is followed and monitoring and reporting on the dewatering plan is undertaken > Ensure all operations are undertaken in accordance with the mine plan > Ensure all water bearing features are mapped and included in survey plans > Ensure emergency response procedures are in place in the event of an inrush event > Ensure adequate pumping capacity with back up pumps as critical spares are kept on site.	**Major (9)**

8 ENVIRONMENTAL MANAGEMENT PLAN

The site has an approved and existing environmental management plan. The assessment for the amendment to include underground mining and associated mitigation measures have been addressed in the environmental management plan provided as Appendix A.

9 FINAL REMARKS

Based on the findings of the assessment and taking into consideration the overall potential adverse impacts, mitigation measures and the potential beneficial impacts, ECC believes the long-term benefits of the proposed project outweigh the short-term adverse impacts. In addition, the proposed project will contribute to the sustainable development of mining in the region in line with National Development Plans.

The implementation of the EMP and associated programme of environmental protection as an outcome of the impact assessment process would serve to minimise the impacts and risks associated with the proposed amendment to an environmental and socially acceptable standard. An Environmental Clearance Certificate could be issued, on condition that the management and mitigation measures in the EMP are adhered to.

APPENDIX A – ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX B – PUBLIC CONSULTATION

Identified Potentially - Interested and or Affected Parties

	Contact person	Contact number	E-mail	Physical Address	Postal Address
Communities					
1 Farmers					
Erhardshof Farm	Duane Rudman	**Contact detailed hidden to protect I&APs privacy.**		N/A	N/A
AloeGrove Safari Lodge	Johan Döman			N/A	N/A
Burgershof Farm	Thinus Nel			N/A	N/A
Erpfsfarm	Hanzi Erpf			N/A	N/A
Farm Okaruhuipuro	AndriesMouton			N/A	N/A
Fisher Farm	Steve Van Wyk			N/A	N/A
Frans Indongo Lodge	Frans Indongo			N/A	N/A
Grosswarlencourt Guestfarm	N/A			N/A	N/A
Guest Farm Oase	Bunzi Erpf			N/A	N/A
HEDWIGSHOF/Etunda	Maahti Asino			N/A	N/A
Gabus Game Ranch	Heinzi Kuehl			N/A	N/A
Hester Farm & Embla Farm	Paul Smit			N/A	N/A
Houmoed Farm	Fielies Liebenberg			N/A	N/A
Kambaku Game Farm and Safari Tours	Thorsten Michels			N/A	N/A
Kavango Secondary School	M Walter			N/A	N/A
Khorab Lodge	Neetling Andre			N/A	N/A
Lardner/ GTO Reg. Agric Union	Stoman Piet			N/A	N/A
Okapuka Jagd Farm	Jan Fourie			N/A	N/A
Okaruhuiput Farm	Steyn Sherad			N/A	N/A
Omarassa Jagd	N/A			N/A	N/A
Orupoku Farm	Petrus Enkali			N/A	N/A
Palmenecke Guest House	Susan Du Toit			N/A	N/A
Platveld Shop	Abisai Ishitile			N/A	N/A
N/A	J.C Harmse			N/A	N/A
Roebersfarm	Jochen Roeber			N/A	N/A
Stark Farm	Nahas Angula			N/A	N/A
Tirol Farm	Elke De Fries			N/A	N/A
Oros	A Steyn			N/A	N/A
Onoro	P.W Labuschagne			N/A	N/A
N/A	P.S Gouws			N/A	N/A
N/A	Johan Swart			N/A	N/A
N/A	Wally Bester			N/A	N/A
N/A	C Mouton			N/A	N/A
N/A	Fanie Gildenhuys			N/A	N/A
N/A	Gillie Bassingthwaighte			N/A	N/A
Gutweide	J Gildenhuys			N/A	N/A
Osib	Nashandi P.			N/A	N/A
Amateta	Hon. Nangolo Mbumba			N/A	N/A
Etunda	Asino Matti			N/A	N/A
EGO	Brigadier Hamunyela			N/A	N/A
HOHENTAL	Mathews Shilunga			N/A	N/A
EGUE	Mathews Shilunga			N/A	N/A
ERHARDSHOF 575	Lucas Tsanib			N/A	N/A
SIEMENSHOF	Epafras Shapumba			N/A	N/A
2 Regional Council					
Otjozondjupa Regional Council	Otto Iipinge - Governor				
3 Municipalities					
Municipality of Walvis Bay	Riaan Archer - Municipal Hazardous Waste Inspector				
Otjiwarongo Municipality					
Otavi Municpality					

PUBLIC PARTICIPATION NOTICE

AMENDMENT APPLICATION

ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR THE EXTENSION OF UNDERGROUND MINING TO THE OTJIKOTO GOLD MINE IN THE OTJOZONDJUPA REGION, NAMIBIA.

Environmental Compliance Consultancy (ECC) hereby gives notice to the public that B2Gold Namibia (Pty) Ltd intends to apply to amend their Environmental Clearance Certificate to incorporate underground mining into their existing Otjikoto mining operation.

Environmental Compliance Consultancy was appointed by B2Gold Namibia, to undertake the environmental assessment for the amendment to the mine plan to incorporate underground mining methods to the existing Otjikoto Gold Mine. The amendment will be made in accordance with the Environmental Management Act No.7 of 2007 as per the following:

Applicant:	**B2Gold Namibia (Pty) Ltd**
Environmental Assessment Practitioner (EAP):	**Environmental Compliance Consultancy**
Location:	**Otjozondjupa Region, Namibia**

Proposed Project: B2Gold has the potential to extend the life of its Namibian operations at Otjikoto Mine by accessing some of the available ore resources through the incorporation of underground mining to the existing open pit operation. These resources are situated on the edges of the current Wolfshag Pit. Accessing parts of these resources will not be possible through the current opencast mining method due to stripping ratio economics. The underground extension will create an opportunity to do selective mining of smaller bodies of mineralisation that elsewise would not have been possible from surface. Near mine exploration is ongoig to define further potential in the area surrounding the existing open pits.

There is also the possibility of accessing further resources to the east from the same underground workings in the future, but this can only be confirmed once results from cover drilling become available.

Application for Environmental Clearance Certificate: In terms of the Environmental Management Act No.7 of 2007, ECC on behalf of B2Gold Namibia (Pty) Ltd is required to apply for Environmental Clearance Certificate to the Ministry of Mines and Energy and the Ministry of Environment and Tourism for the above-mentioned project.

How you can participate: To ensure that all potential issues and concerns are included in the assessment, Interested and Affected Parties (I&APs) and stakeholders are invited to register for the project with the environmental consultant on or before the 20th November to receive further documentation and communication regarding the amendment application.

Environmental Compliance Consultancy Close Corporation
Registration Number: CC/2013/11404
Members: Mr JS Bezuidenhout and Mrs J Mooney
PO Box 91193, Klein Windhoek
Tel: +264 816 697 608
E-mail: info@eccenvironmental.com
Website: https://eccenvironmental.com/projects/
Project ID: ECC-36-240-ADT-03-A

Appointment of Country Manager – Karibib Lithium Project

Desert Lion Energy Pty Ltd ("Desert Lion") is pleased to advise that it has appointed Chris Movirongo as Country Manager, based in Windhoek, Namibia, effective from 1 November 2019.

As Country Manager, Chris will be responsible for external affairs for Desert Lion, and management of the project site at Karibib. The Karibib Lithium Project is owned 80% by Desert Lion, a company which Lepidico Ltd is in the process of acquiring pending Namibia Competition Commission approval.

Chris has had an extensive and varied career in senior management roles in the Namibian mining industry and holds a degree in Agriculture from the University of Namibia and a Master of Science in Sustainable Land Management and Rural Development from the University of Newcastle (U.K.).

Chris has held roles within the Ministry of Agriculture Water and Forestry (MAWF), followed by senior industry management roles; firstly with Skorpion Zinc, from 2008 to 2012 as Sustainable Development Manager, followed by Corporate Affairs and Sustainable Development Manager and; secondly with QKR Namibia Navachab Gold Mine, from 2012 to 2019 as Director for External Affairs.

Chris Movirongo
Country Manager

Desert Lion welcomes Chris to the Karibib Lithium Project and the broader Lepidico team.

Joe Walsh , Managing Director, Lepidico Ltd

FOCUS

Pope to visit Hiroshima on anti-nuclear weapon mission

VATICAN CITY – Pope Francis, who years ago hoped to be a missionary in Japan, travels to the sites of the world's only atomic attacks this week seeking a ban on nuclear weapons.

The Argentine pontiff, 82, flies to Asia on Tuesday, where he will first visit Thailand and then Japan, including the two cities destroyed by devastating US nuclear attacks during the Second World War.

Despite both countries having less than 0.6 percent Catholic populations, Francis is thirsty for interreligious dialogue with them.

He will arrive in Thailand on Wednesday before flying on to Japan on Saturday, where he will stay until November 26.

Sunday is set to be a marathon day with visits to Nagasaki and Hiroshima, where at least 74,000 people and 140,000 people respectively were killed by the atomic bombs attacks.

The August 6, 1945 bombing of Hiroshima and of Nagasaki three days later contributed to Japan's surrender and the end of the Second World War on August 15, months after Nazi Germany capitulated.

Father Yoshio Kajiyama, director of the Jesuit social centre in Tokyo, was born in Hiroshima shortly after the war and is eagerly awaiting the pope's anti-nuclear speech.

"My grandfather died the day of the bomb in Hiroshima, I never knew him. Four days later my aunt died when she was 15 years old," said the 64-year-old. "If you grow up in Hiroshima, you can't forget the bomb."

The pope will make "as vigorous an appeal as possible in favour of concerted measures to completely eliminate nuclear weapons," Vatican number two Cardinal Pietro Parolin told the United Nations in September. "Using atomic energy to wage war is immoral," the head of the world's 1.3 billion Catholics told Japanese television in September. A previous member of Japan's diplomatic mission to the Vatican, Shigeru Tokuyasu, said he hopes the visit will pull the world back from "the globalisation of indifference" over nuclear weapons.

But, said Tokuyasu, the pope should avoid discussing the politically sensitive issue of nuclear energy. Francis is also to meet victims of the devastating 2011 earthquake that struck northeastern Japan and the subsequent tsunami that between them killed 18,500 people and sparked the nuclear power catastrophe at Fukushima.

Francis is used to railing against countries that make money from weapons and has already voiced his fear of a nuclear war.

In January last year, he printed cards with a photo of a Nagasaki bomb victim, inscribing the words "the fruit of war" above his signature.

The 1945 photo, captured by American photographer Joe O'Donnell, showed a small boy standing ramrod straight carrying his dead younger brother on his back while waiting for his turn at a cremation site.

The late pope John Paul II visited Japan in 1981, where at Hiroshima's peace monument he pointed to war as "the work of man".

In August, the city of Hiroshima called on Japan to sign the UN treaty calling for a ban on nuclear weapons, something that all the world's nuclear powers have refused to do.

Japan, with its pacifist post-war constitution, adhered in 1967 to the principle of "not producing, possessing or allowing nuclear weapons on its territory," despite counting on the US nuclear umbrella for protection.

Before arriving in Thailand on Wednesday, the pope praised the "multi-ethnic nation" which "has worked to promote harmony and peaceful coexistence, not only among its habitants but throughout Southeast Asia."

In a video message to the Thai people, the pope said he hoped to "strengthen ties of friendship" with Buddhists.

Since Francis' election six years ago, he has made two trips to Asia, visiting the Philippines and Sri Lanka in 2014, followed by Myanmar and Bangladesh in 2017.

On Thursday in Bangkok, the pontiff is to pay a visit to supreme patriarch Somdej Phra Maha Muneewong at a Buddhist temple. - *Nampa/AFP*

For the have-nots... ***Pope Francis arrives to lead a mass marking the World Day of the Poor, on November 17, 2019 at Saint Peter›s basilica in Vatican.*** *Photo: Nampa/AFP*

Okakarara Town Council
Private Bag 2104
Okakarara, Namibia
Tel: 067 317 084 / 317 075
Fax: 067 317 202
E-mail: okakararatc@gmail.com

VACANCIES

Vision: 'To become a sound vibrant, economically developed Municipality and be a model public institution'

MANAGER FINANCE, HUMAN RESOURCES, ADMINISTRATION (Grade D)

Okakarara Town Council as an equal opportunity employer invites interested and qualified candidates to apply for the above mentioned vacancy.

Key Performance Areas:
- The Manager Finance, Human Resources and Administration is responsible for planning, directing and control the Financial, Human Resources, Administrative functions of the town council through application of council policies and procedures in accordance with relevant legislation.
- To set the financial strategy of the council and department and ensure that the long term financial plan is implemented in order to ensure the adequate consolidation and control of financial resources, preparation of budget and complete of financial statements.
- Responsible for direction, plans, organizes and directs human resource programs for the organization; provides highly responsible administrative staff assistance to the CEO; and performs other related work as required This employee is concerned with the formulation and execution of broad policy, immediate technical supervision, and participation in departmental activities. The Manager Finance serves as acting CEO in the absence of the CEO. Prepare monthly financial reports for submission to the Council

Minimum Requirements:
- Possess a B-Degree in Accounting/Finance plus three (3) years Appropriate Experience of senior supervisory level or 3 years National Diploma plus 8 years in a Financial Accounting position, of which 3 years should have been a senior supervisory position. Plus a diploma and three (3) minimum HR years of Experience
- Trust worthiness Integrity
- High degree for accuracy
- Good communication and interpersonal skills
- Excellent Arithmetic Skills
- Sound Knowledge of accounting Principles in an organization
- Knowledge of Local Authorities Act, Regional Councils Act, Procurement Act and other relevant legal instruments
- Sound customer orientation

Special Requirements:
- Driving license Code B
- Local Authority experience will be an added advantage
- Extensive FINSTEL & VIP knowledge will be an added advantage

The Council offers the following benefits:
A Competitive salary, Housing and vehicle allowance, Pension, Medical Schemes, 13th Cheque and ample leave benefits.

Interested applicants should send their written applications, detailed CVs clearly indicating the qualifications and experiences with certified copies of educational qualifications documentation to:

The Chief Executive Officer
Okakarara Town Council, Private Bag 2104, Okakarara

OR

By hand delivered at Okakarara Town Council office

Enquiries: Miss Verna Tjeriko, Acting-Human Resources Officer @ 067-317084

CLOSING DATE: 29 November 2019

Only shortlisted candidates will be contacted, no fax or e-mail documents will be accepted and no documentation will be returned.

Ten·der |tendər|

noun
An offer to carry out work.

INVITATION FOR BIDS (IFB)

The Namibia Training Authority (NTA) hereby invites bids through the Open National Bidding (ONB) procedure for the provision of:

SC/RP/ NTA-07/2019: Request for Proposal for Technical Author (TA) to coordinate the review and/ or development of Unit Standards and Qualifications for the Travel and Tourism Sector.

The invitation is open to Namibian citizens only. Eligible bidders may obtain the bidding documents on request via email at **procurement@nta.com.na.**

Bids must be deposited in the Bid Box at NTA Village, Administration Building, Rand Street, Khomasdal, Windhoek, before **11H00** on **Thursday, 09 January 2020,** at which time bids will be opened, and which session bidders are welcome to attend.

Late and electronic bids will not be considered.

JXT_002/15/11/2019

Enquiries:
procurement@nta.com.na

NAMIBIA TRAINING AUTHORITY

INVITATION FOR EXPRESSION OF INTEREST FOR EXTERNAL AUDIT SERVICES FOR THE NATIONAL THEATRE OF NAMIBIA (NTN)

Background
The National Theatre of Namibia (NTN) was founded on 25 August 1989 as an Association-not-for- Gain. The National Theatre of Namibia (NTN) replaced the South West Africa Performing Arts Council, which operated the Windhoek Theatre before Namibia's Independence. The company form is generally referred to as an 'Article 21 Company' in terms of the Company Act 1973, a public company, constituted by members of association without a share capital.

The National Theatre of Namibia produces and stages productions and programs with regularity at the NTN (main theatre with the seating capacity of 470, backstage with the seating capacity of 250 and the garden with the seating capacity of 150 standing) covering the entire spectrum of performing arts.

Project brief
The National Theatre of Namibia invites eligible consultants to express their interest in undertaking the Expression of Interest for External Audit Services. The audit is expected to commence annually in June upon execution of the engagement letter and be delivered over a two-month period, ending in July.

The consulting services include the performance of an annual audit of NTN's financial statements including the forming and expressing audit opinion in accordance with the International Standards on Auditing (ISA) and with the Namibian Statement of Generally Accepted Accounting Practice NAC001: Financial Reporting for Small and Medium Sized Entities and in the manner required by the Companies Act of Namibia.

Scope of work
The scope of works includes such tests and auditing procedures as the auditor will consider necessary under the circumstances. Special attention should be paid by the auditor as to whether the:

- Donor financing, including all external and other sources have been used in accordance with the conditions of the relevant financing/donor agreement, and for the purposes for which the financing was provided;
- Goods, works and services financed have been procured in accordance with the relevant financing agreements and the company's policies;
- All necessary supporting documents, records, and accounts have been maintained in respect of all project activities;
- National laws and regulations have been complied with, and that the financial and accounting procedures approved for the project (e.g. Finance Policy, etc) were followed and used;
- Financial performance of the Company is satisfactory.

Requirements
- Interested consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the services.
- Provide information (company profile, summary biographies of senior members of the audit team audit, references, etc.)
- Must have been in existence for the last five (5) years and undertaken consultancies of similar nature.
- Declaration of conflicts of interest.

Expressions of interest must be hand delivered to the address below or via e-mail on or before 11 December 2019 during working hours.

Reference No: External Auditor of April 2020
Attn: Ms. Inga Shitumbe, Finance and Administration Manager
Office Address: 12 John Meinert Street, Windhoek, Namibia
P.O. Box 3794, Windhoek, Namibia

Email: finances@ntn.org.na
Telephone No: 061-374400/7

ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

B2GOLD

PUBLIC PARTICIPATION NOTICE

AMENDMENT APPLICATION

ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR THE EXTENSION OF UNDERGROUND MINING TO THE OTJIKOTO GOLD MINE IN THE OTJOZONDJUPA REGION, NAMIBIA.

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Environmental Assessment Practitioner (EAP):	**Environmental Compliance Consultancy**
Location:	**Otjozondjupa Region, Namibia**

Proposed Project: B2Gold has the potential to extend the life of its Namibian operations at Otjikoto Mine by accessing some of the available ore resources through the incorporation of underground mining to the existing open pit operation. These resources are situated on the edges of the current Wolfshag Pit. Accessing parts of these resources will not be possible through the current opencast mining method due to stripping ratio economics. The underground extension will create an opportunity to do selective mining of smaller bodies of mineralisation that elsewise would not have been possible from surface. Near mine exploration is ongoig to define further potential in the area surrounding the existing open pits.

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How you can participate: To ensure that all potential issues and concerns are included in the assessment, Interested and Affected Parties (I&APs) and stakeholders are invited to register for the project with the environmental consultant on or before the 20th November to receive further documentation and communication regarding the amendment application.

Environmental Compliance Consultancy Close Corporation
Registration Number: CC/2013/11404
Members: Mr JS Bezuidenhout and Mrs J Mooney
PO Box 91193, Klein Windhoek
Tel: +264 816 697 608
E-mail: info@eccenvironmental.com
Website: https://eccenvironmental.com/projects/
Project ID: ECC-36-240-ADT-03-A

ECC ENVIRONMENTAL COMPLIANCE CONSULTANCY

Billions spent on Single's Day

… Chinese consumers go on shopping spree

SHANGHAI - Chinese customers spent billions of dollars during the opening hours of the country's annual "Singles' Day" frenzy Monday, the world's biggest 24-hour shopping event that was kicked off by US megastar Taylor Swift.

E-commerce giant Alibaba said the first US$1 billion spent on its platforms was reached in just 68 seconds.

The total gross merchandise volume settled through its payments platform Alipay hit 100 billion yuan (US$14.3 billion) within 63 minutes and 59 seconds - 43 minutes ahead of last year's pace.

The promotion, now in its 11th year, kicked off early with Chinese bargain-hunters snapping up everything from electronics to clothing and housewares via Alibaba and other competing platforms.

Going all out… A screen shows the gross merchandise volume, a measure of sales, after 1 minute 36 seconds of Singles Day sales. *Photo: Nampa/AFP*

The event is considered a useful annual gauge of consumer sentiment in the world's second-biggest economy.

China is in the midst of a long-term slowdown, further exacerbated by the trade war with the United States, but retail sales have remained a bright spot.

Singles' Day, also called "11.11" for the date on which it is held, was originally set aside as an unofficial day for China's unmarried.

Alibaba kicked off the event with a glitzy gala show in Shanghai, headlined this year by US Grammy-winner star Swift, as it counted down to the start of shopping at midnight.

But Alibaba, based in the eastern city of Hangzhou, latched on to it a decade ago as a shopping promotion akin to the late-November US "Black Friday" retail crush.

Other online platforms and Chinese retailers have tapped in as well.

Capitalising on the Chinese consumer's embrace of e-commerce and one-click smartphone payments, it has proven a success, with Alibaba regularly beating its own sales volume mark.

The full 24-hour tally last year was US$30.7 billion, another record for Alibaba, but the pace of growth slowed from previous years.

US-listed Alibaba earlier this month said the company's sales revenue remained robust in the most recent quarter, ending on September 30, but that growth had slowed to 40 percent compared to 54 percent in the same quarter last year.

This year's Singles' Day is Alibaba's first without co-founder Jack Ma.

Ma stepped aside as leader of the Alibaba Group in September after 20 years in which the charismatic former English teacher's e-commerce company helped unleash the power of Chinese consumer spending.

Today, Alibaba has more than half the domestic e-commerce market and is among the world's most valuable companies.

The firm is hoping to raise up to US$15 billion in a Hong Kong IPO, a report said last week, which would be the city's biggest listing for nine years.

Environmentalists, however, accuse Alibaba and other e-tailers of fuelling a culture of excessive consumption and adding to a growing national problem of overflowing waste, as 11.11 deliveries create mountains of discarded packaging. *-Nampa/AFP*