DRAFT BASIC ASSESSMENT REPORT

ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED INSTALLATION OF DUAL FLUE GAS CONDITIONING (DFGC) PLANTS AT TUTUKA POWER STATION, MPUMALANGA PROVINCE

DFFE Ref Number:

Green Gold Ref: GGG22/50

Report Date: 2022/10/03

PREPARED BY:

PREPARED FOR:

PROJECT DETAILS

Project title	The Proposed Installation of Dual Flue Gas Conditioning (DFGC) Plants at Tutuka Power Station, Mpumalanga Province
Applicant	Eskom Holdings SOC Ltd
Location	Tutuka Power Station is situated on the high plains of southern Mpumalanga Province, 20 km north-east of Standerton Town.
Environmental Assessment Practitioner	Green Gold Group (PTY)Ltd Office M62, Innovation Building 1 Mark Shuttleworth Street Lynnwood, Pretoria
Report Status	Draft Report
Date	2022/10/ 03

DEFINITIONS

TERMS	DEFINITIONS
Environment	Our surroundings, including living and non-living elements, e.g., land, soil, plants, animals, air, water and humans. The environment also refers to our built, social and economic surroundings, and our effect on our surroundings.
Environmental Impact:	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Environmental Impact Assessment:	Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which a basic assessment must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.
Environmental management:	Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.
General Waste	Defined in the NEM: Waste Amendment Act, 2014 (Act No. 26 of 2014) Waste that does not pose an immediate hazard or threat to health or to the environment, and includes: a) Domestic waste; b) Building and demolition waste; c) Business waste; d) Inert waste; or e) Any waste classified as non-hazardous waste in terms of the regulations made under section 69, and includes non-hazardous substances, materials or objects within the business, domestic, inert or building and demolition wastes.

Groundwater	Water found underground, typically supplying wells, boreholes and springs
Hazardous waste	Defined in the NEM: Waste Amendment Act, 2014 (Act No. 26 of 2014) Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within the business waste, residue deposits and residue stockpiles.
Interested and Affected Party	Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.
Mitigation measures	Measures designed to avoid, reduce or remedy adverse impacts.
Red Data Listed species	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Topsoil	Top layer of soil, a depth of between 50mm to 200mm.
Waste management	A control system to limit, collect and dispose of waste in an efficient and environmentally friendly way through clear policies and environmental standards, e.g. reducing plastic packets
Waste water	Any water that has been affected by human use from domestic, industrial, commercial or agricultural activities and any sewer inflow or sewer infiltration

ABBREVIATIONS AND ACRONYMS

TERMS	DEFINITIONS
BAR	Basic Assessment Report
CA	Competent Authority
DARDLEA	Department of Agriculture, Rural Development, Land and Environmental Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMS	Environmental Management System
IDP	Integrated Development Plan
NEMA	National Environmental Management Act
NEM: WA	National Environmental Management Waste Act
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NH_3	Ammonia
PGM	Platinum Group Metals
PPE	Personal Protective Equipment
RDL	Red Data Listed.
SO_3	Sulfur Trioxide

TABLE OF CONTENTS

List of Tables

1 INTRODUCTION

Eskom Holdings SOC Ltd (Eskom), intends to implement various emission reduction strategies at their Tutuka Power Station in order to meet current and future emissions license requirements. One of the specific strategies proposed is the Dual Flue Gas Conditioning (DFGC) through implementation of sulphur trioxide (SO_3) and Ammonia (NH_3) injections. The effectiveness of this technology was tested on unit 6 on-site for a period of six months. The results show that an average reduction of 23% in particulate matter emissions was achieved.

The implementation thereof involves placing the DFGC plant/skids on the "power island" and connecting it to the relevant unit/s where installation is going to be done. The amount of SO_3 and NH_3 to be stored for the plant/skid is 254m^3 which is less than 500m^3; its storage would be on a paved section inside the station block. See Appendix C for facility illustration. An environmental authorisation is required before the project can be implemented.

Green Gold Group was appointed by Eskom Tutuka Power Station as an independent Environmental Assessment Practitioner (EAP) to conduct and facilitate Basic Assessment process for the proposed installation of the DFGC plant within the power station. The application process will follow the process as outlined in terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA) read in conjunction with Chapter 4 of the EIA Regulations 2014 as amended.

Tutuka Power Station is located approximately 25 km north-north-east of the town of Standerton in the Mpumalanga Province. The power station falls within the Lekwa Local Municipality, within the Gert Sibande District Municipality. The centre coordinates for the site are 26º 46'43" S; 29º 21'07" E. See Appendix A for locality map.

2 DETAILS AND EXPERTISE OF THE EAP

Table 1: Details of the EAP

ENVIRONMENTAL CONSULTANT	
Name	Ms. Lebohang Moiloa
Contact Number:	073 232 4312
Telephone Number:	012 844 0248
Physical address:	Office M62, Innovation Building 1 Mark Shuttleworth Street Lynnwood, Pretoria
Postal address:	PO Box 65384, Erasmusrand, Pretoria, 0165
E-mail:	Lebo@greengoldgroup.co.za
Qualifications:	1. MBA: General Management 2. MSc: Geography (Waste Management) 3. BSc Hons: Geography (Environmental Management) 4. BSc: Physics and Geography
Professional Affiliations	1. Professional Natural Scientist (Pr.Sci.Nat). Reg. No. 400146/08 2. International Association for Impact Assessment (IAIAsa). Reg. No. 1624 3. EAPASA Registration application under review
Experience	21 years
ENVIRONMENTAL ASSESSMENT PRACTITIONER	
Name:	Ms. Grace Magaya
Contact Number:	081 494 1611
Telephone Number:	012 844 0248
Physical address:	Office M62, Innovation Building 1 Mark Shuttleworth Street Lynnwood, Pretoria
Postal address:	PO Box 65384, Erasmusrand, Pretoria, 0165
E-mail:	eias@greengoldgroup.co.za
Qualifications:	1. BA: Environmental Management
Professional Affiliations	1. EAPASA Registration No.2018/129
Experience	10 years

SUPPORTING ENVIRONMENTAL CONSULTANT	
Name:	Mr Matome Davhana
Contact Number:	078 798 5249
Telephone Number:	012 844 0248
Physical address:	Office M62, Innovation Building 1 Mark Shuttleworth Street Lynnwood, Pretoria
Postal address:	PO Box 65384, Erasmusrand, Pretoria, 0165
E-mail:	matomed@greengoldgroup.co.za
Qualifications:	1. National Diploma: Environmental Science 2. Advanced Diploma: Environmental Sciences
Professional Affiliations	1. International Association for Impact Assessment (IAIAsa) Reg. No. 7067 2. South African Council of National Scientific Professions Reg. No. 154234

The curriculum vitae (CV) of the EAP is attached as **Appendix H**

3 LOCALITY OF THE PROPOSED PROJECT

1.1. Project Location

Table 2: Project Location Details

Physical Address and Farm Name	Portion 11 of the Farm Pretorius Vley 374 IS
SG Code	T0IS00000000037400011
Coordinates	26°46'34.84"S, 29°21'10.39"E

Table 3: Regional Setting of The Power Station

ASPECT	DETAIL
Province	Mpumalanga Province
Magisterial District	Gert Sibande District Municipality
Regional Authority	Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)
Local Authority	Lekwa Local Municipalities
Local Municipal Ward Number	Ward 12
Farms on which the activities take place	Portion 11 of the Farm Pretorius Vley 374 IS
Nearest town(s)	Standerton
Surrounding communities	Various formal and informal community groupings – landowners, land occupiers, informal and formal settlements and Thuthukani Township
Use of land immediately adjacent to mine	Residential, business (shops and bed and breakfast), mining and farming.
Water catchment and management area	Quaternary Catchment **C11K** (GRA2), within the Upper Vaal Water Management Area

The Locality map is attached as **Appendix A.**

3.1 CURRENT LAND-USE CONSIDERATION

The area of the proposed installation of the DFGC plant is characterized by three (3) distinctive land-uses, namely:

- Heavy industrial development including the Tutuka Power Station and associated conveyors and stockpiles. There is an above-ground conveyor belt running approximately 3.5km east of the power station, linking the facility to an existing pulverized fuel ash dump.
- Urban development including the small settlement of Thuthukani which lies approximately 5km to the west of the power station. This settlement largely houses workers from the power station and associated facilities.
- Agricultural development is the main development type adjacent the proposed site. There is a mixture of arable agriculture and grazing land.

4 DESCRIPTION OF THE PROPOSED PROJECT

4.1 Preferred Option (Option 1)

The aim of installing DFGC plants is to reduce the particulate matter emissions at the power station by increasing the existing Electrostatic Precipitator (ESP) efficiency. It has been established through physical testing that the injection of SO_3 will reduce the particulate matter emissions by 23%. Flue gas is produced during various combustion processes and can contain different dust particles, oil vapours and acid vapours, carbon monoxide as well as other toxic substances. In order to reduce the environmental contamination arising from gas emissions, Eskom intends to install DFGC plant at Tutuka Power Station. The goal of flue gas conditioning is to enhance these properties via injecting SO_3 or NH_3 in the flue gas stream. There will be storage of hazardous materials on-site, including SO_3 and NH_3. The volume of hazardous materials stored to be injected into the DFGC will be approximately 254m^3 at any given time during the operation of the DFGC plants.

Illustration of the process is provided in Appendix C of this report.

4.2. Alternatives

Technology Alternatives

The DFGC technology proposed by Eskom has been tested over a period of six months at the Tutuka Power Station. The plant can use SO_3, NH_3, or combination of the two. Currently there is no conclusive data to suggest which gas is more effective than the other. Furthermore, no other alternative technologies were considered.

Site Alternatives

Two sites have been identified as suitable for the storage of chemicals that will be used in the DFGC plant. The storage will be inside the plant and close to the power station generating units. All the three areas are in the power station generation footprint, which is a brown field without any ecological support function. No other site alternatives were considered since no reasonable environmental impacts would be the same whichever areas are chosen around the power station generating units.

4.3 No-Go alternative:

In the event that the proposed installation of DFGC is not undertaken, the power station will continue to operate as is and will not adhere to the emission standards and licence limits which will result in more penalties from the DFFE.

5 DESCRIPTION OF THE POLICY AND LEGISLATIVE CONTEXT

5.1. TRIGGERED LISTED AND SPECIFIED ACTIVITIES

The proposed project will trigger a listed activity in the Table 4 below in terms of the NEMA and 2014 EIA Regulations as amended. Prior to the commencement of the installation and operation of the proposed DFGC plants, Tutuka Power Station has to acquire an Environmental Authorisation (EA).

Table 4: Listed of Activity Identified

ACTIVITY	DESCRIPTION	PROJECT APPLICABILITY
EIA Regulations 2014 as amended		
GNR 327 of April 2017 Listing Notice 1	**Activity 14** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The proposed plant will require storage of SO_3 and NH_3. The volume of these hazardous materials will be approximately 254m^3 at any given time during the operation of the DFGC plants.

5.2 POLICIES AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. A summary of the applicable legislation is provided in Table 5

Table 5: Policies and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES	REFERENCE WHERE APPLIED
(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	

APPLICABLE LEGISLATION AND GUIDELINES	REFERENCE WHERE APPLIED
National Legislation / Policy / Plans / Programmes	
The Constitution of the Republic of South Africa 1996, (Act No. 108 of 1996)	Section 24 of the Constitution of the Republic of South Africa provides the overarching environmental legislative framework for environmental management. According to this section: "Everyone has the right: to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that- Prevent pollution and ecological degradation; Promote conservation; and Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development
National Environmental Management Act 1998, (Act No. 107 of 1998)	Green Gold Group has been appointed to conduct an Environmental Impact Assessment for the proposed project in line with EIA Regulations 2014 as amended, of NEMA. Submission of BAR and EMPR to the CA as required by NEMA.
National Environmental Management: Waste Act 2008, (Act No. 59 of 2008)	The Waste Act regulates waste management in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation. This Act is applicable to the proposed project as the waste generated throughout the project's phases must be handled and disposed of in terms of this Act.

APPLICABLE LEGISLATION AND GUIDELINES	REFERENCE WHERE APPLIED
Hazardous Substances Act 1973 (Act No.15 of 1973)	The Act provides for the control of substances which may cause injury, ill-health or death of human beings because of their toxic, corrosive, irritant, strongly sensitizing or flammable nature. The proposed project will require storage of hazardous substances in larger quantities.
National Road Traffic Act (Act No 93 of1996)	A special permit may be required for vehicles transporting hazardous materials. All related traffic regulations must be adhered to according to traffic laws stated within the Nation Road traffic Act.
National Environmental Management Air Quality Act (No. 39 of 2004);	The management of air quality in South Africa is legislated under the National Environmental Management: Air Quality Act, Act No. 39 of 2004 (NEM: AQA), the applicable South African National Standards (SANS) for common air pollutants and monitoring guidelines published in SANS 1929:2004. Section 32(b) of the NEM: AQA states that the minister may prescribe steps to be taken to prevent dust nuisance. The power station has air emission licence (AEL) and the proposed DFGC plants are aimed at reducing the power emissions so that they comply with emission limits set out in the AEL.
National Heritage Resources Act (Act No 25 of 1999)	The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 hectares (ha) and where linear developments exceed 300 meters in length. A Heritage Impact Assessment (HIA) report has been prepared in terms of Section 38 of the

APPLICABLE LEGISLATION AND GUIDELINES	REFERENCE WHERE APPLIED
	National Heritage Resources Act (25 of 1999) for the proposed project. The HIA is a precaution taken to make sure that the proposed development does not impact heritage resources that might occur in the footprint of the development.
Occupational Health and Safety Act (No 85 of 1993)	The Act regulates all health and safety related activities undertaken in any workplace to ensure that employees health and safety is prioritised while they are performing their duties.

6 MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED DEVELOPMENT

6.1 Environmental and Health Motivation

A DFGC test plant was installed at Tutuka Power Station and the effectiveness of this technology was tested on unit six on-site for six months. The results show that an average reduction of 23% in particulate matter emissions was achieved. The NEM:QA currently stipulates that the SO_2 emissions limit for existing plants is 3,500mg/Nm3 at 10% O_2 by 31st March 2015, and 500mg/Nm3 at 10% O_2 by 1st April 2020. The Eskom Air Quality Strategy currently stipulates that emissions should comply with 20% below legislated SO_2 emissions limit. This relates to a required compliance of 2800mg/Nm3 at 10% O_2 by 2015, and 400mg/Nm3 at 6% O_2 by 2020.

The DFGC plants proposed for the power station will reduce the PM emissions only. This brings the emissions to below the environmental protection threshold and reduces the impacts of the power station on the environment.

6.2 Socio-Economic Motivation

The Tutuka Power Station is fully owned by Eskom. The AEL has set emission limits which the power station is currently exceeding. The production plan for the future shows a reduction in output and not an increase. Without installation of DFGC plants or alternative technology to reduce emissions, Eskom is at the risk of being penalized for their transgressions. Since Eskom is an essential service provider, it is unlikely that their Tutuka Power Station will be suspended and AEL revoked, this will set a precedence for other heavy industries who are doing their utmost best to keep their emissions below prescribed limits.

In an unlikely event that Tutuka Power Station AEL is revoked and the power station is ordered to shut down due to non-compliance, consequences will be dire. Electricity brown-outs and black-outs have considerable social effects, which are most devastating on the low-income populations. These include compromise of health and safety to vulnerable communities. Furthermore, the loss of consistent electricity supply has massive repercussions on industry and economics of the country. Short and medium-term unreliable electricity supply may have devastating impacts to large and small

businesses due to loss in production and damage to equipment. This in turn will have a definite implication on our country's economy.

The reduction in PM emissions by the DFGC will help Eskom meet their environmental legal obligations and allow for smooth-running of the station without having to deal with litigations.

6.3 **Need and Desirability**

In accordance with the Regulation 31(2)(f) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulations published in Government Notice No. R.327, of 2014 as amended this part of the Environmental Impact Report provides a detailed account of the Need and Desirability of the proposed installation of a dual flue gas conditioning at Tutuka power station.

In considering the need and desirability of the proposed project, the strategic concept of the project along with the broader societal needs and public interest has been taken into account. In the Guideline on Need and Desirability (DEA, 2010) a number of questions formulated to guide the identification of the Need and Desirability of a proposed development are provided. The information provided in Table 6 affords answers specific to the project at hand for each of the guiding questions contained in Section 5 of the Guideline on Need and Desirability (DEA, 2010).

Table 6: Suitability and Compatibility Assessment

Indicator			Explanation
1. Is the activity permitted in terms of the property's existing land use rights?	YES√	NO	There is no change to the existing land-use.
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES√	NO	There is no change to the existing land-use.
(b) Urban edge / Edge of Built environment for the area	YES√	NO	There is no change to the existing land-use.
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES√	NO	There is no change to the existing land-use.
(d) Approved Structure Plan of the Municipality	YES√	NO	The proposed development is in line with the approved structure plan.
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES√	NO	The environmental authorisation process being carried out will ensure that the development does not harm protected areas identified in the EMF.
(f) Any other Plans (e.g. Guide Plan)	YES	NO√	None identified

3. Is the land-use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES√	NO	The proposed activity is in line with both the SDF and IDP of the Municipality
4. Does the community/area need the activity and the associated land-use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES√	NO	The activity will reduce the air pollutant emissions into the ambient air and enables Eskom to provide a more efficient service which will benefit the community in a positive manner.
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	YES√	NO	The necessary services with adequate capacity are currently available and no additional capacity needs to be created in order to cater for the development.
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	YES√	NO	The costs associated with the development will be carried by the Applicant.

7. Is this project part of a national programme to address an issue of national concern or importance?	YES√	NO	The project will be used to reduce the emission of air pollutants into the atmosphere and enable Eskom to operate more efficiently.
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES√	NO	There will not be any changes to the current land-use and zoning.
9. Is the development the best practicable environmental option for this land/site?	YES√	NO	Existing emission reduction at the powers station have failed to reduce emissions below licensed limits, this option will reduce emissions by further 23%.
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES√	NO	There is minimal impact on the environment in the long run, whereas positive impacts benefit the environment for the lifetime of the development.
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES	NO√	The proposed project will not result in positive impacts.

12. Will any person's rights be negatively affected by the proposed activity/ies?	YES	NO√	No, the land is owned by the Applicant and their operations have been monitored and compliant adjacent landowners have not raised concern. The activity reduces the air pollutants into the atmosphere which has a positive impact on the environment.
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO√	The activity is within the power station area.
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES√	NO	More efficient delivery of energy with reduced emissions.
15. What will the benefits be to society in general and to the local communities?			
• 60 Job opportunities will be created during installation phase. • Indirect benefits will include stimulation of economic activity through effective infrastructure development. • Reduction in the emission of particulate matter (PM_{10} and $PM_{2.5}$).			
16. Any other need and desirability considerations related to the proposed activity?			
This new technology reduces emissions and this provides a cleaner atmosphere for the community.			
17. How does the project fit into the National Development Plan for 2030?			**N/A**
Combating the effects of climate change by reducing our emissions. This new technology has been proven to reduce emissions of the plant by 23% without affecting output.			
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.			

Section 23 of NEMA promotes the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities. This Basic Assessment Report and the accompanying EMPR have been used to identify sensitive areas that could potentially be affected negatively by the proposed project. These tools were also used to ensure that future needs and future developments will not be compromised by the proposed project. The proposed development will have minimal negative impacts on the environment.
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.
The following factors were taken into consideration during planning phase of the project: • Need and desirability of the project as discussed in this section • An environmental impact study is being conducted to ensure that the project has minimum impact on the biophysical environment. • By engaging the public in the development of the project through comprehensive public participation process, the developer is promoting an integrated approach to the project where social, environmental and socio-economic benefits of the project will be maximised.

7 PROVISION AND MANAGEMENT OF SERVICES

7.1 Solid Waste Management

The activity will produce limited domestic waste during the installation phase which will happen over a period of 18 months approximately. The waste will be managed by the Contractor as per the waste management guideline provided in the EMPR. Before works commence, the Contractor will be required to submit Waste Management Plan (WMP) to the Contractor Environmental Officer (CEO) for approval.

Waste that can neither be re-used nor recycled shall be disposed of at a registered landfill site and proof thereof kept in their environmental file. Domestic waste that will be produced by workers during the installation phase shall be collected in suitable refuse bins for disposal at a registered landfill site. Construction solid waste, if any, will be collected in skips and disposed of later at a registered landfill site within the Lekwa municipal area.

During operational phase,
Once the site has been handed over to Eskom, Eskom shall be in charge of waste management of their site.

7.2 Water use

Potable water for consumption by workers will be provided by the power station from their existing potable water reticulation system.

7.3 Energy use

The energy will be provided to the construction site using the existing power station electricity supply. Heavy duty machinery will be powered by diesel generator. Smaller generators will be used for other machinery.

The power station electricity supply has enough capacity to accommodate proposed plant.

8 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE RECEIVING ENVIRONMENT

8.1 CLIMATE

The climate for the Tutuka site has been derived from climatic data summarised from Standerton, located about 22 km south-west of Tutuka Power Station. The area receives about 650- 750 mm of rain on average per year. From May to September, rainfall is minimal, with most rainfall occurring from late October to March, peaking between November and January. Temperatures in summer peak during December and January at a daily average of 26°C, with an average of 17°C for June. During July, night temperatures are on average -1°C, with frosts during winter being common.

8.2 TOPOGRAPHY

The site is relatively flat to slightly undulating. Within close proximity of the site are several valley floor wetlands (Vlei), of which one has been expanded to form a dam for farming purposes. There a few wetlands (Vlei) and water courses surrounding the power station but the area is relatively flat.

8.3 SOILS AND GEOLOGY

Soils

The soils occurring in the study area are mostly dark brown to black, they are moderate to strongly structured shirk-swell (Montmorlinite) clay soils on weathering rock. In the lower landscape positions, the subsoil is grey and mottled, showing signs of wetness (Arcadia form). Brown, weakly structured, sandy clay loam topsoil over hard (occasionally weathering) (Mispah soil form) and Brown to grey-brown, weakly structured, sandy clay loam topsoil on brown, moderately structured clay subsoil on grey, mottled gleyed clay. In the lower parts, the gleyed subsoil occurs closer to the surface, with signs of wetness (Sepane form).

Geology

The geology of the study area consists of extensive dolerite intrusions into the sandstone and shale of the Vryheid Formation of the Karoo Sequence (Geological Survey, 1984). The dolerite occurs mainly in the east, with the sandstone and shale occurring in the west and north. The identified sites are completely underlain by rocks of the Early Permian Vryheid Formation.

8.4 **HYDROLOGY**

Surface water and Groundwater

The Lekwa Local Municipality is situated within the Upper Vaal Water Management Area. The Vaal River flows through the municipal area, and forms part of the southern and eastern boundary of the municipality. The Grootdraai Dam, situated upstream of Standerton, is a major impoundment within the upper Vaal system, and is primarily used for flow attenuation and water supply (Lekwa LM, 2008).

The site falls within the Vaal River primary catchment. The power station precinct falls within quaternary catchment C11K whilst the ash dump falls within quaternary catchment C11L. The tributary originating near the power station precinct feeds westwards into the Leeuspruit River which flows northwards away from the Grootdraai Dam. The Leeuspruit River, as well as its tributary, ia a perennial river with a Present Ecological Status (PES) of Class C: Moderately Modified and is considered as Critically Endangered.

8.5 **BIODIVERSITY**

Fauna

There are a number of amphibians, reptiles and mammal species of conservation concern that could occur in the study area according to various existing databases (SANBI, ADU) and Apps (2000). These are discussed below.

Amphibians, Reptiles and Mammals

A small herd of Hartebeest and Eland are being kept within the Tutuka Power Station fenced portion, and were recorded roaming on the study area. During the site visit, antelopes were spotted within the power station.

Species of conservation concern

The red data species presented in Table 7 have been recorded from the area (2827) according to the red list data species list of SANBI and the ADU database:

Table 7 Red data faunal species list of SANBI and the ADU database (2827)

Species	RD Status	Suitable Habitat	Possibility of being present	Threat
Giant Girdled Lizard	VU	Grassland	Slight	Habitat destruction
Giant Bull Frog	NT	Wetlands	Slight	Habitat destruction
Coppery Grass Lizard	NT	Grasslands	Slight	Habitat destruction

8.6 **AIR QUALITY**

The project area is located within the Tutuka Power Station which produces electricity in South Africa. There are numerous sources of pollutant emitters within the power station and the high emissions contribute towards the power station exceeding the limits set within the Atmospheric Emission Licence (AEL). The pollutants emitted by the power station are particulate matter (PM10 and PM2.5), Sulphur dioxide (SO_2) and Nitrogen Oxides (NO_x).

The proposed project will result in positive impact on the air quality around the site as a test plant was used for a period of six (6) months to test the effectiveness of the DFGC on the power station. The results showed that an average reduction of 23% in particulate matter was achieved. The project will reduce the pollutants from the power station and will not produce air pollutants. The cumulative impact on air quality will not be negatively affected by the project which shows its positive impact on air quality.

8.7 **HERITAGE**

Information relating to the heritage, archaeological and palaeontological resources within the proposed study areas was derived from HSA Archaeological and Heritage Services Africa (Pty) Ltd.

HAS prepared Heritage impact Assessment (HIA) Report and Palaeontological Impact Assessment (PIA) Report in terms of Section 38 of the National Heritage Resources Act (25 of 1999) for the proposed installation of a DFGC plants. Both the assessments found nothing of heritage significance that can be expected in the footprint of the proposed DFGC plants. The HIA Report and PIA Report are attached in Appendix D1 and D2 respectively.

8.8 **REGIONAL SOCIO-ECONOMIC STRUCTURES**

The following information was sourced from the Integrated Development Plan ("IDP") Lekwa Local Municipality 2020/2021

Demographics

The Lekwa Local Municipality has a total population of 123 419 people (2016), which is the 6th smallest population and 10.9% of the total population of Gert Sibande District Municipality in 2016. The average population growth rate of the local municipality between 2011 and 2016 was 1.5% per annum- economic growth rate lower than the population growth rate which is negative for the area.

Population Projections: Based on the present age-gender structure and the current fertility, mortality and migration rates, the Lekwa Local Municipality population is projected to grow at an average annual rate of 1.5% from 129 057 in 2018 to 152 022 in 2030.

Gender, Population and Age Profile

Lekwa Local Municipality's male/female split in population was 118.4 males per 100 females in 2016. The Lekwa Local Municipality has significantly more males (54.21%) relative to South Africa (48.93%). This is mainly because of physical labour-intensive industries such as mining located within the Lekwa Local Municipality area. In total there were 289 000 (45.79%) females and 342 000 (54.21%) males within the municipality by 2016.

Unemployment

The unemployed individuals recorded include all persons between 15 and 65 who are currently not working, but who are actively looking for work. It therefore excludes people who are not actively seeking work (referred to as discouraged work seekers). The unemployment rate of Lekwa increased from 22.9% in 2014 to 24.0% in 2017. In 2017, Lekwa's unemployment rate was the 5th lowest among all the municipal areas of Mpumalanga. The unemployment rate for females was 28.8% and that of males was at 24.0%. Youth unemployment rate according to the Census was at 35.2% with the

females having the high youth unemployment rate. There were high concerns about the high unemployment youth and especially females with low level of education and inadequate skill impact negatively on their employability.

9 DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ACTIVITY

9.1 DETAILS OF ALL ALTERNATIVES CONSIDERED

Alternatives in relation to a proposed activity means different means of meeting the general purpose and requirement of the activity. The definition is given in terms of the NEMA Regulations, 2014 (as amended, 2017).

Technology Alternatives

The DFGC technology proposed by Eskom has been tested over a period of six months at the Tutuka Power Station. The plant can use SO_3, NH_3, or combination of the two. Currently there is no conclusive data to suggest which gas is more effective than the other. Sulphur injection is used at all other Eskom sites to reduce PM emissions and is considered as a mature and proven technology. Furthermore, no other alternative technologies were considered.

Site Alternatives

Two sites have been identified as suitable for the storage of chemicals that will be used in the DFGC plant. The storage will be inside the plant and close to the power station generating units. the two areas are in the power station generation footprint, which is considered a brown field without any ecological support function. No other site alternatives were considered since no reasonable environmental impacts would be the same whichever areas are chosen around the power station generating units.

No-go option

In the event that the proposed installation of DFGC is not undertaken, the power station will continue to operate as is and will not adhere to the emission standards which will result in more penalties from the DFFE. This will have a detrimental impact on the health of the workers of Tutuka power station as well as the surrounding environment. The positive economic impacts associated with the creation of employment opportunities, sourcing of local goods and services will not be realised. The installation of the DFGC would have a positive impacts on the environment as it will result in the decrease in the emission of particulate matters into the atmosphere. If the proposed project were not to go ahead then the reduction in emission of particulate matter in the area would not occur.

The bio-physical environment will consequently be affected negatively due to the impacts which may arise from the “no-go” alternative such as the increase in pollutants in the atmosphere which will result in the public inhaling more pollutants. The no-go is not considered feasible.

10 DETAILS OF THE PUBLIC PARTICIPATION PROCESS UNDERTAKEN

10.1 OBJECTIVES OF THE PUBLIC PARTICIPATION PROCESS

The PPP is designed to achieve the following objectives:

- To ensure that I&APs are well-informed about the proposed project;
- To provide I&APs sufficient opportunity to engage and provide input and suggestions regarding the proposed project;
- To verify that stakeholder comments have been accurately recorded;
- To draw on local knowledge in the process of identifying environmental and social issues associated with the proposed project, and to involve I&APs in identifying ways in which these can be addressed; and
- To comply with legal requirements.

10.2 PHASES OF PUBLIC PARTICIPATION

The PPP is designed in three main phases, namely:

- **Basic Assessment phase**
  - ✓ Identification of stakeholders.
  - ✓ Notification of the public of the formal process.
  - ✓ Distribution of a Background Information Document (BID), placement of newspaper adverts and site notices;
  - ✓ Gathering concerns, suggestions and comments from I&APs.
- **Decision Making phase**
  - ✓ With completion of the authorisation process all registered IAPs will be notified of the decision made by the competent authority and will be provided with details should they want to appeal the decision.

10.3 **COMPILATION AND DISTRIBUTION OF PUBLIC PARTICIPATION DOCUMENTS**

The Public Participations Process (PPP) is an integral part of the Basic Assessment process, to inform and involve interested and affected parties. The following documents were compiled and distributed and can be found in **Appendix E**

- Invitation emails sent to stakeholders on the 29th of June 2022 (**Appendix E1**)
- The Background Information Document (BID) emailed to I&APs on the 29th of June 2022 (**Appendix E2**).
- Proof of emails sent to I&APs on the 29th of June 2022 (**Appendix E3**)
- Newspaper Advertisement was published on the 01st of July 2022. (**Appendix E4)**
- Comments and Response Register (**Appendix E5)**
- Site Advertisement placed on the 20th of June 2022 (**Appendix E6**).
- Interested and Affected Parties register was compiled and being updated as additional parties register their interests (**Appendix E7**).

10.4 **SUMMARY OF THE ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES**

Table 8: Comments and Response from Interested and Affected Parties

Interested and Affected Parties	**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**
No written comments have been received from I&APs. (**Appendix E6**)			

11 PROPOSED METHOD OF ASSESSING THE ENVIRONMENTAL IMPACTS

The assessment of the potential impacts is guided by Guideline 5: Assessment of Alternatives and Impacts developed in line with EIA Regulations. The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise from the undertaking of an activity. The findings of impact assessments are used to inform the competent authority's decision as to whether the activity should be authorised, authorised subject to conditions that will mitigate the impacts to within acceptable levels or should be refused.

Different types of impacts may occur from the undertaking of an activity. The impacts may be positive or negative and may be categorised as being direct (primary), indirect (secondary) or cumulative impacts (additional to existing).

Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by construction activities/operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supplies water to a reservoir that supplies water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The first stage of risk/ impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below:

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.

- An **environmental aspect** is an element of an organisation's activities, products and services which can interact with the environment. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.

Impact rating

The significance of the impact is assessed by rating each variable numerically according to the defined criteria. Refer to the Table 1 below. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigations are necessary or not. The assessment of significance is undertaken twice, without mitigations and with mitigations. The assessment criterion is illustrated in Table 6 (a and b) below.

Table 9:Criteria for Assessing Significance of Impacts

a) LIKELIHOOD DESCRIPTORS

PROBABILITY OF IMPACT	**RATING**
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
SENSITIVITY OF RECEIVING ENVIRONMENT	**RATING**
Not sensitive	1
With limited sensitivity	2
Moderately sensitive	3
Highly sensitive	4
Critically sensitive	5

b) CONSEQUENCE DESCRIPTORS

SEVERITY OF IMPACT	**RATING**
Insignificant impact on ecosystem structure and its function remains unchanged	1
Small impact on ecosystem structure and its function is largely unchanged	2
Significant impact on ecosystem structure and its function is moderately altered	3
Great / harmful impact on the ecosystem structure and its function is largely altered	4
Disastrous impact on the ecosystem structure and its function is utterly altered	5
SPATIAL SCOPE OF IMPACT	**RATING**
Activity specific / < 0.5 ha impacted	1
Development specific / within the site boundary	2
Local area / within 1km from the site boundary	3
Regional outside 1 km from the site boundary	4
Entire habitat unit / Entire system / > 5000ha impacted	5
DURATION OF IMPACT	**RATING**
One day to one month	1
One month to one year	2

One year to five years	3
Life of operation or less than 20 years	4
Permanent	5

Table 10:Significance rating matrix

	CONSEQUEENCE (Severity + Spatial Scope + Duration)														
KEHOOD (Probability + Sensitivity)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 11: Positive/ Negative Mitigation Ratings

SIGNIFICANCE RATINGS	VALUE	NEGATIVE IMPACT MANAGEMENT RECOMMENDATION	POSITIVE IMPACT MANAGEMENT RECOMMENDATION
Very high	126-150	Improve current management	Maintain current management
High	101-125	Improve current management	Maintain current management
Medium-high	76-100	Improve current management	Maintain current management
Medium-low	51-75	Maintain current management	Improve current management
Low	26-50	Maintain current management	Improve current management
Very low	1-25	Maintain current management	Improve current management

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the project's area of influence encompassing:
- Primary project site and related facilities that the client and its contractors develop or control;
- Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
- Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

Risks/Impacts were assessed for all stages of the project cycle including:

- Pre-construction
- Construction
- Operational
- Rehabilitation

Mitigation measure development

The following points present the key concepts considered in the development of mitigation measures for the proposed development:

- Mitigation and performance improvement measures and actions that address the risks and impacts are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimization, mitigation or compensation.
- Desired outcomes are defined, and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation.

Recommendations

Recommendations are developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures are developed to address issues in all phases throughout the life of the operation from planning, through construction, operation and closure through to after care and maintenance.

12 SUMMARY OF THE POSITIVE AND NEGATIVE IMPACTS

Potential Environmental impacts associated with the proposed activity are included in the tables below. The complete Impact Assessment is attached as **Appendix F.**

Planning and Design Phase

Table 12:Planning and Design Phase Impacts

Proposed Activities	Potential Impacts
Engineering designs	Design incompatible a non-conducive to the environment Risk of incorrect design and site layout.
Legislative obligations	Non-compliance with legal requirements of national and provincial legislation
Public involvement process	Poor communication and lack of transparency of project information that may lead to conflict.

Construction Phase

Table 13: Installation Phase Impacts

Proposed Activities	Potential Impacts
The storage and use of equipment and hazardous material	Pollution of soils and Groundwater by hydrocarbons and other materials
Installation works.	Non-compliance with regulatory requirements
	Possible incidents and injury to workers due to negligence
	Fire Hazard
	Poor Waste Management littering and hazardous waste
	Socio-economic

	Surface water contamination due to spills from the storage of hazardous goods and leaks from vehicles and indiscriminate waste disposal.
	Disturbance or destruction of sites, features or artefacts of archaeological and/or historical importance.
	Increased ambient dust and exhaust emission generation
Installation of connecting pipes, manholes and installation of a new pump station	There will be emissions into the atmosphere during pipe connections.
Excavation and installation work	Traffic congestion and accidents
	Ambient noise generation

Operational Phase

Table 14: Operational Phase Impacts

Proposed activities	**Potential Impacts**
DFGC maintenance activities	Groundwater pollution due to maintenance activities
Daily Operations of the DFGC	Possible incidents and injury to workers due to negligence.
	Increase in ambient noise levels
	Potential failure of infrastructure: possible leaks from gas pipes or tanks
	Fire hazard
	Increased spread of invasive species

	Soil contamination due to hazardous chemical substances

Rehabilitation Phase

Table 15: Rehabilitation Phase Impacts

Proposed Activity	Potential Impacts
Decommissioning of DFGC units	Waste materials can impact negatively on the station operations
Rehabilitation after decommissioning.	Prevention of erosion and revegetation of surrounding areas

13 CONCLUDING ENVIRONMENTAL STATEMENT

The proposed layout provided in the concept design has been assessed in terms of impacts that could arise during the planning and design, construction, operational and rehabilitation phases of the proposed project.. The site is located within an established power station area which has minimal impacts on environmental aspects as the proposed location area the power station has already been disturbed.

The impacts of the proposed project that have been identified in the planning phase of the development have been mitigated to a very low impact significance. These impacts relate to possible risk associated with non-compliance to legal requirements, incorrect site layout, poor communication and associated harm to the environment due to inadequate planning and design.

The impacts that have been identified in the installation phase relate to legislative requirements, the proposed development footprint, health and safety, of the area have all been mitigated to medium - low impact significance. The impacts identified in terms of risk of pollution (waste disposal) and spillages as a result of construction activities have been mitigated to low impact significance. Impacts that relate to surface and ground water, atmosphere and noise have been mitigated to fall under medium-low and very low significance.

Operational phase impacts associated with the maintenance of the DFGC infrastructure on the surrounding environment have been mitigated to low impact significance. The proposed layout provides many positive socio-economic benefits with high (positive) impact significance that will occur during the operational phase of the proposed development, these impacts include:

- Creation of Jobs and transfer of skills
- Sourcing of local goods and services
- Reduction in emission of particulate matter into the receiving environment which promotes cleaner ambient air quality.

14 RECOMMENDATION FROM ENVIRONMENTAL ASSESSMENT PRACTITIONER

- All exposed soils must be protected for the duration of the construction phase with a suitable covering in order to prevent wind erosion and water erosion carrying sediments into freshwater resources.
- Where feasible, material excavated during trenching for the laying of the DFGC pipelines should be utilised as backfill during rehabilitation
- It is recommended that an internal monthly Audit is to be conducted by the power station to ensure that the facility is in a good condition
- The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment.
- Edge effects of activities need to be actively managed to minimise further impacts to the receiving environment, with specific consideration to erosion control and alien floral species management.
- Restrict vehicles to travelling only on designated roadways to limit the ecological footprint and unnecessary traffic congestion
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced preventing the ingress of hydrocarbons into the soil.

15 MONITORING REQUIREMENTS

- A Contractor Environmental Officer (CEO) must be appointed for the duration the installation period. The CEO will be made sure that the mitigations and recommendations that are stipulated in the BAR and EMPR are implemented.
- The CEO must be on-site daily and all the time during installation hours.
- The EO must be appointed to collect baseline site information before the commencement of installation work and do audit after completion of installation works.
- The CEO must keep record of all activities on site, monitoring programmes, problems identified, transgressions noted and a scheduled of tasks undertaken by the ECO.
- Records relating to monitoring and auditing must be kept on-site and made available for inspection to any relevant and CA in respect of this development.

APPENDIX A: LOCALITY MAPS

APPENDIX B: SITE PHOTOS

APPENDIX C: FACILITY ILLUSTRATION

APPENDIX D: SPECIALIST REPORTS

APPENDIX E: PUBLIC PARTICIPATION PROCESS

APPENDIX F: IMPACT ASSESSMENT REPORT

APPENDIX G: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

APPENDIX H: CURRICULA VITAE OF ENVIRONMENTAL TEAM