KRIEL POWER STATION LIME PLANT UPGRADE

Mpumalanga Province

BASIC ASSESSMENT REPORT

January 2019

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PROJECT DETAILS

Title	:	Basic Assessment Report: Kriel Power Station Lime Plant Upgrade, Mpumalanga Province.
Authors	:	Savannah Environmental (Pty) Ltd Reuben Maroga Gideon Raath Nicolene Venter Jo-Anne Thomas
Client	:	Eskom Holdings SOC Limited
Report Revision	:	Revision 0
Date	:	January 2019

When used as a reference this report should be cited as: Savannah Environmental (2019) Environmental Basic Assessment Report for the Kriel Power Station Lime Plant Upgrade, Mpumalanga.

PURPOSE OF THE BASIC ASSESSMENT REPORT

Eskom Holdings SOC Ltd is proposing the expansion of its existing Cooling Water (CW) Treatment facility at the Kriel Power Station (KPS) situated ~8km west of Kriel, 27km south of Ogies and 34km north-west of Bethal, in the Mpumalanga Province. The project is known as the **Kriel Power Station Lime Plant Upgrade** and will fall within the jurisdiction of the Nkangala District Municipality (NDM) and the eMalahleni Local Municipality (ELM) in the Mpumalanga Province. KPS is an Eskom base load coal fired power station with six units and a generating capacity of 3600MW.

The development will consist of upgrades to the existing Lime Softening Plant with associated infrastructure being added adjacent the Cooling Water Treatment Plant near both the northern and southern sections of the Cooling Towers. The proposed upgrade will be undertaken on the farm, Kriel Power Station 65 IS, occupying a development footprint of 1.96ha within a broader study area of ~ 700ha.

Water for the Kriel Power Station is currently sourced from the Vaal Water Scheme (VWS). The station on average used 180 0000m^3 to 240 0000m^3 between January 2012 and November 2014 as raw water make-up in the Cooling Water system (Mkabane, 2015). The Cooling Water Facility at the station currently uses 88 259 m^3 per day (sourced from multiple sources including the UWS and VWS), and approximately 87 757m^3 per day is lost to evaporation and discharged as effluent to the WWTP and ash water dams (Digby Wells, 2016). Furthermore, 1 193m^3 is discharged as effluent from the cooling water system to the Ash Water Dams. Following the proposed upgrades, the Cooling Water Treatment facility will be able to treat up to 174 000m^3 of cooling water per day and the proposed development has two objectives:

1. Improve the quality of cooling water being discharged to the condensers for cooling through lime treatment. This is needed as the Vaal Water Scheme water quality is much harder compared to the Usutu Scheme water, which results in a higher volume of water required for adequate treatment of the cooling water quality; and
2. Reduce the demand for raw make up water in the Cooling Water system and thus reduce the supply pressure on the Vaal Water Scheme.

The Kriel Power Station can be accessed via the regional roads (R545) and (R547) located to the north-east and east of the power station. The area surrounding the station is of a highly industrial nature and is currently used for power generation and coal mining activities, which is also true of the broader project area and surrounding towns.

As the Cooling Water Treatment Facility will treat ~174 000m^3 of cooling and raw make up water per day, which exceeds the threshold in Listing Notice 1 of the EIA Regulations, 2014 (as amended), Savannah Environmental Pty (Ltd) has been appointed by Eskom SOC Holdings Ltd as an independent environmental consultant to undertake the Basic Assessment (BA) Process for the proposed Kriel Power Station Lime Plant upgrades. The BA process is being undertaken in accordance with the requirements of the EIA Regulations of December 2014 (GNR 326), as amended on 07 April 2017, promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Basic Assessment Report aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of the proposed development (including design, construction, and operation and decommissioning) within the broader study area through a desktop review of existing baseline data.
» Define the scope of studies to be undertaken within the Basic Assessment process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the Basic Assessment process.

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

An overview of the contents of the Basic Assessment Report, as prescribed by Appendix 1 of the 2014 EIA Regulations (GNR 326) as amended; and where the corresponding information can be found within the report is provided in **Table 1.**

Table 1: Legal requirements in terms of the EIA regulations

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE BASIC ASSESSMENT REPORTS	Cross-reference in this Basic Assessment Report
A Basic Assessment Report must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-	
(a) Details of – (i) The EAP who prepared the report. (ii) The expertise of the EAP, including a curriculum vitae.	Chapter 1 Section 1.5 Appendix A
(b) The location of the activity, including – (i) The 21 digit Surveyor General code of each cadastral land parcel. (ii) Where available, the physical address and farm name. (iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	Chapter 3 Section 3.4 Table 3.1
(c) A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken. (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Chapter 3 Section 3.3.2 Figure 3.7
(d) A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered. (ii) A description of the activities to be undertaken, including associated structures and infrastructure.	Chapter 2 Section 2.2.1 Table 2.1 Chapter 3 Section 3.1-3.5 Section 3.4.1
(e) A description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.	Chapter 2 Section 2.2-2.4
(f) A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location. (g) A motivation for the preferred site, activity and technology alternative.	Chapter 3
(h) A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –	
(i) Details of all the alternatives considered.	Chapter 3 Section 3.3

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE BASIC ASSESSMENT REPORTS			Cross-reference in this Basic Assessment Report
	(ii)	Details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	Chapter 4 Section 4.4
	(iii)	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Chapter 2 Section 2.5.3
	(iv)	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Chapter 3
	(v)	The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts – (aa) Can be reversed. (bb) May cause irreplaceable loss of resources. (cc) Can be avoided, managed or mitigated.	Chapter 6
	(vi)	The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	Chapter 6 Section 6.2
	(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Chapter 6 Section 6.3
	(viii)	The possible mitigation measures that could be applied and level of residual risk.	Chapters 5 and 6 Section 6.3 and 7.3
	(ix)	The outcome of the site selection matrix.	N/A
	(x)	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	Chapter 3 Section 3.3.2
	(xi)	A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Chapter 8 Section 8.6
(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.		Chapter 8
(j)	An assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated.		Appendix D
(k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 of to these Regulations and an indication as to how these findings and recommendations have been included in this Report;		Specialist studies were not undertaken for the proposed development, as the project site is located within a severely modified area (brownfields site), within the existing Kriel Power Station grounds
(l)	An environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment;		Chapter 6 Section 6.5

	EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE BASIC ASSESSMENT REPORTS	Cross-reference in this Basic Assessment Report
	(ii) a map at an appropriate scale of which superimposes the proposed activity and its associated structures and infrastructures on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative and risks of the proposed activity and identified alternatives.	
(m)	Based on the assessment and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr	Appendix D
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Appendix D Chapter 6 Section 6.6
(o)	A description of any assumptions, uncertainties, and gaps of knowledge which relate to the assessment and mitigation measures proposed.	Chapter 2 Section 2.2
(p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if it the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Chapter 6 Section 6.5-6.6
(q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Appendix D
(r)	An undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	Appendix F
(s)	Where applicable, details of the financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.	The proposed development does not require financial provision in terms of section 24P of NEMA (as amended) as it is not a mining development.
(t)	Any specific information that may be required by the Competent Authority.	None
(u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Chapter 2, 3, 4, 5 and 6.
2.	Where a government notice gazetted by the Minister Provides for any protocol or minimum information requirement to be applied to a scoping report, the requirements as indicated in such notice will apply.	The proposed development only requires the BA process, thus a Scoping Report is not included.

INVITATION TO COMMENT ON THE DRAFT BASIC ASSESSMENT REPORT

This **Draft Basic Assessment Report** has been prepared by Savannah Environmental in accordance with the requirement of the EIA Regulations of GNR326 (as amended on, 07 April 2017). The Draft Basic Assessment Report has been made available for public review at the following places, which lie in the vicinity of the proposed project area from **18 January 2019-18 February 2019**

- Kriel Power Station Reception, Ogies Road, Kriel, Mpumalanga.
- Kriel Public Library, Corner Quintin and Heinrich St, Kriel, Mpumalanga.

The report is also available for download on:

- www.savannahSA.com

Please submit your comments to
Nicolene Venter of **Savannah Environmental** PO Box 148, Sunninghill, 2157 Tel: 011 656 3237 Fax: 086 684 0547 Email: publicprocess@savannahsa.com
The due date for comments on the Draft Basic Assessment Report is **18 February 2019**

Comments can be made as written submission via fax, post or e-mail.

EXECUTIVE SUMMARY

Background

Eskom Holdings SOC Ltd is proposing the expansion of its existing Cooling Water (CW) Treatment facility at the Kriel Power Station (KPS) situated ~8km west of Kriel, 27km south of Ogies and 34km north-west of Bethal, in the Mpumalanga Province. The Lime Treatment Plant upgrades are proposed on the Farm Kriel Power Station 65 IS which is situated within the eMalahleni Local Municipality (one of the six (6) LMs within the Nkangala District). The proposed upgrades will occupy a development footprint of ~1.96ha. Furthermore, the project is to be known as the Kriel Power Station Lime Plant Upgrade (see **Figure 1.1, 1.2, 1.3 and 1.4**).

The purpose of the proposed Lime Treatment Plant upgrades would be to increase the treatment capacity on both plants, located on the northern and southern sections of the four (4) cooling towers at the station. Therefore, this will improve the quality of the cooling water being recycled back to the condensers for cooling by treatment of an adequate amount of concentrated cooling water (CCW) for hardness removal. In addition, another objective is to reduce the demand for raw make up water currently supplied by the Vaal Water Scheme (VWS).

The main infrastructure associated with the Lime Treatment Plant upgrades includes the following:

- Two additional clarifiers to each side with a capacity of 1750m$^{3;}$
- Pipelines (500m x 600mm) to tie in the clarifiers to the existing Lime Treatment plants; and
- Dilution feed water pumps.

Potential impacts associated with the upgrades of the Kriel Power Station Lime Treatment plants are expected to occur during both the construction, operational and decommissioning phases. The conclusions of the BA Process undertaken identified, no fatal flaws, no-go areas or areas of environmental sensitivity within the project site. The following provides a summary of environmental impacts associated with the proposed Lime Treatment Plant upgrades:

- *Impacts on Vegetation:* During the construction phase, vegetation will be cleared to prepare the site for the establishment of the clarifiers and associated infrastructure. Mitigation measures in accordance with the EMPr will be implemented on an on-going basis.

- *Soil Compaction and Erosion Impacts*: The excavation and removal of foundations during the construction and decommissioning phase will increase the likelihood of soil erosion and compaction impacts.

- *Impacts on Air Quality:* The proposed expansion of the lime plants will generate dust emissions which will be suppressed in accordance with the mitigation measures provided in the EMPr.

- *Socio-economic aspects:* The construction of the Kriel Power Station Lime Treatment Plant upgrades will result in the creation of employment and business opportunities for local SMEs and unemployed residents within the surrounding communities.

- *Waste impacts: It is anticipated that during the construction phase, waste will be generated and will be disposed of at a licensed waste disposal facility.*

- *Traffic Impacts: During the construction, operation and decommissioning phases, an increase in vehicular movement is expected* inside the station.

The BA Process undertaken by the environmental assessment practitioner (EAP) to assess both the benefits and negative impacts anticipated as a result of the proposed Kriel Power Station Lime Plant upgrades, conclude that there are **no environmental flaws** that should prevent the proposed development from proceeding,

provided that the recommended mitigation and management measures are implemented.

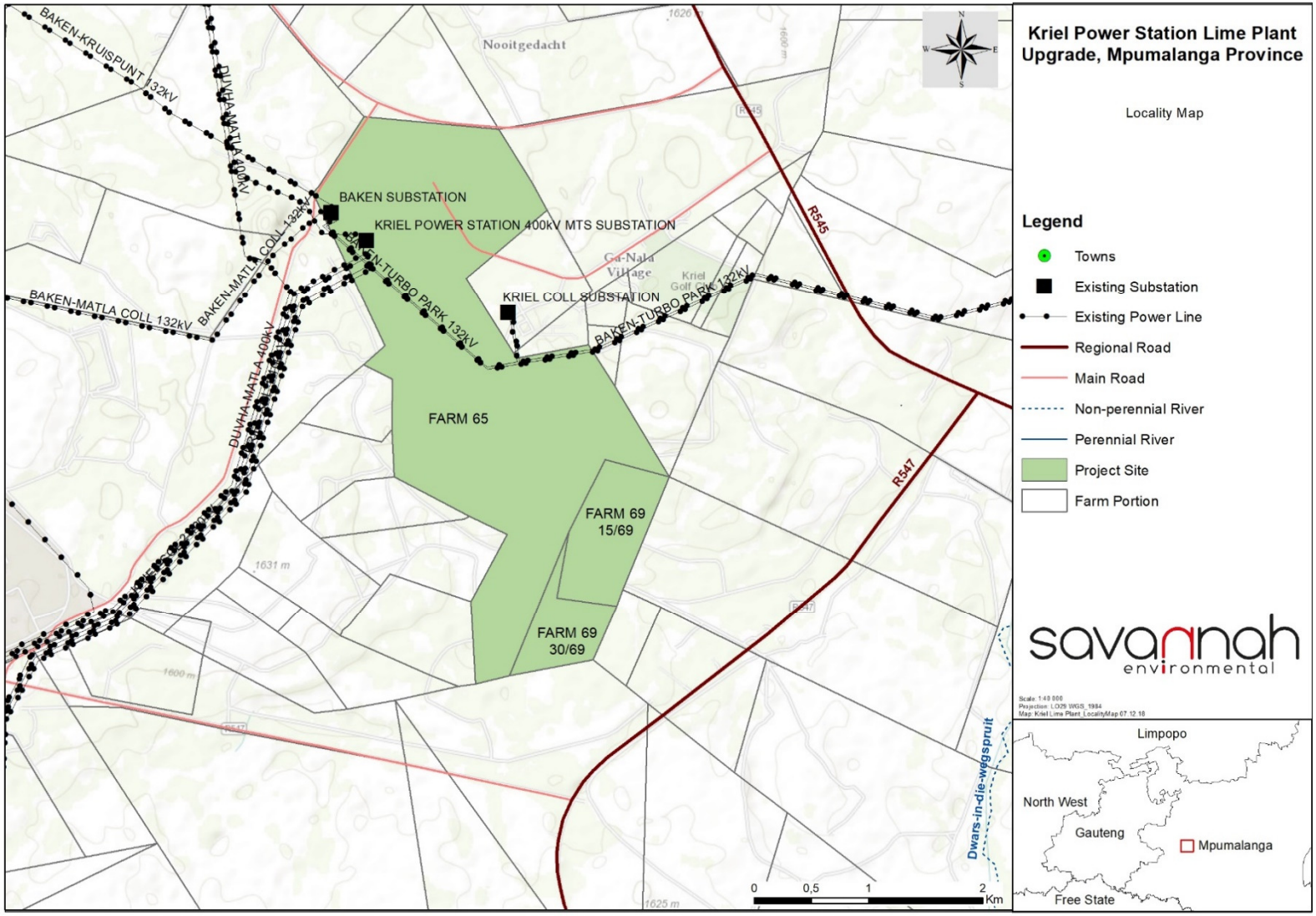

Figure 1.1: Locality map showing the area proposed for the establishment of the Lime Treatment Plant upgrades within the Kriel Power Station.

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Blowdowns: water intentionally wasted from a boiler to avoid concentration of impurities during continuing evaporation of steam. The water is blown out of the boiler with some force by steam pressure within the boiler.

Clarifier: settling tanks built with mechanical means for the continuous removal of solids being deposited by sedimentation. A clarifier is generally used to remove solid particulates or suspended solids from liquid for clarification and (or) thickening.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Commissioning: Commissioning commences once construction is completed.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

Corrosion: a natural process, which converts a refined metal to a more chemically-stable form, such as its oxide, hydroxide, or sulphide.

Cumulative impacts: 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 and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Dezincification: a form of corrosion and weakening of brass objects in which zinc is dissolved out of the brass alloy.

Direct impacts: 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 blasting 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.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' (no-go) alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Effluent: liquid waste or sewage discharged into a river or sea.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations and in relation to an application to which scoping 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.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Flocculant: chemicals that promote flocculation by causing colloids and other suspended particles in liquids to aggregate, forming a floc. Flocculants are used in water treatment processes to improve the sedimentation or filterability of small particles

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply 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 because of the activity.

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 public.

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigation: the stage of the EIA process when measures are identified to avoid, minimise or remedy impacts. These measures are implemented as part of the process of impact management, together with any necessary adjustments to respond to unforeseen impacts

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

ABBREVIATIONS AND ACRONYMS

BA	Basic Assessment
COC	Cycle of Concentration
CWT	Cooling Water Treatment
DAFF	Department of Forestry and Fishery
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
ELM	eMalahleni Local Municipality
EMPr	Environmental Management Programme
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km^2	Square kilometres
km	Kilometres
KPS	Kriel Power Station
kV	Kilovolt
m^2	Square meters
m^3	Cubic meters
MDEDET	Mpumalanga Department of Economic Development and Tourism
MW	Mega Watt
NDM	Nkangala District Municipality
NDMSPDF	Nkangala District Municipality Spatial Development Framework
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SOC	State Owned Company
SDF	Spatial Development Framework

TDS	Total Dissolved Solids
UWS	Usuthu Water Scheme
VWS	Vaal Water Scheme
WWTP	Waste Water Treatment Plant

APPENDICES LIST

CHAPTER 1: INTRODUCTION

Eskom Holdings SOC Ltd is proposing the expansion of its existing Cooling Water (CW) Treatment facility at the Kriel Power Station (KPS) situated ~8km west of Kriel, 27km south of Ogies and 34km north-west of Bethal, in the Mpumalanga Province. The project is known as the **Kriel Power Station Lime Plant Upgrade** and will fall within the jurisdiction of the Nkangala District Municipality (NDM) and the eMalahleni Local Municipality (ELM) in the Mpumalanga Province. KPS is an Eskom base load coal fired power station with six units and a generating capacity of 3600MW.

The proposed development (for authorisation) will consist of an upgrade to the existing Lime Softening Plant with associated infrastructure being added onto the Cooling Water Treatment Plant on both the northern and southern sections of the Cooling Towers. The proposed upgrade will occur on the farm Kriel Power Station 65 IS, occupying a development footprint of 1.96ha within a broader study area of ~ 700ha.

The project site has been identified within the Kriel Power Station within which the proposed Lime Plant upgrade will be located. The project site is considered to be a brownfields site as it has been modified by numerous industrial and mining developments prominent in the area, and is entirely located within the boundaries of the existing Kriel power station (immediately between the northern and southern cooling towers) (refer to **Figure 1.3, 1.4** and **Table 1.1**).

The Kriel Power Station currently utilises six boilers to produce steam that drives turbines which eventually generate electricity, this process is best known as the Rankine Cycle (refer to **Figure 1.1**). In a Rankine Cycle power plant, water is boiled to create steam, which then spins turbines to generate electricity. The heat used to boil water comes from the burning of coal. Once steam has passed through a turbine, it must be cooled back into water before it can be re-used in generating more electricity.

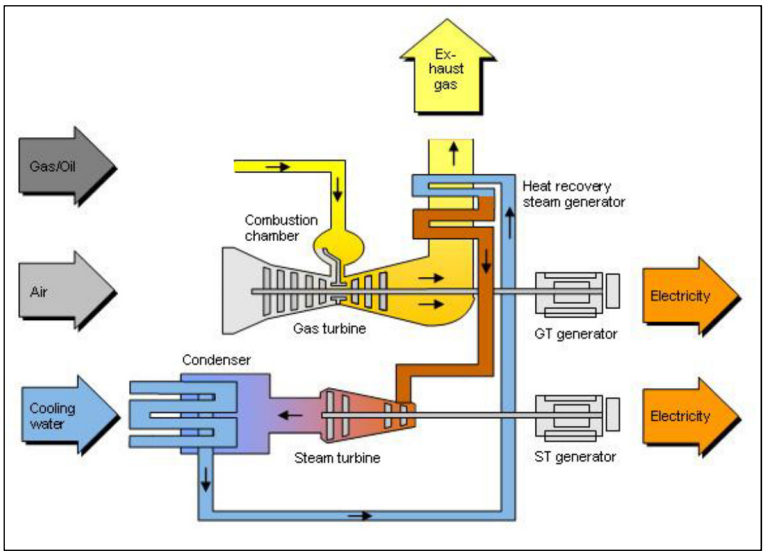

Figure 1.1: Schematic diagram illustrating the Rankine Cycle

KPS currently operates on the 'open evaporative system or wet-recirculating system', where steam used in the turbine is recovered by condensation. The system utilises raw water as a coolant and during condensation, the temperature is decreased through exposure to ambient air in the cooling towers. Some of the water is lost to evaporation and the remaining water will contain an increase in concentrations of impurities. This water, called 'hot duct', has high alkalinity ('hard water') and is softened in the Lime Plant to reduce scaling potential in the condensers (Mkabane, 2015). Scaling causes a vastly reduced operational capacity by precipitating and settling within the pipes and reducing the pipe throughput, as well as increasing maintenance requirements and costs.

Previously the CWT facility at the KPS proved to be effective in treating water cooling water and effluent water, but only through continuous process optimisation. In 2006, the raw water source for the facility was changed from the Usutu Water Scheme (UWS) to the Vaal Water Scheme (VWS) supply. The Waste Water Treatment Plant at KPS (WWTP) experienced challenges as it was not designed for the VWS water quality, which is more abrasive and extremely turbid when compared to the Usutu Scheme. This prompted KPS to repair and upgrade their current Lime Softening Plant, as this is the only feasible means of treating the process water on site to within acceptable levels, for continued use of the VWS supply in their operations.

In anticipation of increased supply of harder water from the VWS, a study was conducted to determine the dosage rates required for the proposed development. The findings of the study revealed that the lime dosage rate of 23 tons/day with a treatment capacity of 174 000m^3 /day is required. The current lime dosage rate is 13.72 tons/day with a treatment capacity of 81 000m^3/day. Therefore, the deficiency in cooling water treatment is an additional 93 000cm^3/day with a dosage rate of 10 tons/day. In order for KPS to meet the Eskom Chemistry Standard for Cooling Water when supplied with Vaal water at their current dosage of 13.72 tons/day, the station is required to supplement the lime treatment plant with additional sulphuric acid hence the need for this project.

The treatment of raw water at the WWTP produces by-products called effluents. Effluent water is released to the Ash Dams at the KPS. The water is characterised by high levels of total dissolved solids (TDS) which cause corrosion in the WWTP infrastructure (i.e. pipes). KPS generates effluent of approximately 3 000m^3 /day to 4 000m^3/day with 5 000m^3/day being the maximum effluent output from different streams excluding sewage coming from the pre-treatment plant.

The Lime Plant Upgrade at the KPS will be developed on the northern and southern sections of the Cooling Towers and will have a combined treatment capacity of 174 000m^3. As a result, the proposed development will reduce the amount of raw water required in the CW system reducing the supply pressure on the Vaal Water Scheme supply. Therefore, the three main objectives of the Lime Plant Upgrade include the following:

1. Improving and reducing the quality and quantity of water discharged to the Ash Dams;
2. Increasing the treatment and recovery of effluent through the process of Lime Softening at the WWTP; and
3. Reducing the demand for raw water in the cooling system, therefore reducing supply pressure on the Vaal Water Scheme supply.

The proposed upgrades of the Lime Plant (see **Figure 1.2**, and **1.4**) will increase the throughput capacity of the WWTP to approximately 174 000m^3 of hard water per day. As a result, this project has a likelihood of

having an impact on the environment and a Basic Assessment reporting (BAR) process is required to be completed in support of an application for Environmental Authorisation (EA) before the commencement of the construction and operational phases of this project.

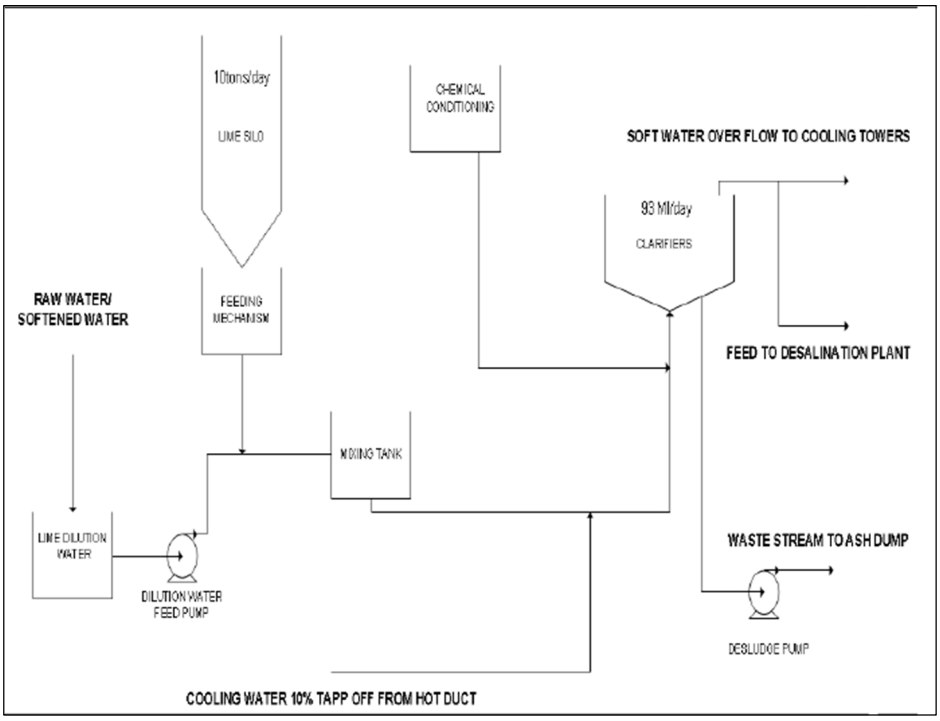

Figure 1.2: Summary of the Process Flow diagram of the Lime Softening Treatment Process to be used at the Kriel Power Station.

The nature and extend of the Lime Plant Upgrade, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases of a facility of this nature are explored in detail in this Basic Assessment report. Site specific environmental issues and constraints are considered in this report in order to test the environmental suitability of the preferred project site for the Lime Plant Upgrade.

The Basic Assessment phase addresses those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts. The Basic Assessment Report aims to provide the DEA with sufficient information to make an informed decision regarding the project.

This Basic Assessment Report consists of the following sections:

- **Chapter 1** provides background to the project and the BA process, a summary of the recommendations and conclusions, and the details of the Environmental Assessment Practitioner (EAP) conducting the Basic Assessment process.
- **Chapter 2** outlines the legal and regulatory context and the public participation process.
- **Chapter 3** provides a description of the project, including feasible alternatives considered, and the need and desirability of the project.
- **Chapter 4** describes the existing biophysical and socio-economic environment within and surrounding the project development footprint.

- **Chapter 5** provides an assessment of the potential issues and impacts associated with the Kriel Power Station Lime Plant Upgrade and presents recommendations for mitigation of significant impacts.
- **Chapter 6** presents the conclusions and recommendations based on the findings of the BA process.
- **Chapter 7** provides a list of reference material used to compile the BA Report.

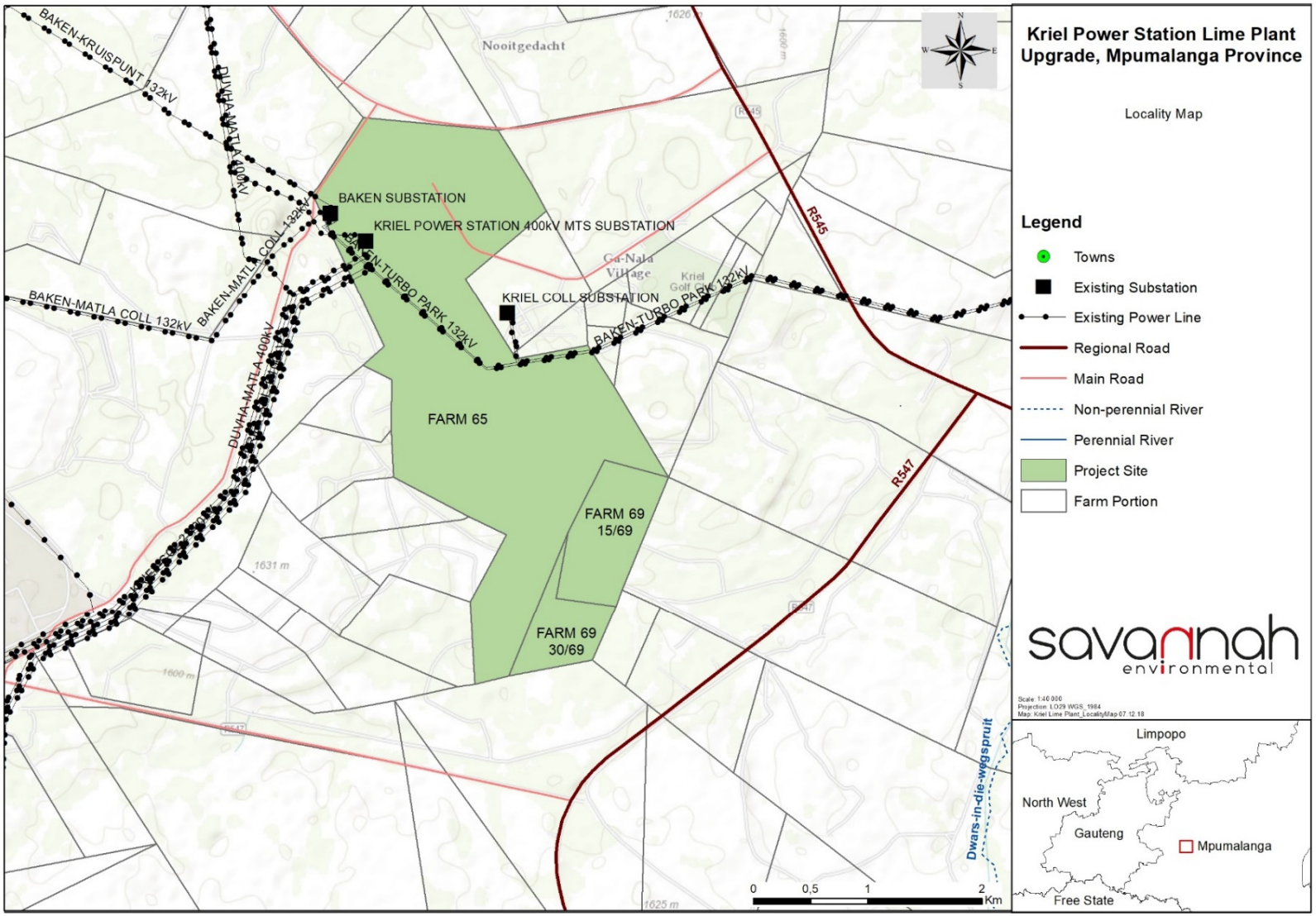

Figure1.3: A locality map showing the proposed project site for the Lime Plant upgrades and the surrounding environment

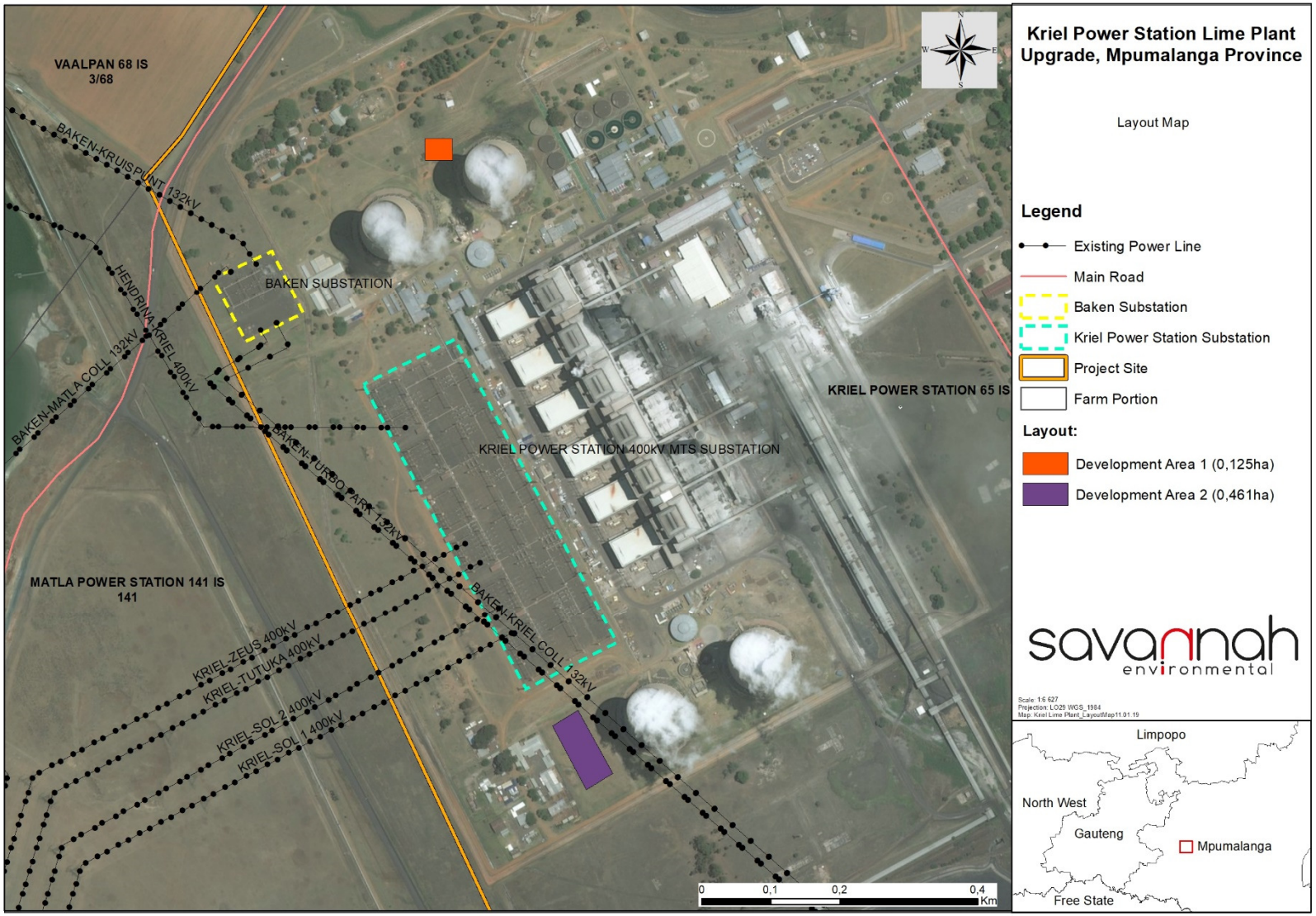

Figure 1.4: Site layout map showing the proposed development areas for the Lime Treatment upgrades at the Kriel Power Station.

1.1 Requirements for an Environmental Impact Assessment Process

The construction and operation of the Kriel Power Station Lime Plant Upgrade is subjected to the requirements of the EIA Regulations, 2014 (as amended on 07 April 2017), published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. NEMA is the national legislation that provides for the environmental authorisation of certain controlled activities known as, "listed activities". In terms of Section 24(1) of NEMA, the potential impacts on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the Competent Authority (decision-maker) charged by NEMA with the granting of an environmental authorisation.

In terms of the regulations promulgated by Sections 24 and 24D of NEMA, various aspects of the proposed project are listed as activities that may have a detrimental impact on the environment. The main listed activity triggered by the proposed facility is Activity 57 of Listing Notice 1 (GN R 327), which relates to the expansion and related operation of facilities or infrastructure for the treatment of effluent, waste water, or sewage where a capacity will be increased by 15 000cm^3 or more per day and the development footprint will increase by 1000m^2 or more. Following the proposed upgrades on the two Lime Plants, the facility will have a treatment capacity of 174 000 m^3 and a combined development footprint of 1.96ha.

This Basic Assessment report (hereafter referred to as the BA report) is also undertaken in line with Appendix 1 of the EIA Regulations, 2014 (as amended). Eskom Holdings SOC Limited appointed Savannah Environmental (Pty) Ltd, as the independent environmental consultants to conduct the BA process for the proposed upgrades on the Lime Plants at the Kriel Power Station.

A BA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issues reported on in the BA report as well as dialogue with interested and affected parties (I&APs).

The BA process comprises one phase and involves the identification and assessment of environmental impacts as well as public participation. The process followed in the Basic Assessment involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) and one round of public participation. Following the public review period of the BA report and Environmental Management Programme (EMPr), a final BA report and an EMPr is submitted to the Competent Authority, which includes the recommendations for practical and achievable mitigation and management measures for final review and decision-making.

The need to comply with the requirements of the EIA Regulations ensures that the competent authority is provided with the opportunity to consider the potential environmental impacts of a project early in the project development process. Above all, this enables the competent authority to assess whether the identified impacts can be avoided, minimised or mitigated to acceptable levels.

A site-specific environmental assessment of the Kriel Power Station, and specifically the proposed development footprint has been undertaken during the BA process. A comprehensive and independent environmental study is required in accordance with the EIA Regulations to provide the Competent Authority with sufficient information in order to make an informed decision.

1.2 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This BA report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended in April 2017) promulgated in terms of Chapter 5 of the National Environmental Act (Act No 107 of 1998). This chapter of the BA report includes the following information required in terms of Appendix 1: Content of Basic Assessment reports:

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in section 1.5. The curriculum vitae of the EAP, project team and independent specialists are included in **Appendix A**.
3(b) the location of the activity including (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the Lime Plant Upgrade facility is included in section 1.3, Table 1.1 and Figure 1.3. The information provided includes the 21-digit Surveyor General code of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land zoning.

1.3 Project Overview

Eskom Holdings SOC Limited is proposing the expansion of the existing Lime Plants at the Kriel Power Station in order to conserve water and save operational costs and maintenance expenditure incurred at the station. Eskom Holdings SOC Limited identified the designated locations on the northern and southern sections of the cooling towers as the preferred sites for the proposed development. Both preferred sites have a combined extent of ~1.96ha (allowing sufficient space) and suitable for the development of two 1750m^3 clarifiers and associated infrastructure at each site. The project site is located ~8km west of Kriel (Mpumalanga), with the entire extent of the proposed upgrades located within the Kriel Power Station. The proposed upgrades (with associated infrastructure) are to be constructed within the KPS. Each Lime Plant facility following the upgrades will have a footprint of ~1.96ha.

The Kriel Power Station Lime Plant Upgrades on each site will consist of the following components:

- Two clarifiers on either side of the station each with a capacity of 1750m^3 .
- Pipes (500m x 600mm) to tie in the clarifiers onto the existing lime plants.
- Dilution water feed pumps.

Table 1.1: A detailed description of Kriel Power Station Lime Plant Upgrade site.

Province	Mpumalanga
District Municipality	Nkangala District Municipality
Local Municipality	eMalahleni Local Municipality
Ward number(s)	23
Nearest town(s)	The Kriel Power Station is located ~8km west of Kriel, 27km south of Ogies and 34km north-west of Bethal.
Farm Name(s) & Portion Number (s)	Kriel Power Station 69 IS, Portion 0
SG 21 Digit Code (s)	T0IS00000000006500000
Physical Address	Ogies Road (R 545), Kriel
Current zoning	Agriculture

The land on which the KPS is located is entirely owned by Eskom Holdings SOC Limited and is zoned for agricultural activities. Generally, the development footprint consists of paved areas and cultivated lawns. Due to the site being highly modified, no sensitive ecological species are anticipated to occur in and around the development footprint.

1.4. Objectives of the Basic Assessment Process

Appendix 1 of the EIA Regulations, 2014 (as amended), contains the objectives to be achieved through the undertaking of a BA process. The following objectives have been considered, undertaken and achieved through a consultative process within this BA report for Kriel Power Station Lime Plant Upgrade.

- The identification and consideration of the policies and legislative context associated with the location of the Lime Plant Upgrade and the manner in which the proposed development complies with and responds to the relevant policies and legislative context.
- The identification and consideration of feasible alternatives associated with the Kriel Power Station Lime Plant upgrades that relate to the specific proposed activity, the location of where the development is proposed and the technology considered to be installed and operated.
- The consideration of the need and the desirability of the Kriel Power Station Lime Plant Upgrade considering the alternatives identified, including the desirability for the development within the preferred project sites.
- The identification and consideration of the nature, consequence, extent, duration and probability of the impacts associated with the Kriel Power Station Lime Plant Upgrade, as well as the degree to which the impacts can be reversed, result in irreplaceable loss of resources and be avoided, managed or mitigated.
- Motivation for the preferred project site, proposed activity and technology.

The release of the BA report for a 30-day review period will provide stakeholders with an opportunity to review and provide input in terms of potential issues and concerns that may be associated with the establishment of the Lime Plant upgrades at the KPS. The final BA report for submission to the DEA will consider and incorporate all issues, concerns and responses raised during the review period of the BA report. The DEA will also consider these issues, concerns and responses in their decision-making of the application for Environmental Authorisation.

1.5. Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), Eskom Holdings SOC Limited has appointed Savannah Environmental (Pty) Ltd as the independent Environmental Assessment consultant to undertake the Basic Assessment and prepare the BA report for the Kriel Power Station Lime Plant Upgrade facility. Neither Savannah Environmental nor any of its appointed specialists are subsidiaries of, are affiliated to Eskom Holdings SOC Limited. Furthermore, Savannah Environmental does not have any vested interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in basic assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with WWTP projects.

- **Reuben Maroga**, the principle author of this report. He holds a Bachelor degree in Environmental Management and has 2 years of experience in the environmental field. His key focus is on environmental impact assessments, public participation, environmental management programmes, water use licence applications, as well as ECO work as and when required.

- **Gideon Raath**, the environmental and permitting consultant at Savannah Environmental. Gideon has a Master's degree in Environmental Management and Geography. He has 4.5 years of experience consulting in the environmental field. His competencies are in environmental impact assessments mainly within the renewable energy (wind and solar) sector, as well as for infrastructure (roads, water pipeline and power line) related projects.

- **Nicolene Venter**, Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management and public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

- **Jo-Anne Thomas**, is a Director at Savannah Environmental (Pty) Ltd. Jo-Anne has a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A.**

CHAPTER 2: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policies and legislation applicable to the proposed development and outlines the public participation process followed. In terms of the EIA Regulations of December 2014 published in terms of the National Environmental Management Act (NEMA; No. 107 1998), as amended, the construction and operation of the proposed project is a Listed Activity requiring environmental authorisation via a Basic Assessment process. This Basic Assessment Process for the proposed Kriel Power Station Lime Plant Upgrade is being undertaken in accordance with the Section 24 (5) of the NEMA. The Basic Assessment (BA) Process aims at identifying and describing potential issues associated with the proposed project. This was achieved through an evaluation of the proposed project by the appointed environmental assessment practitioner (EAP). In addition, a consultation process was carried out with the Interested and Affected Parties (I&APs), including the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant organs of state **departments**, ward councillors and other key stakeholders. This chapter serves to outline the process which was followed during the BA process.

2.1 Legal Requirements as per the EIA Regulations for the undertaking of a Basic Assessment Report, 2014 (as amended)

This chapter of the Basic Assessment report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(a) the details of the EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details (including expertise) of the EAP who prepared the EIA Report as well as the supporting Savannah Environmental project team are included in Section 1.5. The CVs of the project team have also been included as **Appendix A**.
3(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted Scoping Report including (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the project site proposed for the development of the Kriel Power Station, is illustrated in Figures 1.2 and 1.3. Details of the project site are included in Section 1.3, Table 1.1.
(d) description of the scope of the proposed activity, including (i) all listed and specified activities triggered and (ii) a description of the activities to be undertaken, including associated structures and infrastructure.	All relevant listed activities triggered by the development of the Kriel Power Station Lime Plant Upgrade and a description of the activities which form part of the development of the project have been included in section 4.2 and Table 2.1.
(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken as part of the BA process for the Lime Plant Upgrade have been described and are included in section 4.4.2.
(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	A summary of the issues raised by I&APs has been included in section 4.6. A Comments and Responses report including all comments and responses has been included in Appendix C8. .
(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives are included in section 4.4.2.

2.2 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this BA process:

- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- It is assumed that the development footprint for the proposed lime plant upgrades identified by the Eskom represents a technically suitable site for the establishment of the lime plant upgrades which are based on the design undertaken by technical consultants for the project.
- This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other waste water treatment alternatives.

2.3 Legal and Regulatory Context

The need to conserve natural water resources is based on national policy and informed by on-going strategic planning undertaken by the Department of Water and Sanitation (DWS). The policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed Kriel Power Station Lime Plant Upgrade.

2.3.1. National Environmental Management Act (No. 107 of 1998)

The National Environmental Management Act (NEMA) provides for environmental governance by establishing principles for decision-making on matters that affect the environment and defines the principles that apply to the organs of states involved in the decision-making process. The Act stipulates the legal and procedural requirements for environmental compliance. Regulations promulgated under the Act defined activities that may not commence without prior approval from the Competent Authority. The Department of Environmental Affairs (DEA) is the competent authority for this BA process and the proposed development requires an authorisation from this Department in accordance with the NEMA (as amended).

The application for Environmental Authorisation (EA) for the Kriel Power Station Lime Plant upgrade is in accordance with the published 2014 EIA Regulations (as amended on, 07 April 2017). In the event that this application is to be considered by a competent authority, the following table (refer to **Table 2.1**) provides the applicable Listed Activities promulgated under the 2014 EIA Regulations (as amended) and ensures that all Listed Activities are considered and assessed in this BA report. In addition, the EIA Regulations (2014, as amended) consist of three (3) categories of activities namely:

- Listing Notice 1 (GN **R327**);
- Listing Notice 2 (GN **R325**); and
- Listing Notice 3 (GN **R324**).

Activities listed under GN R327 require only a BA process whereas those listed under GN R325 undergo the full Scoping and Environmental Impact Reporting Process (SEIR) and activities under GN R 324 only require a BA process if a development will be taking place in an identified sensitive geographical area. The DEA is hereby the competent authority for the proposed Kriel Power Station Lime Plant Upgrade and the activities associated with the upgrades, for which environmental authorisation is required as follows:

Table 2.1: Listed activities triggered according to the 2014 EIA Regulations (as amended on, 07 April 2017)

Activity No(s):	Relevant Basic Assessment Activity(ies) as set out in the Listing Notice 1 (GN R327)	Description of the portion of the Kriel Power Station Lime Plant Upgrade which the Listed Activity relates
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	*The storage capacity and handling of any dangerous goods is not expected to exceed the 500 m^3 threshold.*

Activity No(s):	Relevant Basic Assessment Activity(ies) as set out in the Listing Notice 1 (GN R327)	Description of the portion of the Kriel Power Station Lime Plant Upgrade which the Listed Activity relates
	occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	
27	The clearance of an area of 1 hectares of more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	*The construction phase of the proposed Lime Plant upgrades will involve the clearing of cultivated lawn/grass on both the northern and southern sections of the Cooling Towers at the KPS.*
34	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding- (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or (iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic metres or less per day.	*The proposed development will involve an increment in the treatment capacity of the existing Lime Treatment plants, and the applicant, Eskom SOC Holdings Limited will require a WUL from the DWS. However, no atmospheric emission or waste management licence will be required.*
46 (i)(ii)(a) and (b)	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, return water, industrial discharge, or slimes where the existing infrastructure- (i) has an internal diameter of 0,36 metres or more; or (ii) has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1000 metres in length or (b) where the throughput capacity of the facility will be increased by 10% or more. excluding where such expansion- (aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or (bb) will occur within an urban area.	*The throughput of the Lime Treatment Plant will be increased by more than 10% (from 86 000m^3 to 174 000m^3 per day). However, the proposed pipeline on each side of the lime plants will have a length of 500m and a width of 600mm.*
48 (1)	The expansion of infrastructure or structures where the physical footprint is expanded by 100 square metres or more.	*Both lime plants following the expansion will have a total development footprint of 1.96ha.*

Activity No(s):	Relevant Basic Assessment Activity(ies) as set out in the Listing Notice 1 (GN R327)	Description of the portion of the Kriel Power Station Lime Plant Upgrade which the Listed Activity relates
57	The expansion and related operation of facilities or infrastructure for the treatment of effluent, wastewater, or sewage where the capacity will be increased by 15 000 cubic metres or more per day and the development footprint will increase by 1000 square metres or more.	*The treatment capacity of the Lime Treatment plants will be increased to a total 174 000m³, whereas the proposed development footprint for the two (2) clarifiers and associated infrastructure exceeds 1000 square metres.*
	Listing Notice 3 (GN R324)	
10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters.	*It is expected that during the construction phase, diesel and other lubricants will be stored on site for the duration of the construction phase. In addition, the storage of acid for pH regulation at the treatment plan will exceed this threshold*
12	The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	*During the construction phase of the clarifiers, an area exceeding 1ha will be cleared of vegetation on the station to erect the clarifiers and associated infrastructure.*

2.3.2. National Water Act (No. 36 of 1998)

The National Water Act (No. 36 of 1998) hereafter referred to as the Act, was enacted for the protection and conservation of natural water resources (i.e. rivers, wetlands, estuaries and groundwater) and provides for absolute water rights for basic human needs and aims to secure sustainable development and use of South Africa's water resources. In terms of Section 21 of the Act, the following activities are considered as water uses, which in general must be authorized, unless permitted as a Schedule 1 activity (i.e. domestic use of water), or permissible in terms of a General Authorization under Section 39 of the Act.

- Abstraction of water from a resource.
- Storing of water.
- Impounding or diverting the flow of water in a water course.
- Altering the bed, bank, course or characteristics of a water course.
- Disposing of waste in a manner which may impact on a water resource.

Eskom's Environmental Department: Water is in the process of obtaining a Water Use Licence on behalf of the KPS as part of an Integrated Water Use Licence Application (IWULA) from the Department of Water and Sanitation (DWS).

2.3.4. National Environmental Management: Air Quality Act (No. 39 of 2004)

The National Environmental Management: Air Quality Act, No. 39 of 2004 (NEMAQA), National Dust Control Regulations, 2013 (Government Notice R827 published on 1 November 2013) makes provision for national dust fall standards, the control of dust and prevention of nuisance by dust in addition to measures for the control of dust. During the construction phase of the proposed Lime Plant upgrades, dust emissions must be prevented by implementing the prescribed control measures contained within this report and the Environmental Management Programme (EMPr). Apart from dust reduction control mechanisms, no licencing or authorisations under the NEMAQA is required for the proposed project.

2.2.6. Hazardous Substances Act

According to the Hazardous Substances Act (No. 15 of 1973), Eskom Holdings SOC Limited should identify the various groups of hazardous substances which will be used in terms of the Lime Plant upgrades. The identified substances should be classed in terms of SANS: 10228 to ensure that they are properly stored and that a Material Safety Data Sheet (MSDS) is available in the event of a spillage or containment breach.

2.2.7. Occupational Health and Safety Act (No. 85 of 1993)

According to the OHSA, specifically GN R1179 (published on 25 August 1995-Hazardous Chemical Substances Regulations), the regulations provide for the handling of hazardous substances in terms of occupational hygiene. These include the assessment of potential exposure, medical surveillance, personal protective equipment (PPE) etc. The KPS makes use of fuels, oils, solvents etc., and the regulations contained in the legislation above need to be taken into consideration in terms of transport, storage, handling and disposal of any hazardous chemical substances associated with the construction and operational phases of the Kriel Power Station Lime Plant upgrades.

2.3. Provincial and Local Context

2.3.1 Mpumalanga Provincial Growth Path (MEGDP) (2011)

The Mpumalanga Economic Growth and Development Path (MEGDP, 2011) underpins the following two spatial strategic objectives:

- To actively promote and support economic growth and development in terms of the provincial economy, its linkages to the national and international economy with an emphasis on provincial priorities such as targeted growth areas, priority sectors and corridors as well as developmental priorities such as employment and eradicating poverty.
- Facilitate and provide essential services in social and human development in areas such as health, education, social welfare, community safety with an emphasis on human capital development including human resources development and skills development.

The above is to be achieved through the following:
- Reducing the unemployment rate in the Province by creating additional jobs.
- Increasing the income level of more individuals above the poverty line.
- Increasing the Human Development Index (HDI), the literacy levels and the life expectancy.
- Reducing inequality.

Furthermore, the following main economic sectors have been identified as key stimulants for economic growth and job creation in Mpumalanga:

- Agriculture and forestry.
- Mining and energy.
- Manufacturing and beneficiation.
- Tourism and cultural industries.

The proposed Lime Plant upgrades development will have a positive impact on the socio-economic status of the Kriel area due to the employment opportunities that will be available during the construction phase. Thus, it is understood that the project developer will give preference to unskilled and semi-skilled labourers from the Kriel and Thubelihle communities.

2.3.2. Mpumalanga Provincial Spatial Development Framework (2018)

The Mpumalanga Provincial Spatial Development Framework (MSDF) lists a number of strategic objectives and plans to be read and treated as key components of the PSDF. Of these, numerous strategic objectives are relevant to the proposed Lime Plant upgrades. These include:

- Protection of Biodiversity and Resource Utilisation;
- Safeguarding and conserving all Water Resources and Catchment Areas; and
- Promotion of a Low Carbon and Climate Resilient Economy.

Mpumalanga Province is a distinctive province in that, it consists of a wide range of biodiversity, mineral resources and good arable soils for agriculture. Mining and agriculture are two important sectors for the sustenance of its economy. However, the areas associated with good arable soils and areas with extensive mineral resources (i.e. coal) often overlap. Therefore, these sectors compete with each other for land and available water resources. At times, these two sectors encroach areas demarcated for biodiversity conservation and natural ecosystems.

Spatial planning in Mpumalanga encourages sustainable, balanced growth and development within the carrying capacity of the area. This has been achieved through controlling all kinds of man-made developments and conservation of agricultural and environmentally significant land. Such conservation activities include, the preservation and efficient management of natural resources.

In the view of the above, the proposed development will aid the Province in meeting its strategic objectives in terms of conservation of water resources, as the proposed increment in treatment capacity of the lime plants will enable the station to treat more water and reduce existing supply pressure on the VWS and other sources. Furthermore, the proposed development will improve the availability of water resources within the province as the level of consumption will be reduced by the lime treatment process. Therefore, this has positive socio-economic impacts in that the Province will be in a better position to meet its water requirements needs in areas that are currently considered as being water scarce.

2.3.3. Nkangala District Municipality Spatial Development Framework (2017-2022)

The vision of the greater Nkangala District Municipality is, "Improved quality of life for all", and the SDF is based on the following key principles:

- To achieve a sustainable equilibrium between urbanisation, biodiversity conservation, mining, industry, agriculture, forestry, and tourism related activities within the District, by way of effective environmental and land use management.
- To establish a functional hierarchy of urban and rural nodes (service centres/agri-villages) in the Nkangala District area; and to ensure equitable and equal access of all communities to social infrastructure and the promotion of local economic development by way of strategically located multipurpose centres.

- To optimally utilise the mining potential in the District without compromising the long term sustainability of the natural environment.
- To ensure that all communities (rural and urban) have access to at least the minimum levels of service as enshrined in the Constitution.

The Kriel Power Station Lime Plant Upgrade development has the potential to improve the quality of life for the unemployed citizens within the NDM municipal area during the construction phase, since preference will be given to unskilled and semi-skilled labourers residing within the Kriel and Thubelihle communities. Therefore, the proposed development supports the vision and strategic objectives of the NDMSDF as published in 2017.

2.3.4. eMalahleni Local Municipality Spatial Development Framework (2015)

The vision statement set out in the eMalahleni Local Municipality Spatial Development Framework (2015) is, "striving together to be an excellent centre for service delivery and development", and is based on the following four strategic objectives:

- To enhance the sustainability of the area by way of protection, management and enhancement of the natural environmental resources of the Municipality.
- To improve spatial efficiency, justice and sustainability by consolidating urbanisation around existing nodes and corridors and within an urban development boundary.
- To maintain/enhance connectivity between the identified activity nodes, and with surrounding regional towns and activity areas.
- To build a diverse, efficient and resilient local economy and to optimise the spatial distribution of conflicting economic sectors.

The proposed expansion of the lime plants at the KPS has the potential to add more participants within the ELM's economy due to the number of employment opportunities that will be available for the residents of the municipal area during the construction phase. In addition, there is a likelihood of transfer of skills associated with the development as preference will be given to unskilled labourers to improve the socio-economic status of the municipal area.

2.4. Applicable Legislation

The following legislation and guidelines have informed the scope and content of this Basic Assessment Report:

- National Environmental Management Act (Act No 107 of 1998);
- EIA Regulations, published under Chapter 5 of the NEMA (GNR 326 in Government Gazette 38282 of 4 December 2014) as amended; and
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Public Participation in the EIA Process (DEA, 2010).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in Basic Assessment Report. A listing of relevant legislation is provided in **Table 2.2.**

Table 2.2: Relevant policies, legislation, guidelines, and standards applicable to the Kriel Power Station Lime Plant Upgrade.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
NEMA (Act No. 107 of 1998)	The Environmental Assessment Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R324, R325, and R327 of 4 December 2014, as amended an Environmental Impact Assessment Process is required to be undertaken for the proposed project.	Department of Environmental Affairs (DEA) Mpumalanga Department of Economic Development, Environment and Tourism. (MDEDET)	The Listed Activities triggered by the proposed Kriel Power Station Lime Plant upgrades have been identified and assessed within this BA process. This BA Report will be submitted to the Competent Authority (DEA) in support of an application for environmental authorisation, and the Commenting Authority (MDEDET).
NEMA (Act No. 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	Department of Environmental Affairs (DEA)	The proposed section does not prescribe any permitting or licensing requirements directly, however this section is applicable in the BA process through the consideration of potential impacts (cumulative, direct, and indirect). Therefore, it will continue to apply throughout the life cycle of the project.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs Mpumalanga Department of Economic Development, Tourism and Environmental Affairs (MDEDET). Local Authorities	Negligible noise impacts are expected to be associated with the construction phase of the proposed development and these are not likely to present a significant intrusion to the local community.

			Therefore, there is no requirement for a noise permit in terms of the legislation.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.	National Department of Water Affairs and Sanitation (DWS) Mpumalanga Provincial Department of Water Affairs (MDWS)	Eskom Water will undertake the process of applying for a WUL with the DWS.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) and National Dust Control Regulations of November 2013.	Department of Environmental Affairs (DEA)	No permitting or licensing requirements arise from this legislation. Dust control measures will be included in the EMPR.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	Department of Agriculture, Forestry and Fisheries (DAFF)	This Act is applicable throughout the life cycle of the project. Soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

	because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product; and Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
All waste disposal, treatment or storage from the proposed development will be conducted in compliance with the existing KPS's Waste Management Procedure (RER0221).	The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 718), An Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.	Department of Environmental Affairs (DEA) Mpumalanga Provincial Department of Environmental Affairs (MDEDET): General Waste	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP. The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption	South African National Roads Agency Limited (SANRAL)	An abnormal load/vehicle permit may be required to transport the

	Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	Mpumalanga Provincial Department of Public Works, Roads and Transport.	various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

2.5 Overview of Public Participation Process

The Public Participation Process (PPP) therefore aims to ensure that:

» Information containing all relevant facts in respect of the application is made available to I&APs for review.
» Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on Kriel Power Station Lime Plant Upgrade.
» An adequate review period is provided for I&APs to comment on the findings of the Basic Assessment Report.

Key tasks undertaken during the Public Participation included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels);
» Identification of interested and affected parties (I&APs); and
» Compilation of a Comments and Responses Report detailing key issues raised by I&APs and responses provided by the project team as part of the public participation process.

The tasks are discussed in detail in the sub-sections below.

2.5.1 Public Participation Process (PPP)

Public Participation (PP) is an essential and regulatory requirement for an environmental authorisation process and is guided by Chapter 6 of the EIA Regulations 2014. Therefore, information sharing forms the basis of the public participation process and provides Interested and Affected Parties (I&APs) with an opportunity to become actively involved in the BA process from the outset. The Public Participation Process (PPP) is designed to provide sufficient and accessible information to I&APs in an objective manner by undertaking the following tasks below:

Public Participation	
During the BA process	» identify issues of concern and suggestions for enhanced benefits; » assist in identifying reasonable alternatives; » contribute relevant local information and knowledge to the environmental assessment; » verify that their issues have been recorded, considered in the environmental investigations; and » comment on the findings of the environmental assessments.
During the decision-making phase	» to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

In order to ensure effective participation, the PPP includes the following:

» Distribution of project related information in the form of notification letters including background information at the outset of the BA process.
» Identification of stakeholders and I&APs, including:
  * all organs of state which have jurisdiction in respect of the activity to which the application for environmental authorisation relates;
  * owners, persons in control of and occupiers of the site where the activity is to be undertaken or to any alternative site where the activity is to be undertaken;
  * owners, persons in control of, and occupiers of land adjacent to the site where the activity is to be undertaken, or to any alternative site where the activity may be undertaken.

- the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
- the municipality which has jurisdiction in the area; and
- any other I&APs as required by the competent authority.

» Placement of site notices at the project site and any alternative sites considered in the BA Process.
» Placement of advertisements in a local newspaper.
» Compilation of an I&AP database which is updated throughout the BA Process.
» On-going consultation with I&APs regarding the progress of the BA Process through stakeholder consultation via notification letters, telephone calls and consultation meetings.
» Release of the BA Report for a 30-day review period.

The following sections detail the tasks which were undertaken as part of the PPP to date.

i. Stakeholder identification

The first step in the PPP is to initiate the identification of potential I&APs. I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the study area and a registration process involving the completion of a registration and comment sheet. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register as stakeholders or I&APs for the BA Process. An initial list of key stakeholders identified and registered is listed in **Table 2.3.**

Table 2.3: List of key stakeholders identified during the BA process.

Organs of State
National Government Departments
Department of Environmental Affairs (DEA)
Department of Environmental Affairs (DEA): Chemical and Waste
Department of Environmental Affairs (DEA): Biodiversity
National Department of Agriculture and Fisheries (DAFF)
National Department of Water Affairs (DWAF)
Government Bodies and State-Owned Companies
National Energy Regulator of South Africa (NERSA)
South African Roads Agency (SANRAL)
South African Heritage Resources Agency (SAHRA)
Provincial Government Departments
Mpumalanga, Department of Agriculture, Land Reform and Rural Development
Mpumalanga, Department of Water and Sanitation (DWS)
Mpumalanga, Department of Mineral Resources
Mpumalanga, Department of Public Works, Roads and Transport
Mpumalanga, Department of Economic Development, Environment and Tourism (DEDET)
Mpumalanga, Department of Energy
Mpumalanga Provincial Heritage Authority (MPHRA)
Local Government Departments
Nkangala District Municipality
eMalahleni Local Municipality
Nkangala District Department of Health
Landowners

ii. Register of Interested and Affected Parties

As per Regulation 42 of the EIA Regulations, 2014 (as amended in April 2017), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix E1** for a listing of the recorded parties). The register of I&APs contains the names, contact details and addresses of:

- all persons who requested to be registered on the database in writing;
- all organs of state which hold jurisdiction in respect of the activity to which the application relates; and
- all persons who submitted written comments or attended meetings during the PPP.

I&APs have been encouraged to register their interest in the EIA process from the onset, and the identification and registration of I&APs will be on-going for the duration of the BA process. The register of I&APs will be updated throughout the BA process, and will act as a record of the parties involved in the Public Participation process.

iii. Advertisements and Notifications

The BA Process was announced with an invitation to the organs of state, potentially affected and neighbouring landowners and general public to register as I&APs and to actively participate in the process. This was achieved via the following:

- Placement of site notices announcing the BA Process at visible points along the boundary of the project site, in accordance with the requirements of the EIA Regulations. Site Notices were place along the R545 and at the Kriel Power Station Reception. Photographs and the GPS coordinates of the site notices are contained in **Appendix C2**.
- Placement of advertisements announcing the BA Process for the project and inviting members of the public to register themselves as I&APs on the project database and announcing the availability of, and inviting comment on, the Basic Assessment Report have been placed in the Witbank News on **18 January 2019** at the commencement of the 30-day review period. The tear sheet of the newspaper advert is contained in **Appendix C2**.
- BA process notification letters announcing the BA process, notifying organs of state, potentially affected and neighbouring landowners, as well as stakeholders/I&APs of the Kriel Power Station Lime Plant Upgrade and inviting I&APs to register on the project's database, were distributed via email and registered post on **1 November 2018.** The evidence of the distribution of the process notification letters is contained in **Appendix C1**.
- The availability of the Basic Assessment Report for review has been made available for review by I&APs for a 30-day review period for **18 January 2019 to 18 February 2019.**

iv. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their issues. I&APs are being consulted through the following means:

Table 2.4: Summary of Public Participation Process

Activity	Date
Placement of site notices, on-site and in public places.	29 October 2018
Distribution of process notification and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database.	1 November 2018
The BA process was advertised in the Witbank News newspaper.	18 January 2019
Public review period for the Basic Assessment Report for comment.	18 January 2019-18 February 2019

2.5.2 Review of the Basic Assessment Report

The Basic Assessment Report has been made available for review from **18 January 2019– 18 February 2019** at the following locations:

» Kriel Power Station, R545 Ogies Road, Kriel, 2271
» Kriel Public Library, c/o Quintin & Heinrich Street, Kriel, 2271
» www.savannahSA.com

2.5.3 Identification and Recording of Comments

Comments raised during the 30-day review of the Basic Assessment Report will be recorded, included and responded to in the final Basic Assessment Report that will be submitted to the DEA.

CHAPTER 3: PROJECT DESCRIPTION

3.1. Legal Requirements as per the EIA Regulations for the undertaking of a Basic Assessment Report, 2014 (as amended)

This chapter of the Basic Assessment report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(d) (ii) a description of the scope of the proposed activity, including a description of the associated structures and infrastructure related to the development.	A description of the Kriel Power Station Lime Plant Upgrade and infrastructure is included within Section 3.3.
3(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	A motivation for the need and desirability for the Kriel Power Station Lime Plant Upgrade is included in Section 3.2.
3(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.	A motivation for the preferred development footprint within the project site is included in Section 3.3.1.
3(h) (i) details of the development footprint considered.	The details of the development footprint are included in Section 3.4 and Table 3.1.
3(h)(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such.	No development footprint alternative was considered. The motivation for not considering a footprint alternative is included in Section 3.3.1.
3(h)(x) a concluding statement indicating location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	A concluding statement for the preferred development footprint within the project site is included in Section 3.3.1.

3.2. Need and Desirability for the Kriel Power Station Lime Plant Upgrade

Eskom is a large consumer of freshwater in South Africa, accounting for approximately 1.5% of the country's total water consumption annually. The utility's power stations run constantly, supplying in excess of 95% of South Africa's electrical energy and more than half of the electricity used on the African continent. Without water, this output would not be possible (Eskom, 2018)

The water catchment areas where majority of Eskom's power stations are situated are relatively water scarce, compelling the need for inter basin transfers. Previously, various water supply schemes have been constructed to supply the necessary water to the power stations.

The increase in demand for electricity in South Africa will have a direct impact on water consumption at the numerous Eskom power stations. However, Eskom recognises that the organisation needs to find ways of reducing its water consumption and contribute to the sustainable use of water in South Africa. Old infrastructure like the KPS still incur high operational costs associated with water usage in the power generation process. Hence, the need for this proposed upgrade to the existing Lime Plant infrastructure at the KPS. The power station and its cooling water system operates on a continuous intake of raw water due to losses experienced through evaporation, effluent, leaks and blowdowns. Although, KPS can do little to avert the process of evaporation in the cooling towers, it is assumed that better strategies can be implemented in re-treating effluent and preventing blow downs and leaks in the existing infrastructure.

In order to reduce the amount of effluent generated through the waste water treatment process on the station, KPS has identified a need to upgrade their existing Lime Softening Plant. This follows the change in chemistry of the raw water being utilised on the station from a UWS supply to the VWS whilst the existing Lime Plant at the station was designed to treat Usutu water. Therefore, at present the station receives a high volume of water from the VWS which is more turbid and contains high concentrations of total dissolved solids (TDS). KPS then conducted a study on the lime dosage rate that will be required if the station was to entirely use a VWS supply as a make up in the cooling system.

The findings of the study revealed that KPS will require an additional 5 tons/day of lime dosage on each side of the cooling towers in order to meet its treatment targets and to comply with the Eskom Chemistry Standard. Therefore, the need for this project in terms of improved water management, saving operational costs at the KPS on raw water from the VWS, is high and desirable. The upgrade of the Lime Plant will provide a more efficient and sustainable solution to address KPS's current and future process water requirements.

Need (timing) for proposed expansion

The eMalahleni Draft Integrated Development Plan (2015/16) (IDP) indicated that one of its key objectives is to ensure efficient infrastructure and energy supply that will contribute towards the improvement of quality of life for all citizens within the eMalahleni Local Municipality. Furthermore, the eMalahleni IDP (2015) indicates that Kriel was established by Eskom in 1973 as a residential area for its employees at the Kriel Power Station, which was constructed between 1973 and 1979. Between 1982 and 1989 the town experienced rapid growth and was declared a municipality in 1990. Therefore, majority of Kriel and Thubelihle residents are employed at the power stations and the mines in the area underpinning the importance to sustain the economic viability of these towns.

Furthermore, the eMalahleni Spatial Development Framework (SDF) published in 2015, recognises that the southern part of the eMalahleni Local Municipality forms part of the region referred to as the 'Energy Mecca of South Africa', due to its rich coal deposits and power stations. The SDF identifies these deposits, mines and power stations on the southern periphery of the municipal area, as the dominant structural elements that have an influence on settlement patterns and future development trends.

In the view of the above, the significance of the Kriel Power Station in the socio-economic environment of the area is evident, which then highlights the strategic importance of the proposed Lime Plant upgrades. The upgrades will aid the station in saving operational costs. Above all, the development will ensure the station runs optimally for at least another 28 years whilst contributing 3000MW of electrical power to the national Eskom grid.

Location Desirability of the proposed Kriel Lime Plant upgrades

Eskom initiated the BA process for the development of upgrades on the existing Lime Treatment plants at the Kriel Power Station. Following the upgrades, the plant will have sufficient treatment capacity for the remaining operational life of the power station, until 2038. During the site selection process, potential areas within the study areas were identified by considering a range of technical, financial and environmental criteria. These included inter alia existing infrastructure and geotechnical considerations. Thus, it was determined that the areas adjacent to the existing cooling towers would the preferred sites since they are:

» Located within the Kriel Power Station, and the preferred sites have been selected due to their proximity to the existing Lime Treatment plants, meaning from a technical perspective, it will be cheaper and more efficient to tie in the new infrastructure into the old one;

- A brownfields site with limited future land use (due to the nature of the adjacent activities);
- Reduction of environmental footprint due to the proposed development;
- Located on Eskom-owned land;
- Not located on a Critical Biodiversity Area (CBA), National Protected Areas Expansion Strategy (NPAES) or any other priority environmental area;
- Willl not have impact a the sense of place of the area; and
- Not opposing any plannng in the eMalahleni SDF and IDP.

The current land-use on the site is agriculture (grazing). The development of the Lime Plant upgrades at the Kriel Power Station will not have any impact on the existing agricultural activities in the surrounding area, as it will be within the boundaries of the power station. Therefore, the current land use of the surrounding environment will be retained, while also conserving water through the power generation process. This represents a win-win situation for Eskom and the environment.

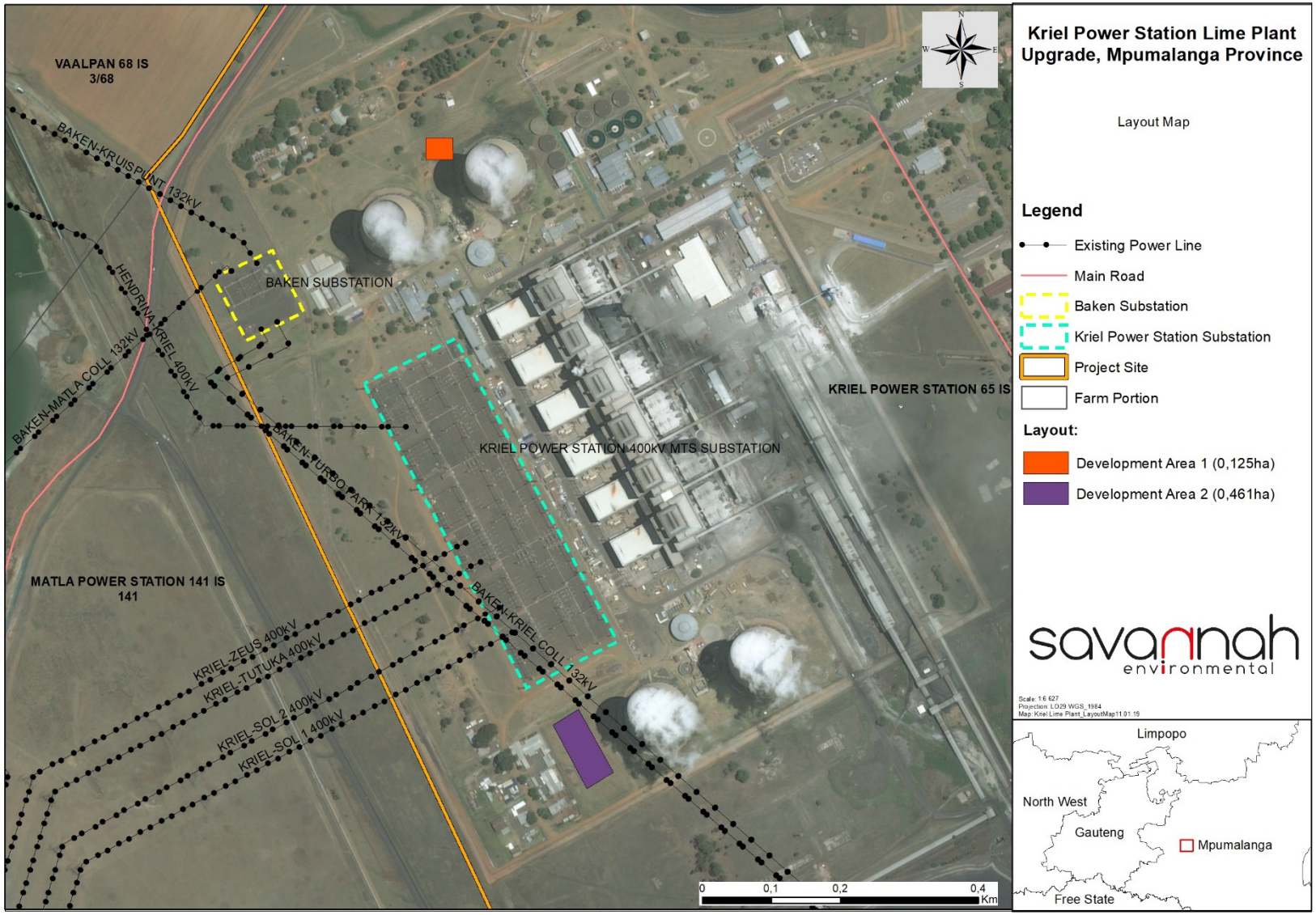

Figure 3.1: Layout map for the proposed Kriel Power Station Lime Plant Upgrade.

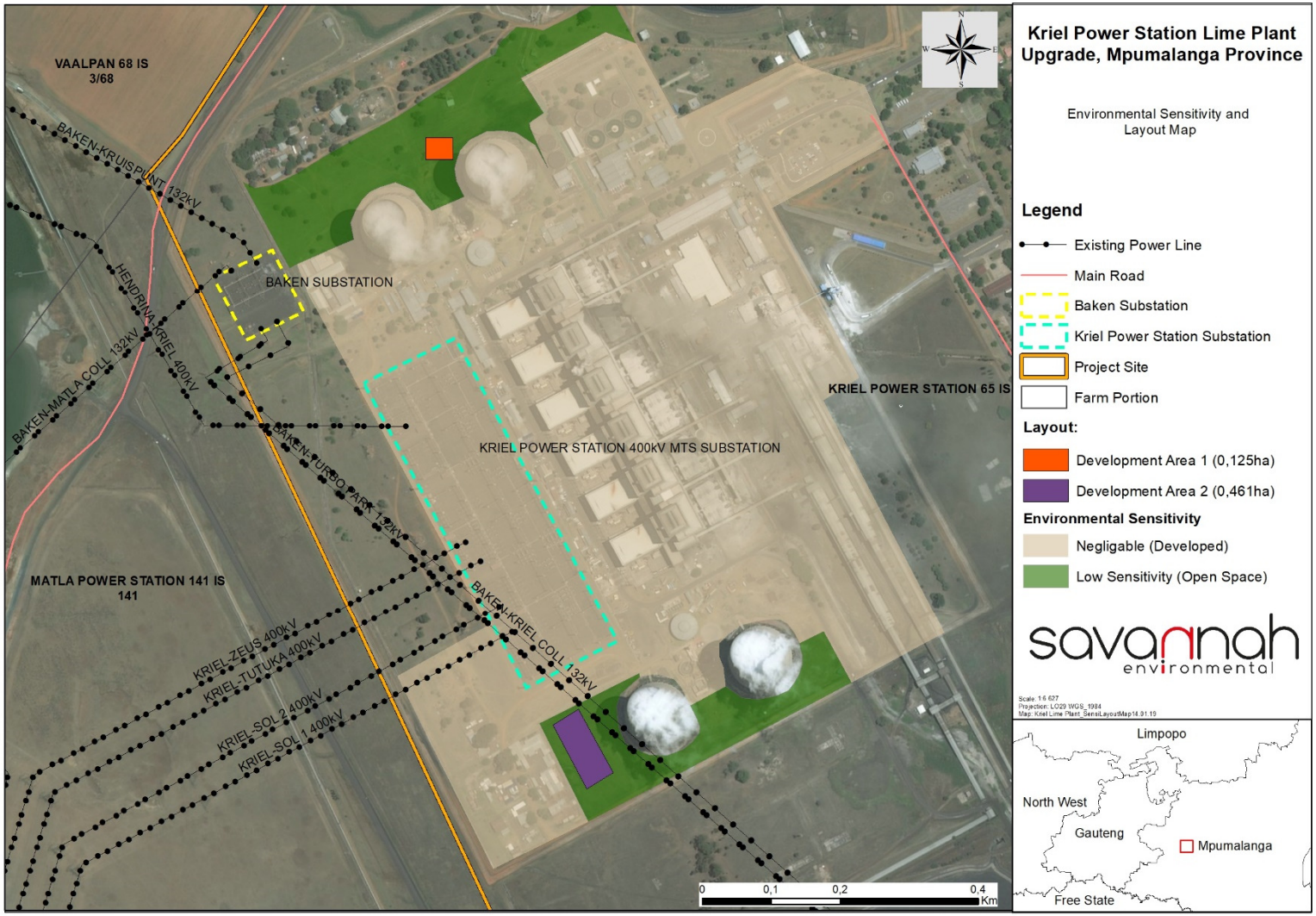

Figure 3.2: A map showing areas of low sensitivity at the Kriel Power Station.

3.3 Project Alternatives

In accordance with the requirements outlined in Appendix 2 of the EIA Regulations 2014 (as amended), the consideration of alternatives including site, activity, technology, as well as the "do-nothing" alternative should be undertaken. Therefore, the identification of alternatives is a key aspect of the success of the BA process. In relation to a proposed activity "Alternatives" means different ways of meeting the general purposes and requirements of the proposed activity. The following sections address this requirement in terms of the project in question.

3.3.1 Site Alternatives

A site selection process was undertaken by Eskom Holdings SOC Limited to locate and identify potential sites for the development of the Lime Plant upgrades. Due to the nature of the development, the location of the project site is largely dependent on several factors which includes:

- Location in relation to the exisiting Lime Treatment Plant;
- Size of the property to undertake upgrades on a Lime Treatment Plant;
- Availability of the site for development;
- Existing Lime Treatment Plant infrastructure is already available (proposed development will consist of add-ons to existing infrastructure (i.e. clarifiers)); and
- Accessibility to major road infrastructure.

Based on the above criteria, Eskom Holdings SOC Limited identified these areas (refer to **Figure 3.1**) as the most suitable for the development of the proposed Lime Plant upgrades. The site assessment process was undertaken within the confines of the KPS, as the expansion is to be undertaken on existing lime plants located within the boundaries of the station.

The KPS as a project site adheres to the characteristics considered in the site selection process in the following ways:

- The station aerial extent of the station is considered sufficient to enough to accomodate the proposed Lime Plant upgrades and associated infrastructure.
- The project site(s) are adjacent to existing cooling water system infrastructure. Thus, there will not be a great need for an additional lengthy pipeline network withiin the power station.
- Accessibiity to the Kriel Power Station is possible via the D356 and R545 roads. These routes connect to other local and provincial routes within the region allowing for widespread accessibility.
- The property on which the proposed development will be undertaken is already owned by the applicant, Eskom Holdings SOC Limited.

3.3.2 Technology Alternatives

Sulphuric Acid (dosing) Treatment

The treatment of cooling water by acid dosing with sulphuric acid and the installation of a desalination plant is considered to be an advanced treatment technology that has the ability to produce clean cooling water supplied to the power station by the Vaal Water Scheme (VWS). Currently, the station has a sulphuric acid dosing plant installed on the north and south sections and contains two (2) sulphuric acid storage tanks. Furthermore, no upgrades would be required on the existing storage capacity with this option. However, treatment of water on the station with this method would produce a lower number of COCs (7), as

compared with the lime treatment option which produces 20 COCs. Therefore, this process will generate excess blowdown as it cannot be accommodated on the existing ash dams and pre-treatment through a desalination plant will be required in the process to remove turbidity in the VWS water. Therefore, this option is economically not viable, as it would require the construction of a desalination plant on the station and the formulation of a brine management plan.

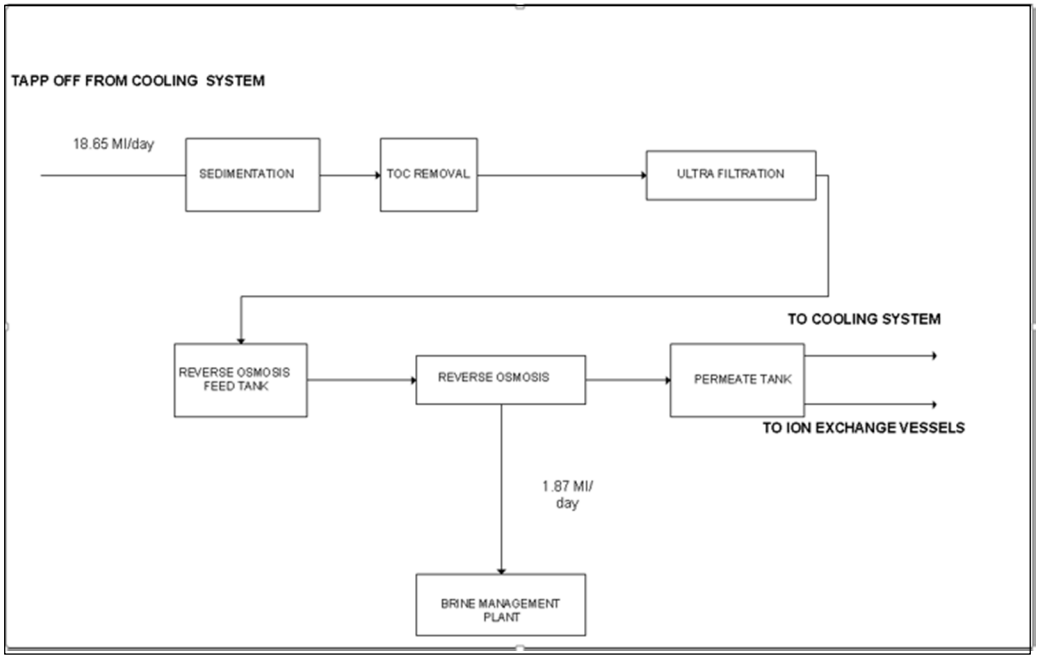

Figure 3.3: Basic Process Flow Diagram for the Sulphuric Acid Treatment Option

Nano-filtration treatment

This technology is fairly recent and is used often in treating water with a low TDS such as surface and groundwater. The process like the preferred option, lime treatment, removes hardness and alkalinity from the water. However, the main disadvantage associated with this option is the cost and maintenance of membranes associated with it. This is due to nano-filters or membranes being the most expensive component of the process.

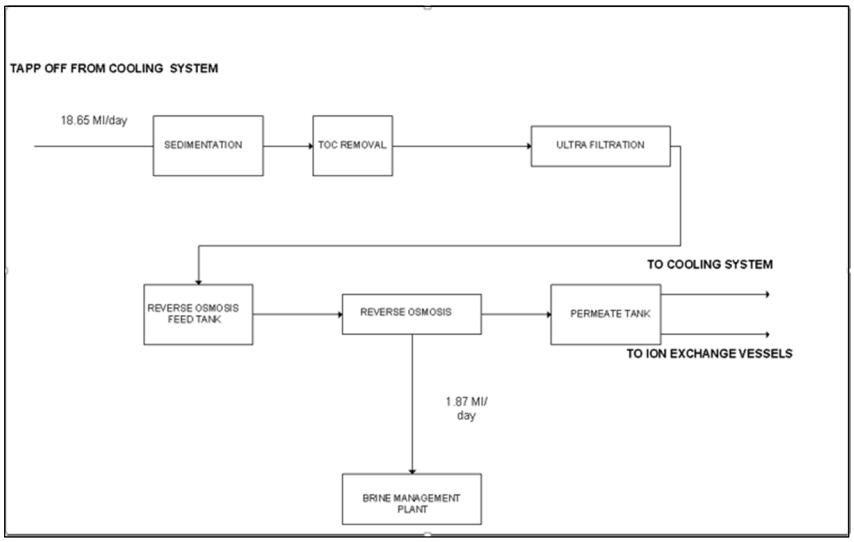

Figure 3.4: Nano Filtration Treatment Process Flow Diagram

3.3.4 The 'Do Nothing' Alternative

The 'Do Nothing' alternative is the option of not constructing the proposed Lime Plant upgrades at the Kriel Power Station. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of the Lime Treatment Plant using the Lime Softening process. Furthermore, any benefits associated with the development of the project will not be realised.

Water conservation is a key environmental objective for Eskom and the operation of the power stations across the country presents the power utility with a challenge on how to best conserve water resources. Therefore, the development of the project will enable Eskom to fulfil this objective as more water will be recycled within the cooling water system at the KPS. Automatically, this reduces the demand for makeup water from the VWS. Therefore, the no-go alternative for the Lime Plant upgrades is not considered as the desirable or feasible alternative due to the following reasons:

- The project will result in socio-economic benefits at a local scale through job creation, procurement of materials and provision of services and other associated downstream economic developments. These will persist during the construction and operational phases of the project.
- The project is considered to be a suitable land use project for the proposed site, as it will be located within the boundary of the power station.
- The implementation of the proposed project involves an increment in the capacity for the existing plant to treat waste water discharged from the station's infrastructure (i.e. boilers and cooling towers), thereby reducing pressure on the VWS supply and the amount of effluent generated per day by the KPS.

The benefits of the project are expected to occur at a local level. The costs to the environment at a site-specific level can largely be limited through the implementation of mitigation measures. The no-go alternative will therefore result in the above benefits **not being realised** and a subsequent loss of income and opportunities to local people. Above all, the 'no go' alternative would deprive Eskom and the KPS an opportunity to lower water consumption at the station. Therefore, it is on this basis that the 'no go' alternative is not preferred for the proposed development.

3.4. Description of the Kriel Power Station Lime Plant Upgrade

The table below contains a summary of the project site details of the proposed Kriel Power Station Lime Plant Upgrade development:

Table 3.1: Project Site Details of Kriel Power Station Lime Plant Upgrade

Component	Description/ Dimensions		
Province	Mpumalanga Province		
Location of the site	~8km west of R545		
Municipal Jurisdiction	» Nkangala District Municipality » eMalahleni Local Municipality		
Current Zoning	Industrial Use-the neighbouring properties are located in and around the Kriel and Matla power stations which are zoned as industrial.		
Site Extent	» ~700ha		
Site Co-ordinates		**Latitude**	**Longitude**
	North	26°15'5.95"S	29°10'31.16"E
	South	26°15'32.31"S	29°10'46.42"E

Extent of the proposed development footprint	~1.96ha
Extent of broader site available for both developments	~700ha
Throughput capacity (m^3)	~174 000 m^3
Site access	The Kriel Power Station can be accessed via the regional and provincial routes (R545) and (D356), which are located to the north and east of the power station.

The proposed Lime Plant upgrades will accommodate the Lime Softening technology used to treat water for cooling purposes in the power generation process. The Lime Plants following the proposed expansion will have a combined throughput capacity of 174 000m^3 per day of effluent. The following is relevant regarding water supply and treatment:

» The KPS receives its water via a pipeline from the Matla Power Station.
» Lime will be stored on-site in a silo on the northern section (limo silo already available on the southern section).

The Lime Treatment Plants will utilise the lime softening process to treat cooling water from the cooling towers at both the northern and southern sections of the towers. Following the proposed upgrades, the lime plants will have a combined treatment capacity of 1750 m^3 per hour of concentrated cooling water.

3.4.1 Infrastructure

The main infrastructure associated with the Lime Plant upgrades include the following:

» Clarifiers;
» Pipelines (500m x 600mm); and
» Ddilution Water Pumps.

Table 3.2 provides details of the proposed Lime Plant upgrades, including main infrastructure services.

Component	Description/Dimensions
Treatment Capacity	174 000 m^3
Proposed Technology	Lime Softening Treatment
Clarifier Dimensions ∗ **Diameter:** ∗ **Height:**	 » 33m » 6m
Pipeline(s)	» 500m x 600mm on each Lime Plant,
Access roads	» 700m in length and 8m wide.
Site Access	» Main access to the project site will be via the existing road, D356 and R545.
Services Required	» *Waste Disposal,* all waste material generated from the construction phase will be collected by a contractor and the waste will be disposed of at a licensed waste dump. » *Sanitation,* during construction, chemical toilets will be used. All sewage waste will be collected by a contractor to be disposed of at a licensed waste disposal site. » *Water*, water will be sourced from the power station during the construction phase for a period of 16 months. » *Electricity,* it is envisaged that electricity from the power station will be used for the construction and operation phase of the project.

Component	Description/Dimensions
	No agreement or confirmation for the above services have been obtained as yet.

Sludge generated as a result of the lime treatment process will be discharged to the existing slime dams around the power station.

3.4.2 Kriel Power Station CWT Challenges

The open cooling water system being utilized at the KPS experiences severe water losses through evaporation and blow downs. Therefore, water that is re-circulated in the system experiences an accumulation of salts in its concentration which leads to corrosion, scaling and fouling in the station's infrastructure. These aspects are explored in detail below:

Cooling water systems experience difficulties due to water losses through evaporation which increase the accumulation of salts in the infrastructure. Issues related to the water quality include, corrosion, scaling and fouling.

Corrosion
Corrosion refers to the destruction of a metal by a chemical or electrochemical reaction with its environment. In the KPS cooling water system, corrosion causes two basic problems, namely:

» The failure of equipment leading to an increase in maintenance costs and plant downtimes; and
» Decrease in plant efficiency due to loss of heat transfer, the result of heat exchanger fouling caused by the accumulation of corrosion products.

Effects of Corrosion
A well-known impact of corrosion at all major Eskom power stations, like the KPS is the impact associated with the corrosion or weakening of brass objects in which zinc is dissolved out of the brass alloy. This process is known as, **dezincification.** During dezincification, affected units at the station are taken offline and the failed tubes in the condenser are identified and plugged. Above all, dezincification results in low levels of turbine efficiency and the condenser would require new tubes.

Another possible cause of corrosion within KPS's infrastructure is sulphate-reducing bacteria (SRB) due to, Sulphur availability for the bacteria is high as the element is common and widespread in the form of sulphate ions. The bacterium breaks up organic matter into smaller molecules and commonly occurs in anaerobic environments such as, inside water pipes and on metal components that are not evenly coated.

Scaling
Scaling at the station occurs due to the precipitation of compounds which have become insoluble due to numerous factors such as, water composition, temperature and the pH value. Scaling is known to interfere with heat transfer and reduces the flow of cooling water. Calcite ($CaCO_3$) is a typical substance found within power station infrastructure that is associated with scaling. Furthermore, there is a fine balance between scaling and corrosion and in order to mitigate the risk of either occurring, the raw water should be saturated with calcium carbonate.

Fouling
The Vaal Water Scheme draws its water resources from the Vaal draws its water from the Olifants River where a lot of microbial organisms are present. Therefore, fouling is caused by the settling out of suspended solid,

the buildup of corrosion products and growth of microbial masses. Above all, fouling interferes with heat transfer and reduces the flow of cooling water in the system and promotes corrosion.

3.4.3 Clarification and Lime Softening Process

Clarifiers used at the KPS are designed to ensure that three (3) processes take place in one unit. The type of clarifier used is called a **sludge blanket clarifier**. In a typical sludge blanket clarifier, flocculants are maintained in a fluidized blanket through which the water flows. As the sludge passes through the blanket, larger flocculants will settle to the bottom due to gravity and the remaining flocculants are removed by straining and absorption. The concentration of flocculants and solids in the reaction zone is controlled by variable speed mixers.

Lime Softening Process

The Lime Treatment Plant at the Kriel Power Station uses lime (Ca (OH) $_2$) or portlandite (hydrated lime) and a polyelectrolyte as a flocculant in the clarification process in order to treat the cooling water. Lime stored in the silo and motive water (i.e. water that has been treated), mix together in the mixing tanks and end up in the clarifiers with the flocculants and cooling water. The coagulation, flocculation and sedimentation processes taking place inside the clarifier generate sludge which is discharged at the bottom of the clarifier while treated cooling water overflows into launders at the top of the clarifier and then into the main cooling water system.

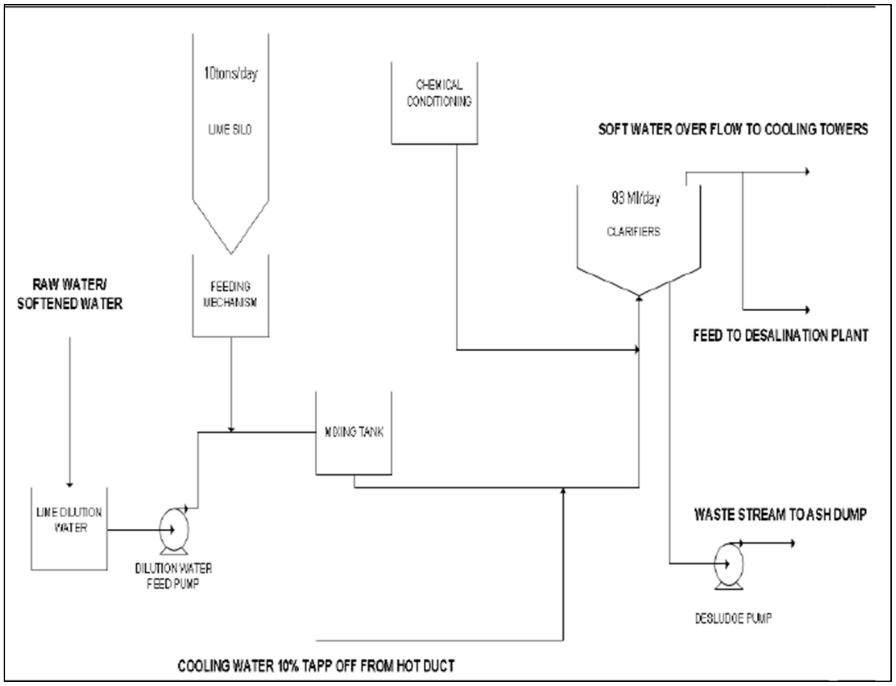

Figure 3.5: Basic Process Flow Diagram for the Lime Softening Treatment Process

The process removes alkalinity and hardness by means of calcium carbonate and magnesium hydroxide in the clarifiers which is then removed by blow downs (sludge).

3.5 Life-Cycle Phases of the Lime Plant

3.5.1 Construction Phase

Construction of the Lime Plant upgrades and associated infrastructure is expected to take a period of 16 months and the construction activities involve the following:

- Prior to the commencement of any construction activity, a number of surveys will be required including, but not limited to, a comprehensive geotechnical study, site survey and confirmation of the Lime Plant expansion footprint.
- Site preparation activities will include clearance of any vegetation within the Kriel Power Station and excavations for foundations within the project site.
- Civil works will take place, including concrete works for structures such as foundations, the erection of the clarifiers and associated infrastructure.
- Mechanical and electrical work will then follow.
- As construction is completed in a certain area within the project site, the construction equipment will be removed from the specific area.

Water requirements:
During construction, water will be sourced from the Kriel Power Station. It is expected that a maximum of 100kl of water per day would be required during the construction phase. Water is expected to be supplied via a direct tie-into the Kriel Power Station water supply line. Eskom Water will undertake the application for a WUL on behalf of KPS from the DWS.

Storage and Handling of Hazardous Substances:
The construction phase will require the handling and storage of materials including fuel, water treatment additives and chemicals. The combined capacity of storage containers will not exceed 80m^3.

Employment:
Employment opportunities will be created during the construction phase of the project which will include highly skilled, skilled and semi-skilled positions. These opportunities will be firmed up on approval of contract strategy planned for June/July 2019. The Skills Development and Localisation (SD&L) process will apply to determine employment opportunities and will form part of the contract agreement between Eskom and the appointed Contractor over the 16-month construction phase. No employees will reside on the project site.

3.5.2 Operation Phase

The Lime Treatment Plant following the proposed upgrades, will be operational until the power station is decommissioned in 2038. Furthermore, existing Kriel Power Station full-time security, maintenance and control personnel will form part of the operational phase of the project. Maintenance will be undertaken on both plants as and when required. Key elements of the Operation and Maintenance plans include monitoring and reporting the performance of both lime plants, conducting preventative and corrective maintenance, receiving visitors and maintaining overall security.

Storage and Handling of Hazardous Substances:
During the operation phase, the handling and storage of chemicals will include diesel, water treatment additives and chemicals. The combined capacity of the storage containers will not exceed 500m^3.

Lime:
Lime will be transported to the Kriel Power Station via road transport, and will be transferred and stored within a silo adjacent to each Lime Treatment Plant. The lime will be transferred via the rotary vane feeder into the educt for the lime treatment process, as required.

Employment:
Employment opportunities will be created during the construction phase of the project which will include highly skilled, skilled and semi-skilled positions. These opportunities will be firmed up on approval of contract strategy planned for June/July 2019. The Skills Development and Localisation (SD&L) process will apply to determine employment opportunities and will form part of the contract agreement between Eskom and the appointed Contractor over the 16-month construction phase. No employees will reside on the project site.

Water Requirements:
The Lime Treatment plants are each expected to treat 1750m^3 of cooling water per day. The cooling water will be obtained from the cooling towers, as well as from the Vaal Water Scheme through the existing pipeline running between the Kriel and Matla power stations. Following treatment, the desludge pumps will discharge any excess material from the clarifiers to the ash dumps (see **Figure 3.5**).

3.5.3 Decommissioning Phase

The lifespan of the Lime Treatment plants at the Kriel Power Station will lapse when the station is decommissioned in 2038. Equipment or components associated with the Lime Treatment plants will only be decommissioned once it has reached the end of its economic life or if it is no longer required.

Decommissioning activities will involve demolishing of clarifiers and ancillary infrastructure, demolishing of buildings and rehabilitation of the site to the desired end-use. As far as possible, components will be broken down and recycled.

CHAPTER 4: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section of the BA Report provides a description of the environment that may be affected by the Kriel Power Station Lime Plant Upgrade. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed development is situated. Features of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this BA is being conducted

4.1 Legal Requirements as per the EIA Regulations for the undertaking of a Basic Assessment Report, 2014 (as amended)

This chapter of the BA report includes the following information required in terms of Appendix 1: Content of the BA Report

Requirement	Relevant Section
(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The environmental attributes associated with the development of the Kriel Power Station Lime Plant Upgrade are included within this chapter. The environmental attributes that are assessed within this chapter include the following:
	» The regional location of the project site is described in Section 4.1.
	» The climatic conditions of the Kriel Power Station are described in Section 4.5.
	» Biophysical characteristics of the project site and the surrounding areas are described in Section 5.5 – 5.9. This includes the topography, climate, geology, agricultural potential, aquatic and ecology of the project site.
	» Heritage resources, including the palaeontology and archaeology of the project site are described in Section 4.9.
	» Social and economic characteristics of the area surrounding the Kriel Power Station Lime Plant Upgrade are described in Section 4.10.

4.2 Regional Setting: Location of the Project Site

The Kriel Power Station is located approximately 8km west of Kriel in the Mpumalanga Province, ~4km north-east of Matla Power Station and 60km south of eMalahleni. The Mpumalanga Province is South Africa's 8th largest province and the Province covers an area of approximately 76 49km^2 in extent, which is equivalent to ~6.5% of South Arica's total land area. The Province accommodates 4 039 939 million residents and is the 6th most populous province in the country. The province shares its borders with countries, Mozambique and Swaziland.

The project site (Kriel Power Station) is located within the eMalahleni Local Municipality which is one of the six (6) municipalities located within the greater Nkangala District Municipality (NDM). The NDM is situated within the western section of the Mpumalanga Province and is home to twelve (12) Eskom coal-fired power stations.

Table 4.1: Location information of the proposed Kriel Power Station Lime Plant upgrades

Physical Address	Kriel Power Station Ogies Road, Kriel 2271
Co-ordinates * **Latitude** * **Longitude**	 29°10'33.16"E 26°15'8.88"S
District Municipality	Nkangala District Municipality
Local Municipality	eMalahleni Local Municipality

The N4 national route links the province with Mozambique whereas, the other national routes in the province; N11 and N12 link Mpumalanga with the Gauteng, Limpopo, North West and the Kwa Zulu Natal province. The Kriel Power Station Lime Plant upgrades will be constructed within a broader study area of approximately 700ha, occupying the north and southern portions of Kriel Power Station 65 IS (where the Kriel Power Station is located) and only 1.96ha of the broader study area will be affected by the proposed development.

Within the radius of the Kriel Power Station, other existing infrastructure is present which include the Kriel Colliery (supplies KPS with coal) and the Matla Power Station.

4.3 Existing land-use

The land on which the Kriel Power Station is located is wholly owned by Eskom. However, the area is currently zoned for agricultural activities and mostly comprises of grassed slopes with pockets of thicker vegetation and trees in certain areas. The KPS region, and the immediate surface area that will be utilised by the proposed development, is currently employed as a coal-fired power station, with associated activities.

Table 4.2: Properties affected by the proposed Kriel Power Station Lime Plant Upgrade

ID	Major Region	Parcel No.	Portion	Parent Farm Name
T0IS00000000006500000	IS	65	0	Kriel Power Station

The land use on the surrounding area is mainly agriculture (i.e. maize and cattle stock farming) and mining. The KPS is located adjacent to the Kriel Colliery, which currently both Kriel and Matla power stations with coal. The town of Kriel and the Thubelihle township are located 8km west and 11km north-east of the power station respectively. Furthermore, the Exxaro Matla three (3) underground coal mines are located to the east of Kriel whereas, their main infrastructure is located 6km east of the KPS.

A 1km airfield is located 1km east of the KPS whereas the Rietstroom Park and Lehlaka Park residential areas are located 9km to the north of the power station. In addition, the station covers an area of 700ha and the area surrounding the KPS is characterised by mine dumps, water retention dams and coal open cast mines.

Services on or in close proximity to the site include:
» Roads including R545 and R547; and
» Existing electrical infrastructure including overhead power lines and substations.

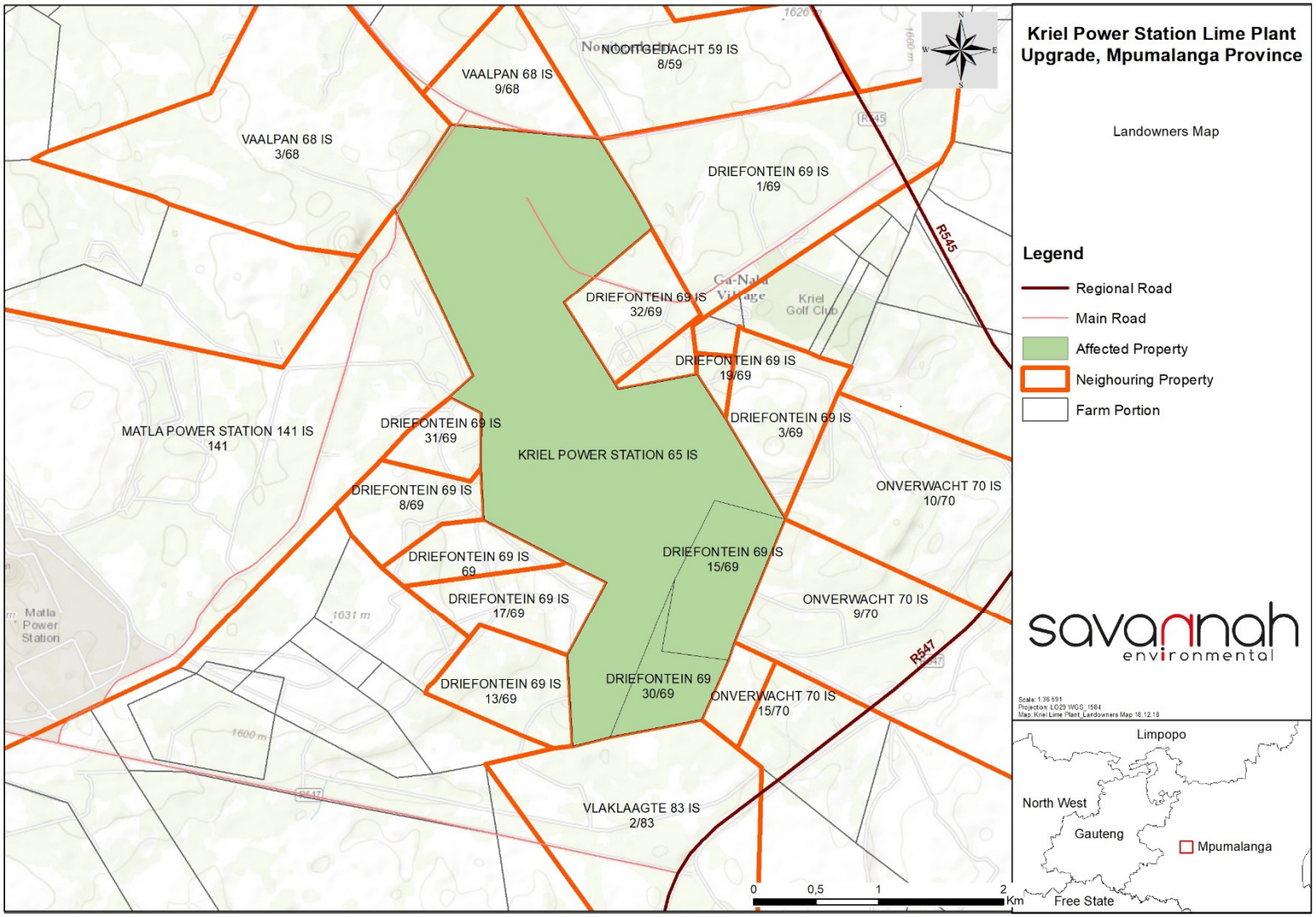

Figure 4.1: A landowner's map illustrating the Kriel Power Station's cadastral unit (polygon highlighted in green).

4.4 Access and Transport Routes in the Region

The N12, R545, R547 and D356 are the primary roads in the region and the main link between Gauteng, eMalahleni, Ogies and Kriel. Access to the Kriel Power Station is via a 700m tarred road (refer to **Appendix E1**). In the view of the access roads being available within the power station, no new access roads will be required for the proposed development.

4.5 Climatic Conditions

The Kriel Power Station is located within the Highveld climate zone. This zone is characterised by summer rainfall from October to March, mainly through thunderstorms. The zone on average receives 601-700mm per annum of rainfall. The average temperatures for the municipal area are moderate (average of 24°C) with cold and frosty winter months. Prevailing northerly and easterly winds are dominant during summer months, while easterly winds occur in autumn and westerly winds during winter.

4.6 Topography

The eMalahleni municipal area is approximately 1600m above sea level on the Highveld plateau and is characterised by an undulating landscape with slopes less than 1:30. The general surface area surrounding the Kriel Power Station is characterised by mine dumps and open cast mines (eMalahleni Local Municipality, 2009).

4.7 Hydrology

The eMalahleni Local Municipality and the KPS fall within the Olifants Catchment area, with the Klein-Olifants, Olifants, Wilge, Rietspruit, Steenkoolspruit and Brugspruit being the main rivers in the municipal area. Major dams include the Rietspruit, Doringpoort and Witbank Dams (eMalahleni Local Municipality, 2009). Natural springs in the vicinity of the Kriel Power Station feed the seasonal Onverwacht, Pampoen, and Vaal Pan Spruits.

The springs drain to the east, north and west respectively. Furthermore, all surface water within the area drains in the Olifants River via the Riet and Steenkool Spruits. Therefore, the Rietspruit flows to the north of the Kriel Power Station into the Rietspruit Dam from where the water enters the Steenkoolspruit, which is located to the southeast of the power station. Both rivers are located within the B11E and B11D quaternary catchments and are perennial. Furthermore, both rivers have a Present Ecological Status (PES) of Class D: Largely Modified. Therefore, these rivers are considered to be Critically Endangered due to the ecosystem processes they maintain downstream.

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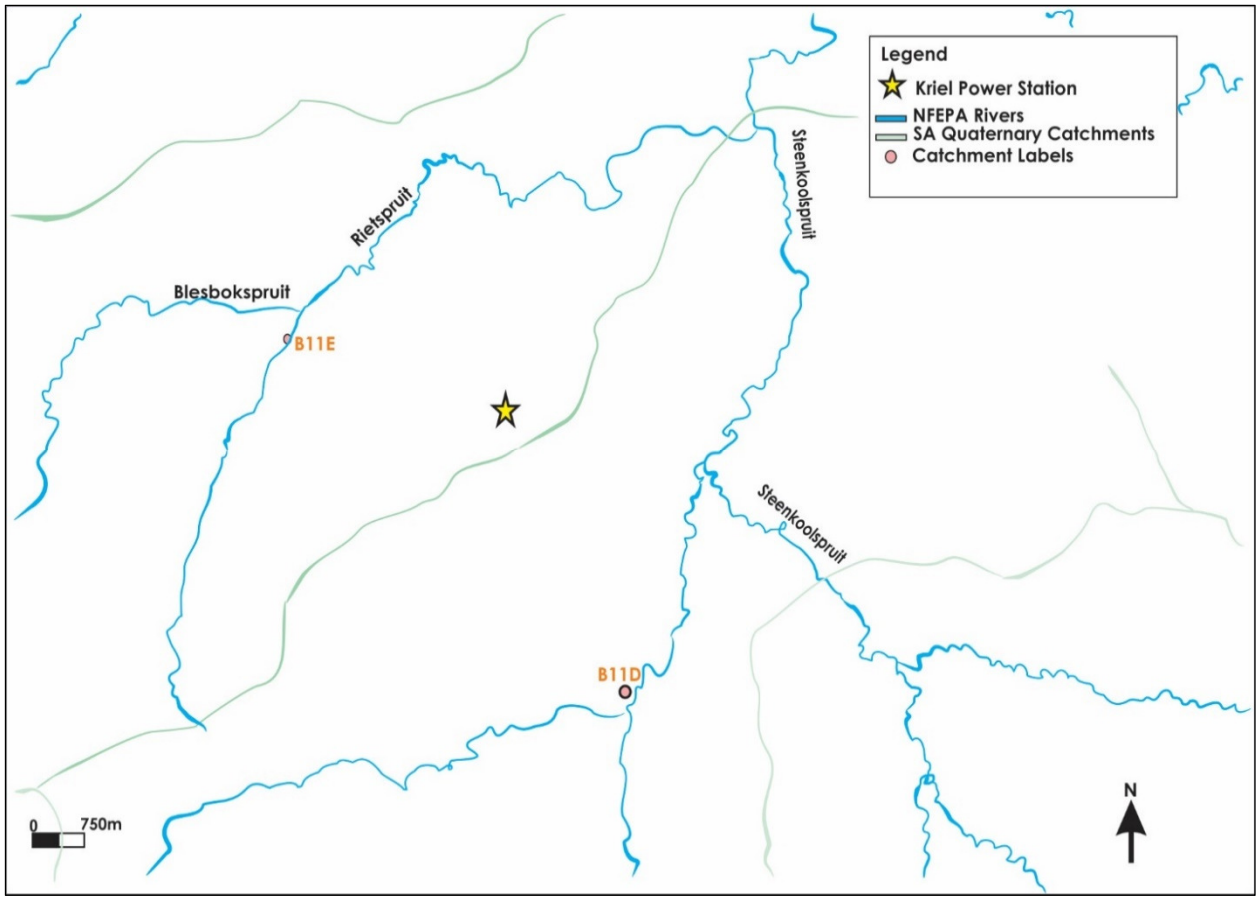

Figure 4.2: Tributaries within the quaternary catchments in and around Kriel (adapted from Aurecon,2017)

4.8 Geology

Kriel Power Station is located within the Karoo Basin that contains sediments deposited in fluvial floodplains and a shallow continental shelf over a period extending from the late Carboniferous Period (~290 million years ago) to the early Jurassic Period (~190 million years ago), before the separation of southern Africa and Gondwanaland. These sediments were deposited in fluvio-deltaic environments where swamps and marshes existed and peat accumulated. Therefore, interlayered shales, mudstones, siltstones and sandstones constitute the bulk of the rock strata found in the area. Furthermore, dolerites, a prominent geological feature of the Karoo Basin, intruded after sedimentation in the basin had nearly ceased due to the intrusion of the Drakensburg basalts. The intrusive rocks intruded older successions of the Karoo Basin along planes of weakness. Therefore, in the vicinity of Kriel, few doleritic intrusions are present which form a few sub-vertical dykes (J &W,2010).

Small fracture zones normally associated with the upper and lower contacts of sills (usually aquifers) also occur throughout the power station area (Aurecon, 2010). The basin has been subjected to several cycles of erosion, which resulted in weathering to great depths. Therefore, rocky outcrops are rare in the Kriel area and are often covered by transported soils. Weathering in the area is largely dependent on climatic conditions with disintegration occurring in the dry regions and decomposition in the wet regions (J&W, 2010).

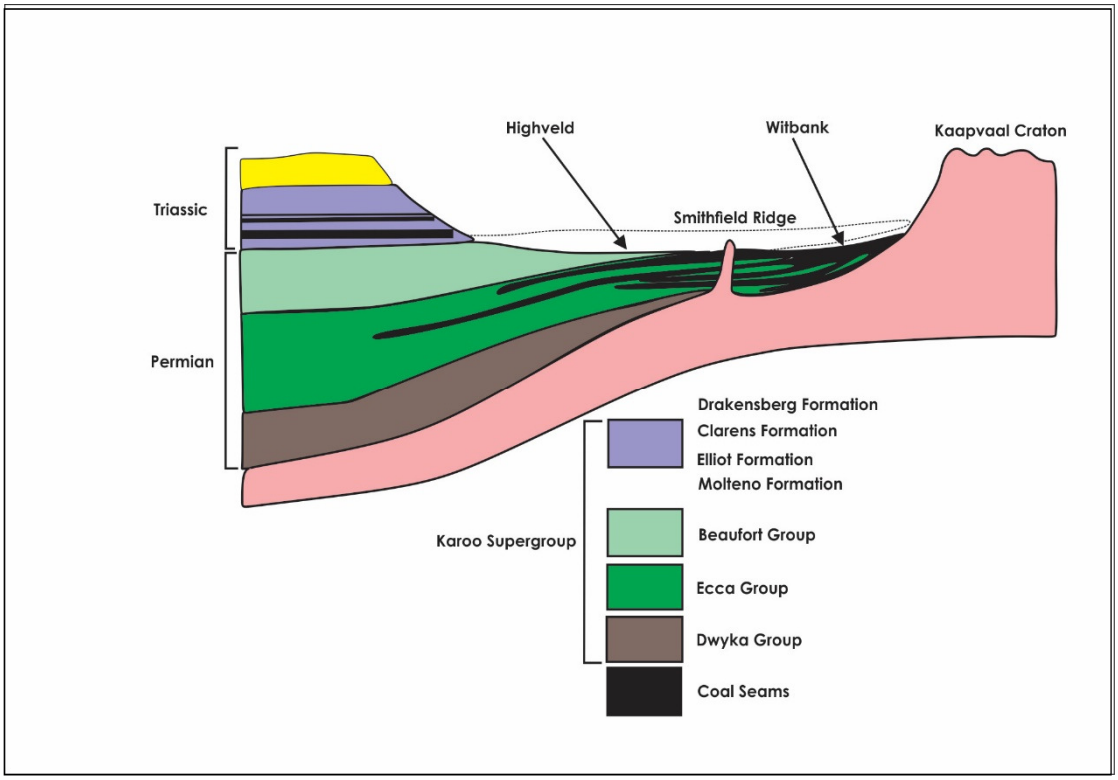

Figure 4.3: Schematic diagram illustrating the Witbank and Highveld coalfields separated by the Smithfield Ridge (adapted from Hancox, 2014).

4.9 Ecological Profile and Heritage Resources

4.9.1. Vegetation

The Kriel Power Station is located within the Mesic Highveld Grassland (MHG) Bioregion as defined by Mucina and Rutherford (2006). Within the vicinity of the power station, the dominant vegetation type found is the Eastern Highveld Grassland. Typically, this vegetation type occurs at a general altitude of 1 520-1 780m, as well as 1 300m, within the Mpumalanga and Gauteng Provinces. However, on the development footprint, the grass species described above is minimal to non-existent as the project site is heavily modified and entirely cultivated with lawn.

4.9.2 Heritage Resources

It is understood from a literature perspective that the Kriel Power Station (study area) is underlain by fluvial and deltaic deposits consisting of coarse sandstones, conglomerates and coal seams of the Vryheid Formation (Ecca Group, Karoo Supergroup). The Vryheid Formation is paleontologically significant, there is moderate possibility that any fossil remains will be found within the proposed development footprint as the KPS is a heavily modified site. Thus, the likelihood of finding fossils intact in sedimentary rocks within the development footprint is very low.

4.10 Social and Economic Characteristics of the Project Site and Surrounding Areas

The expansion of the Lime Treatment plants at the Kriel Power Station is expected to be of low significance on the receiving socio-economic environment. However, it is regardless considered necessary to look at the

potential socio-economic impacts associated with the proposed development. The following parameters and characteristics inform the socio-economic environment around the Kriel Power Station.

Demographics

The project site is located within the eMalahleni Local Municipality (ELM) which is one of the six (6) local municipalities within the greater Nkangala District Municipality (NDM). The area of the ELM covers an estimated, 2 678m^2 whilst that of the NDM covers, 16 892m^2 in extent. Both municipalities have populations of 395 466 and 1 226 500 respectively. Furthermore, the NDM has the highest population density (35%) amongst the three (3) DMs within the Mpumalanga Province.

The eMalahleni Local Municipality is distinguished from other LMs within the Province by a strong economically active population, representing more than half of the total population of the NDM. The local municipality has experienced population growth of ~3.6% between 2001 and 2011, which is higher than the national growth rate of 1.86% (Census, 2011). The dominant population groups within the ELM are, the black African population (81%), White (16%), Coloured and Indian (each covering less than 2%). The population age distribution reveals a young and economically active population (15-64) at 71%.

Education

Levels of education, like health are a good and reliable indication of the economic status and quality of life within an area. Data from the ELM regarding education has shown that, only 5.8% of its population that is above the age of 20 years, has not received any formal schooling. However, 38,4% of the municipality's residents have received primary education, whilst 5.9% completing this phase and another 32.7% receiving secondary education. Furthermore, only 2.5% of those that received secondary education completed matric (or passed Grade 12).

The eMalahleni Local Municipality Spatial Development Framework, 2015 has alludes to four (4) institutions of higher learning being located within the jurisdiction of the ELM. In order to reduce the high unemployment rate of the youth in the ELM and increase literacy levels, the improvement of institutions of learning should be prioritised.

Employment

The ELM is characterised by a high unemployment rate of, 19%, however is lower than the national average of 27%. However, the youth unemployment rate is 36% (ELM SDF, 2015). The average house income per annum in the ELM is R57 500, higher than the national average of R30 000. Thus, certain parts of the ELM may experience high poverty levels, however the statistics above show, the concentration of economic activities such a mining and power generation has had a positive economic impact on the area.

Economy

The ELM economy is dominated by four main sectors, mining, agriculture, power generation and the service industry. Data has shown that majority of the population within the municipal area is employed by the formal sector (77%), whereas 11% is employed within the informal sector.

As already indicated, the location of vast coal reserves has concentrated a lot of mining companies within the municipal area. Thus, making coal mining the dominant economic activity/sector within the ELM. This is a result of, 5 coal seams being located within the southern periphery of the municipal area. Other minerals found and exploited within the municipal area include, flint, iron, gold, cobalt, molybdenite, and iron oxide. Therefore, it goes without saying that the NDM and ELM have a considerable mining potential. Due to the

location of these coal reserves, the power utility, Eskom has established, four (4) of its 13 coal-fired power stations in the municipal area.

Furthermore, the agricultural and manufacturing sectors are also significant economic contributors within the NDM and ELM. Vast tracks of land within both municipalities are used for maize and stock farming and these are predominantly located to the south of the N4 national route. In addition, the establishment of steel production plants (Highveld Steel and Columbus) within the NDM and ELM have made the area a manufacturing hub

CHAPTER 5: ASSESSMENT OF POTENTIAL IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of the **Kriel Power Station Lime Plant Upgrade** (refer to **Figure 5.1**). This assessment is conducted for the proposed lime treatment plant upgrades at the Kriel Power Station within a development footprint of ~1.96ha (within a broader study area of ~700ha) and for all the plant's components including:

- Clarifiers with a capacity of ~1750m^3;
- Pipes (500m x 600m) to tie in the newly constructed clarifiers onto the existing Lime Plants;
- Dilution Water Feed Pumps.

Potential impacts associated with the proposed development at the KPS including associated infrastructure are discussed below. Kindly note that the site is completely transformed, therefore no independent environmental specialist assessments/studies were required nor undertaken.

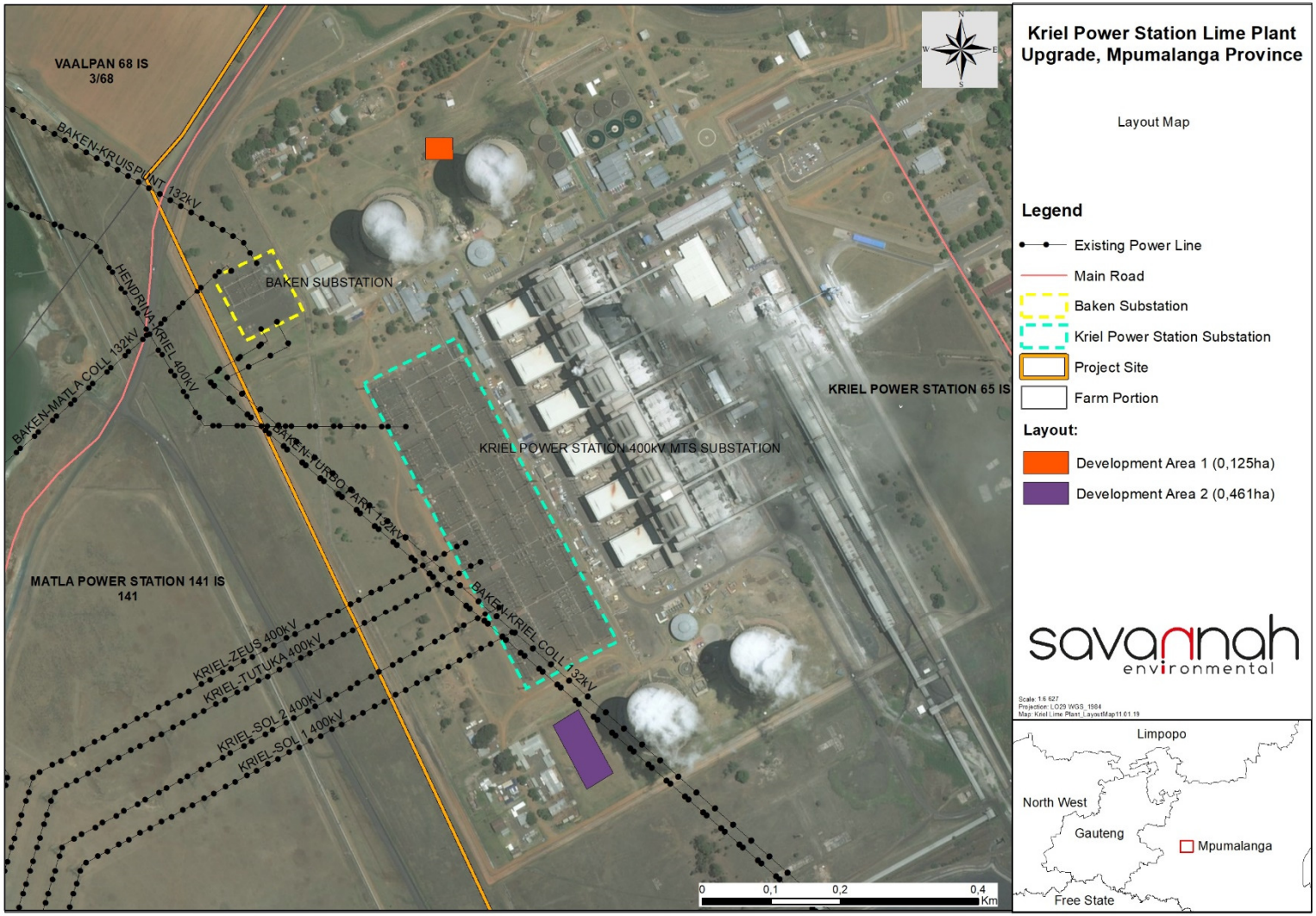

Figure 5.1: Map showing the proposed development footprint within the Kriel Power Station and associated infrastructure located within the project site assessed as part of this BA process (refer to **Appendix H** for A3 maps).

The facility will have a development footprint of approximately ~1.96ha, within which other associated infrastructure are included.

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation including implementation of a stormwater management plan. The construction phase for the Kriel Power Station Lime Plant Upgrade is expected to take approximately 16 months.
» *Operation* – will include the treatment of raw and cooling water at the KPS which will be re-circulated within the existing cooling water system. The operational phase is expected to last until the station is decommissioned in 2038.
» *Decommissioning* – the Lime Treatment Plant is expected to have a long-term lifespan which will be associated with the operation of the Kriel Power Station. Equipment associated with the Lime Treatment Plant will be decommissioned once it has reached the ends of its economic life. Decommissioning activities will include the disassembly or replacement of the Lime Treatment Plant infrastructure with more appropriate technology/infrastructure available at that time.

5.1 Legal Requirements as per the EIA Regulations for the undertaking of a Basic Assessment Report, 2014 (as amended)

This chapter of the report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
(h)(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.	The potential impacts associated with the construction and operation of the Kriel Power Station Lime Plant Upgrade are identified and evaluated within section 5.2.
(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of the Kriel Power Station Lime Plant Upgrade are summarised in section 5.3-5.4.
(h)(viii) the possible mitigation measures that could be applied and level of residual risk	Recommendations regarding the development of the lime plant upgrades are included in section 5.3 -
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii)an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	A description of the environmental issues and risks that were identified during the environmental impact assessment process and an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures are included in sections 5.3-5.5.
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	Recommendations from the environmental assessment practitioner (EAP) and identified mitigation measures are included in the EMPr and are discussed within sections 5.3-5.5. and within the EMPr, which is included as **Appendix D**. The EMPr also includes the recording of the management objective and the impact management outcomes.

5.2 Impact Assessment Methodology

Potential impacts associated with the construction, operation and decommissioning of the Kriel Power Station Lime Treatment Plant, including associated plant infrastructure at the KPS are discussed below. Since the site is completely transformed, no environmental specialist assessment was required nor undertaken. Generic potential impacts that could be associated with the proposed development have been included within this BA report, and are discussed below.

The following methodology was used in assessing impacts related to the proposed activity. All impacts are assessed according to the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or;
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which is described as positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S= (E+D+M) P; where
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance** weightings for each potential impact are as follows:

» < **30 points**: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» **30-60 points**: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» **> 60 points**: High (i.e. where the impact must have an influence on the decision process to develop in the area).

5.3 Construction Phase Impacts

No specialist study was undertaken for this aspect, as the site is:

i. Contained entirely within the existing KPS project area, which has been historically highly disturbed and impacted (brownfields site);
ii. The entirety of the site is currently cultivated garden consisting entirely of mowed and maintained lawn grass. As such, the ecological contribution of the proposed footprint is deemed negligible and impact thereto low to negligble.

As such, no specialist input was deemed necessary to adequately address the impacts of the proposed project. Potential impacts as determined by the Environmental Assessment Practitioner (EAP) have been included below.

a) Potential impacts on Biodiversity

Nature: Clearing of vegetation		
	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Temporary (2)	Temporary (0)
Magnitude	Minor (2)	Low (0)
Probability	Definite (5)	Definite (5)
Significance	Low (13)	Low (1)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes
Mitigation: » Contractors should rehabilitate areas that were affected by the proposed development in accordance with the EMPr. » Existing service roads within the station should be used. » Only areas within the development footprint must be cleared. » Strict control over the movement of heavy equipment/machinery must be maintained.		
Cumulative impacts: » None		
Residual impacts:		

» None

b) Soil Compaction & Erosion

Nature:
Activities relating to the excavation of foundations on site will create a soil compaction and erosion impact during this phase. Therefore, the movement of traffic, storage of equipment, and stockpiling of any topsoil is regarded as an impact for this phase. Above all, the removal of the lawns will expose the soil to erosion agents such as wind and surface run-off, thus increasing the soils susceptibility to erosion.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Temporary (2)	Temporary (0)
Magnitude	Minor (2)	Minor (0)
Probability	Definite (5)	Improbable (2)
Significance	Low (13)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation :
- » Contractors should rehabiliate areas that were affected by the proposed development in accordance with the EMPr.
- » Existing service roads within the station must be used.
- » Bare areas should be suppressed for dust (using a water tank/bowser) in accordance with the EMPr. Therefore, this will reduce the likelihood of wind being an effective erosion agent for the duration of the 18-month construction phase.
- » Only areas within the development footprint must be cleared.
- » Removed soil should be used as infill material for any voids created during the construction phase.
- » Drivers and operators of any equipment being used should adhere to the prescribed speed limits within the station.

Cumulative impacts:
- » None

Residual impacts:
- » None

c) Potential impacts on Air quality:

Nature:
Generation of Dust

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (0)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (4)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation :
- » Clearance of areas with cultivated lawn grass must be kept to a minimum.
- » Regular dust suppression of dusty construction areas by a water bowser tank or any appropriate absorbent material at construction areas.
- » Bare surfaces should be re-planted with lawn during the rehabilitation phase in accordance with the EMPr.
- » Low emission equipment and machinery should be used.
- » Ensure that construction vehicles are maintained to keep emissions within possible limits.
- » Construction vehicles should adhere to the station's prescribed speed limit.
- » Workers should be provided with PPE (i.e dust mask etc).

Cumulative impacts:
- » None

Residual impacts:
- » None

d) Generation of Solid Waste

Nature:
During the construction phase, examples of solid waste will include but not limited to, rubble from the construction activities and any surplus material or waste generated during the clearance of the site.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Improbable (1)
Significance	Low (16)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

General waste:

- Where possible, waste should be recycled.
- General waste should be disposed of an approved waste disposal facility.
- All unused or used concrete or brick rubble must be removed on completion of the construction activities.
- No dumping of waste material must be permitted in the surrounding open areas.
- Records of all waste being taken off site must be recorded and kept as evidence.
- Management of solid waste should be handled according to KPS's Waste Management Procedure (RER0221)

Hazardous waste:

- Spillages during construction should be cleaned up using absorbent material.
- Absorbent materials used to clean up spillages should be disposed of in a separate and labelled hazardous waste bin.
- The storage area for hazardous material must be concreted, bunded, covered, labelled and well ventilated.
- All hazardous waste must be disposed at an appropriately registered hazardous waste disposal facility.
- Records of all waste being taken off site must be recorded and kept as evidence.
- Management of hazardous waste should be handled according to KPS's Waste Management Procedure (RER0221).

Cumulative impacts:
- None

Residual impacts:
- None

e) Health and Safety Impacts

Nature:
Impacts on the health and safety of the Contractors and staff is anticipated during the construction phase.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (8)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- All Health and Safety regulatory frameworks must be complied with.

- Areas near generators and fuel storage tanks must be clearly demarcated as no-smoking areas.
- Workers should conduct and complete a job-specific risk assessment before commencing with any task.
- The Contractor should implement the Emergency Preparedness Plan (RIR0113) available at the station.
- Fire extinguishers must be placed (and serviced regularly) at conspicuous locations so they can be easily accessible.
- All staff must be provided with adequate PPE gear.

Cumulative impacts:
- None

Residual impacts:
- None

f) Creation of employment opportunities

Nature:
Contractors are expected to give preference to unskilled and skilled labourers residing in the communities of Kriel and Thubelihle for the duration of the construction phase.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Low (2)
Probability	Definite (5)	Improbable (2)
Significance	Low (20)	Low (8)
Status (Positive or negative)	Positive	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- A local's first approach should be adopted for the procurement of sub-contractors and employees on the construction site.
- Priority should be given to unskilled members of the local community.
- Existing local community structures should be used as a communication or liaison tool between the applicant and members of the local community.

Cumulative impacts:
- None

Residual impacts:
- Unemployment levels within Kriel and Thubelihle at a broader scale remains unchanged

g) Purchase of Materials from local SMEs:

Nature:
The construction of the clarifiers and associated infrastructure and supply chain opportunities will be created that could benefit local SMEs.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Low (2)
Probability	Definite (5)	Improbable (2)
Significance	Low (20)	Low (8)
Status (Positive or negative)	Positive	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- Liaison should be made with local businesses to register on a vending list to manage expectations.

Cumulative impacts:
- None

Residual impacts:
- None

h) Noise Impacts:

Nature Noise impacts are expected as a result of civil works for the duration of the construction phase.		
	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (3)	Minor (2)
Probability	Definite (5)	Improbable (2)
Significance	Low (25)	Low (8)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes
Mitigation: » Any drilling activity should take place during the approved working hours, these are to be known and agreed upon with all contractors. » Machinery and equipment are to be switched off when not used. » All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993). » Noise protection ((i.e. earplugs/ear muffs) should be used by all construction workers where excessive noise is to be generated.		
Cumulative impacts: » None		
Residual impacts: » None		

i) Impacts on Security:

Nature: Potential safety and security risk posed by the presence of construction workers on site.		
	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (8)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes
Mitigation: » Contractors and staff should be searched when entering the station's premises and when exiting. » Vehicles should be searched when entering the premises and exiting the premises » The movement of contractors on-site should be closely managed and monitored by the Contractor.		
Cumulative impacts: » None		
Residual impacts: » None		

j) Traffic Impacts:

Nature: An increase in traffic inside the Kriel Power Station is expected to increase during the construction phase, due to the delivery of workers and various components required for the expansion of the lime plants.		
	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)

Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	Medium (30)	Low (12)
Status (Positive or negative)3	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- » Contractors should adhere to speed limits and roads signs on and off site at all times.
- » All construction vehicles must be road worthy and all designated drivers must be in possession of a valid South African drivers licence.
- » If any abnormal loads will be transported to site during the construction phase, all the prescribed permits and clearances should be obtained from the relevant authorities. Above all, abnormal load transportation should be limited to during peak hours.
- » Transportation of material and waste should complu with the necessary road regulations at all times.

Cumulative impacts:
- » None

Residual impacts:
- » None

k) Storm Water Impacts:

Nature:
Storm water impacts during periods of rainfall.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	Medium (40)	Low (18)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- » Use of appropriate structures (silt nets, sand bags etc.) to prevent sedimentation during construction.
- » Use of sumps to filter contaminated storm water flows where appropriate to reduce contamination of storm water.
- » Implementation of suitable storm water structures to handle storm water run-off from hard structures following the expansion of both facilities.
- » Upgrade and utilise the existing storm water management plan for the KPS, or compile a new storm water management plan should this be required.
- » Monitor and control hydrocarbon leakages from construction equipment and machinery (i.e. placement of drip trays underneath machinery during mechanical breakdowns).

Cumulative impacts:
- » None

Residual impacts:
- » None

5.4 Operation Phase Impacts

a) Generation of Solid Waste:

Nature:
Domestic Waste is anticipated to be generated during the 20-yerar operational lifespan of the plant.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long term (4)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Improbable (1)
Significance	Low (28)	Low (5)

Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

General waste:

- Where possible, waste should be recycled.
- General waste should be disposed of an approved waste disposal facility.
- No dumping of waste material must be permitted in the surrounding open areas.
- Records of all waste being taken off site must be recorded and kept as evidence.
- All solid waste should be handled and disposed of in accordance with KPS's Waste Management Procedure (RER0221).
- Records of all waste being taken off site must be recorded and kept as evidence.

Cumulative impacts:
- None

Residual impacts:
- None

b) Hazardous Waste Generation:

Nature:
During the operational phase, hazardous waste is expected to be generated from the Lime Plants and disposed of in the ash water dams on the station.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Improbable (1)
Significance	Low (28)	Low (5)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

Hazardous waste:

- Any spillages during the operational phase should be cleaned up using absorbent material.
- Absorbent materials used to clean up spillages should be disposed of in a separate and labelled hazardous waste bin.
- The storage area for hazardous material must be concreted, bunded, covered, labelled and well ventilated.
- All hazardous waste should be handled and disposed of in accordance with KPS's Waste Management Procedure (RER0221).
- All hazardous waste must be disposed at an appropriately registered hazardous waste disposal facility or at the ash water dams.
- Records of all waste being taken off site must be recorded and kept as evidence.

Cumulative impacts:
- None

Residual impacts:
- None

b) Health and Safety Impacts

Nature:
Impacts on the health and safety of the staff is anticipated during the operation phase.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (2)

Probability	Probable (3)	Improbable (2)
Significance	Low (27)	Low (14)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

- All Health and Safety regulatory frameworks must be complied with.
- Areas near generators and fuel storage tanks must be clearly demarcated as no-smoking areas.
- SHEQ Department should implement and co-ordinate regular fire drills in conjunction of those at the station.
- The plant operators should conduct and complete a job-specific risk assessment before commencing with any task on the plants.
- An existing Emergency Plan for the Lime Plants must be used or updated following the addition of new infrastructure.
- Fire extinguishers must be placed (and serviced regularly) at conspicuous locations so they can be easily accessible.
- All staff must be provided with adequate PPE gear.

Cumulative impacts:

- None

Residual impacts:

- None

c) Employment creation:

Nature:
Eskom is expected to give preference to skilled plant operators residing in the communities of Kriel and Thubelihle for the duration of the operational phase.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (21)
Status (Positive or negative)	Positive	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

- Priority should be given to skilled plant operators located within the surrounding communities.
- Existing local community structures should be used as a communication or liaison tool between the applicant and members of the local community.

Cumulative impacts:

- None

Residual impacts:

- Unemployment levels within Kriel and Thubelihle at a broader scale remain unchanged as the operational phase will only generate negligible employment opportunities.

d) Economic Benefits to Kriel Power Station:

Nature:
The proposed expansion on the lime plants will reduce the station running costs during the operational phase.

	Pre-Mitigation	**Post-Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Medium (35)
Status (Positive or negative)	Positive	Positive
Reversibility	Reversible	Reversible

Can impact be mitigated?	Yes	Yes

Mitigation:
- Latest technology and equipment should be procured and utilised on the plants to enhance its treatment capacity and durability.

Cumulative impacts:
- None

Residual impacts:
- None

e) Traffic Impacts:

Nature:
It is expected that lime powder will be delivered by road transport to the KPS as and when required.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (6)	Low (3)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (32)	Low (10)
Status (Positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- Contractors tasked with the delivery of lime powder to the KPS should adhere to speed limits and roads signs on and off station at all times.
- Should there be more than one heavy load vehicle making a delivery, alternative parking (preferably outside the station) should be used.
- All heavy load vehicles delivering lime powder to the station must be road worthy and all designated drivers must be in possession of a valid South African drivers licence.

Cumulative impacts:
- None

Residual impacts:
- None

f) Storm Water Impacts:

Nature:
Storm water impacts during periods of rainfall.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (32)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- Ensure bare areas around the plants are paved.
- Monitor and control hydrocarbon leakages from operations equipment and machinery (i.e. placement of drip trays underneath plant components during mechanical breakdowns).
- Ensure ongoing and sufficient maintenance of the stormwater drains of the lime treatment plant facility to ensure effective stormwater control on site.

Cumulative impacts:
- None

Residual impacts:
- None

5.5 Decommissioning Phase Impacts

a) Soil Compaction & Erosion

Nature:
Activities relating to the removal of foundations on site will create a soil compaction and erosion impact during this phase. Therefore, the movement of traffic, storage of equipment, and stockpiling of any material is regarded as an impact for this phase. Above all, the removal of the lawns will expose the soil to erosion agents such as wind and surface run-off, thus increasing the soils susceptibility to erosion.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Temporary (2)	Temporary (0)
Magnitude	Minor (2)	Minor (0)
Probability	Definite (5)	Improbable (2)
Significance	Low (13)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation :
- Removal of any foundations should be kept within the development footprint.
- Clearance of any areas with cultivated lawn grass must be kept to a minimum.
- Existing service roads within the station must be used.
- Bare areas should be suppressed for dust (using a water tank/bowser) in accordance with the EMPr. Therefore, this will reduce the likelihood of wind being an effective erosion agent for the duration of the 18-month construction phase.
- Removed soil should be used as infill material for any voids created during the decomissioning phase.
- Drivers and operators of any equipment being used should adhere to the prescribed speed limits within the station.

Cumulative impacts:
- None

Residual impacts:
- None

b) Waste Generation:

Nature:
During the decommissioning phase, examples of solid waste will include but not limited to, rubble from the decommissioned infrastructure and any surplus material or waste generated during the decommissioning of the plants. .

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Improbable (1)
Significance	Low (16)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:

General waste:
- Where possible, waste should be recycled.
- General waste should be disposed of an approved waste disposal facility.
- All concrete or brick rubble must be removed on completion of the decomissioning activities.
- No dumping of waste material must be permitted in the surrounding open areas.

- Records of all waste being taken off site must be recorded and kept as evidence.
- Contractors undertaking any decomissioning activity should adhere to the detailed Waste Management Plan.

Hazardous waste:

- Spillages during the decomissioning phase should be cleaned up using absorbent material.
- Absorbent materials used to clean up spillages should be disposed of in a separate and labelled hazardous waste bin.
- The storage area for hazardous material must be concreted, bunded, covered, labelled and well ventilated.
- All hazardous waste must be disposed at an appropriately registered hazardous waste disposal facility.
- Records of all waste being taken off site must be recorded and kept as evidence.

Cumulative impacts:
- None

Residual impacts:
- None

c) Air Quality Impacts

Nature:
Generation of Dust

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (0)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (4)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation :
- Regular dust suppression of dusty decomissioning areas by a water bowser tank or any appropriate absorbent material at construction areas.
- Low emission equipment and machinery should be used.
- Ensure that construction vehicles are maintained to keep emissions within possible limits.
- Construction vehicles should adhere to the station's prescribed speed limit.
- Workers should be provided with PPE (i.e dust mask etc).

Cumulative impacts:
- None

Residual impacts:
- None

d) Health and Safety Impacts:

Nature:
Impacts on the health and safety of the Contractor and workers is anticipated during the decommissioning phase.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (8)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- All Health and Safety regulatory frameworks must be complied with.

- Areas near generators and fuel storage tanks must be clearly demarcated as no-smoking areas.
- Workers should conduct and complete a job-specific risk assessment before commencing with any task.
- Fire extinguishers must be placed (and serviced regularly) at conspicuous locations so they can be easily accessible.
- All staff must be provided with adequate PPE gear.

Cumulative impacts:
- None

Residual impacts:
- None

e) Security Risk:

Nature:
Potential safety and security risk posed by the presence of an influx of workers on site.

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (8)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	Yes

Mitigation:
- Contractors and staff should be searched when entering the station's premises and when exiting.
- Vehicles should be searched when entering the premises and exiting the premises
- The movement of contractors on-site should be closely managed and monitored by the Contractor.

Cumulative impacts:
- None

Residual impacts:
- None

f) Traffic Impacts:

Nature:
Increase in traffic can be expected within the KPS during the decommissioning phase. This follows the disassembly of plant infrastructure and transportation from the station by heavy load vehicles

	Pre-Mitigation	Post-Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (5)	Minor (0)
Probability	Definite (5)	Improbable (1)
Significance	Medium (35)	Low (2)
Status (Positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Can impact be mitigated?	Yes	

Mitigation:
- Contractors tasked with the decomissioning of the lime plants should adhere to the speed limit and road signs on and off the station at all times.
- Alternative parking areas should be utilised for heavy load vehicles taking material from the lime plants to designated waste disposal sites for decomissioning purposes.
- All heavy load vehicles that will collect various components of the lime plants from the station for decomissioning, their drivers must all be in possession of a valid South African drivers licence.

Cumulative impacts:
- None

Residual impacts:

- None

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

The proposed Lime Plant upgrades discussed in this report will provide the proponent, Eskom (KPS) to reduce running costs and continue to fulfil its mandate (power generation) optimally. Therefore, the approval of this project means any scaling potential (in piping infrastructure) within the water treatment infrastructure at the station will be greatly reduced, thus minimising the potential and likelihood of plant breakdowns. In the view of this, it would be of benefit if the proposed development could be approved by the Competent Authority (DEA), as it would enable Eskom and the KPS to fulfil their respective objectives.

The conclusions and recommendations of this BA Report are the result of the assessment of identified impacts by the environmental assessment practitioner, and the parallel process of Public Participation. The Public Participation process has been extensive and every effort has been made to include representatives of all stakeholders in the broader study area. A summary of the recommendations and conclusions for the Kriel Power Station Lime Plant Upgrade is provided in this Chapter.

6.1 Legal Requirements as per the EIA Regulations for the undertaking of an Environmental Impact Assessment Report, 2014 (as amended)

This chapter of the EIA report includes the following information required in terms of Appendix 3: Content of Environmental Impact Assessment reports:

Requirement	Relevant Section
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	No specialist studies were required nor undertaken for this project as the project site is already a completely modified area, within an existing brownfield development (KPS). A summary of the findings of the BA report are included in section 6.4. A summary of the recommendations for the Kriel Power Station Lime Plant Upgrade is included in section 6.6.
(h)(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted Scoping Report.	The preferred alternative for the proposed development has been included in section 6.4.
(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement (overall conclusion) is included in section 6.7. A summary of the key findings of the environmental impact assessment is included in sections 6.3. No sensitive areas or no-go areas where identified within the development footprint, thus sub-regulation (ii) is not applicable in this regard, however a map showing the development footprint and associated infrastructure has been included in Section 6.3 as Figure 6.1.A summary of the costs (negative) and benefits (positive) impacts and risks of the proposed Kriel Power Station Lime Plant Upgrade is included in section 6.3.
(n) the final proposed alternatives which respond to the impact management measures, avoidance and mitigation measures identified through the assessment.	No environmental sensitivities were found within this BA process; thus, no alternative sites are available for the proposed development.
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	The BA Report in section 6.3, 6.4 and 6.5 prescribes for conditions that should be included in the environmental authorisation by the Competent Authority.
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the Kriel Power Station Lime Plant Upgrade should receive authorisation and the conditions that should form part of the authorisation is included in section 6.6.

6.2 Overview of the Kriel Power Station Lime Plant Upgrade

The Kriel Power Station utilises the open re-circulating system where steam used by the turbines is recovered through the process of condensation. During condensation, the temperature of the cooling water is decreased through exposure to ambient air in the Cooling Towers (i.e. heat exchange) and some water is lost to evaporation. The water remaining in the cooling system will contain an increase in concentrations of impurities. This water, called 'hot duct', has a high alkalinity and is softened in the Lime Treatment Plant to reduce scaling potential in the condensers.

The expansion of the existing Lime Treatment Plants will increase the treatment capacity of the existing Lime Treatment plants to 174 000m^3 per day. The development footprint of the proposed project will be 1.9ha in extent within a broader study area of ~700ha and will consist of the following infrastructure which has been included in this BA process.

- Clarifiers with a capacity of ~1750m^3 .
- A 600mm x 500m pipe on each Lime Plant to tap of 10% 'hot duct' from the Cooling Towers into the plants for lime treatment.
- Dilution water feed pumps.

The proposed development of the Lime Treatment Plant upgrades within the Kriel Power Station is considered to be desirable as a result of the opportunity for Eskom to conserve water throughout the power generation process, save operational costs and the opportunity to provide employment.

6.3 Evaluation of the Proposed Project

The preceding chapters of this report, provided a detailed assessment of the environmental impacts on the social and biophysical environment as a result of the proposed project, as identified through this BA process. This Chapter concludes the BA process by providing a summary of the conclusions of the assessment of the Kriel Power Station Lime Plant Upgrade and associated infrastructure. In doing so, it draws on information gathered as part of the BA process and the knowledge gained by the environmental consultants during the course of the Basic Assessment, and presents an informed opinion of the environmental impacts associated with the proposed project.

From the conclusions of the detailed BA process undertaken, no fatal flaws, no-go areas or areas of high sensitivity were identified within the project site (refer to **Figure 6.1**). Therefore, the entire project site has been assessed as being suitable and appropriate from an environmental perspective for the development and will not have a detrimental impact on any sensitive environmental features present in the surrounding area.

The potential environmental impacts associated with the Kriel Power Station Lime Plant Upgrade include:

a) Construction Phase

Construction Phase Impacts		
Nature: Potential Impacts on Biodiversity		
	Pre-Mitigation	Post-Mitigation
Significance	Low (13)	Low (1)
Nature:		

Soil Compaction & Erosion		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (13)	Low (2)
Nature: Potential Impacts on Air Quality (i.e. dust emissions etc.)		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (4)
Nature: Solid waste Generation (i.e. brick and cement rubble)		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (16)	Low (2)
Nature: Impacts on the health and safety of the Contractors (and workers) are anticipated during the construction phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (8)
Nature: Contractors are expected to give preference to unskilled and skilled labourers residing in the communities of Kriel and Thubelihle for the duration of the construction phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (20)	Low (8)
Nature: The construction of the clarifiers and associated infrastructure and supply chain opportunities will be created that could benefit local SMEs.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (20)	Low (8)
Nature: Noise impacts are expected as a result of civil works for the duration of the construction phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (25)	Low (8)
Nature: Potential safety and security risk posed by the presence of construction workers on site.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (8)
Nature: An increase in traffic inside the Kriel Power Station is expected to increase during the construction phase, due to the delivery of various components required for the expansion of the lime plants.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (30)	Low (12)
Nature: Storm water impacts during periods of rainfall.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (40)	Low (18)

b) Operation Phase

Operation Phase		
Nature: During the operation of the Lime Plants, solid waste will be generated by operators and maintenance workers on the plants.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (16)	Low (2)
Nature: During the operational phase, hazardous waste is expected to be generated from the Lime Plants and disposed of in the ash water dams on the station.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (16)	Low (2)
Nature: Impacts on the health and safety of the staff is anticipated during the operation phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (8)
Nature:		

Eskom is expected to give preference to skilled plant operators residing in the communities of Kriel and Thubelihle for the duration of the operational phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (21)	Low (21)
Nature: The proposed expansion on the lime plants will save the station running costs during the operational phase.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (35)	Medium (35)
Nature: It is expected that lime powder will be delivered by road transport to the KPS as and when required.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (32)	Low (10)
Nature: Storm water impacts during periods of rainfall.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (32)	Low (2)

c) Decomissioning Phase

Nature: Activities relating to the removal of foundations on site will create a soil compaction and erosion impact during this phase. Therefore, the movement of traffic, storage of equipment, and stockpiling of any material is regarded as an impact for this phase. Above all, the removal of the lawns will expose the soil to erosion agents such as wind and surface run-off, thus increasing the soils susceptibility to erosion.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (35)	Low (2)
Nature: During the decommissioning phase, examples of solid waste will include but not limited to, rubble from the decommissioned infrastructure and any surplus material or waste generated during the decommissioning of the plants. .		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (16)	Low (2)
Nature: Impacts on the health and safety of the Contractor and workers is anticipated during the decommissioning phase.		
Significance	**Pre-Mitigation**	**Post-Mitigation**
	Low (18)	Low (2)
Nature: Potential safety and security risk posed by the presence of an influx of workers on site.		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (8)
Nature: Increase in traffic can be expected within the KPS during the decommissioning phase. This follows the disassembly of plant infrastructure and transportation from the station by heavy load vehicles		
	Pre-Mitigation	**Post-Mitigation**
Significance	Medium (35)	Low (2)
Nature: Generation of Dust		
	Pre-Mitigation	**Post-Mitigation**
Significance	Low (18)	Low (4)

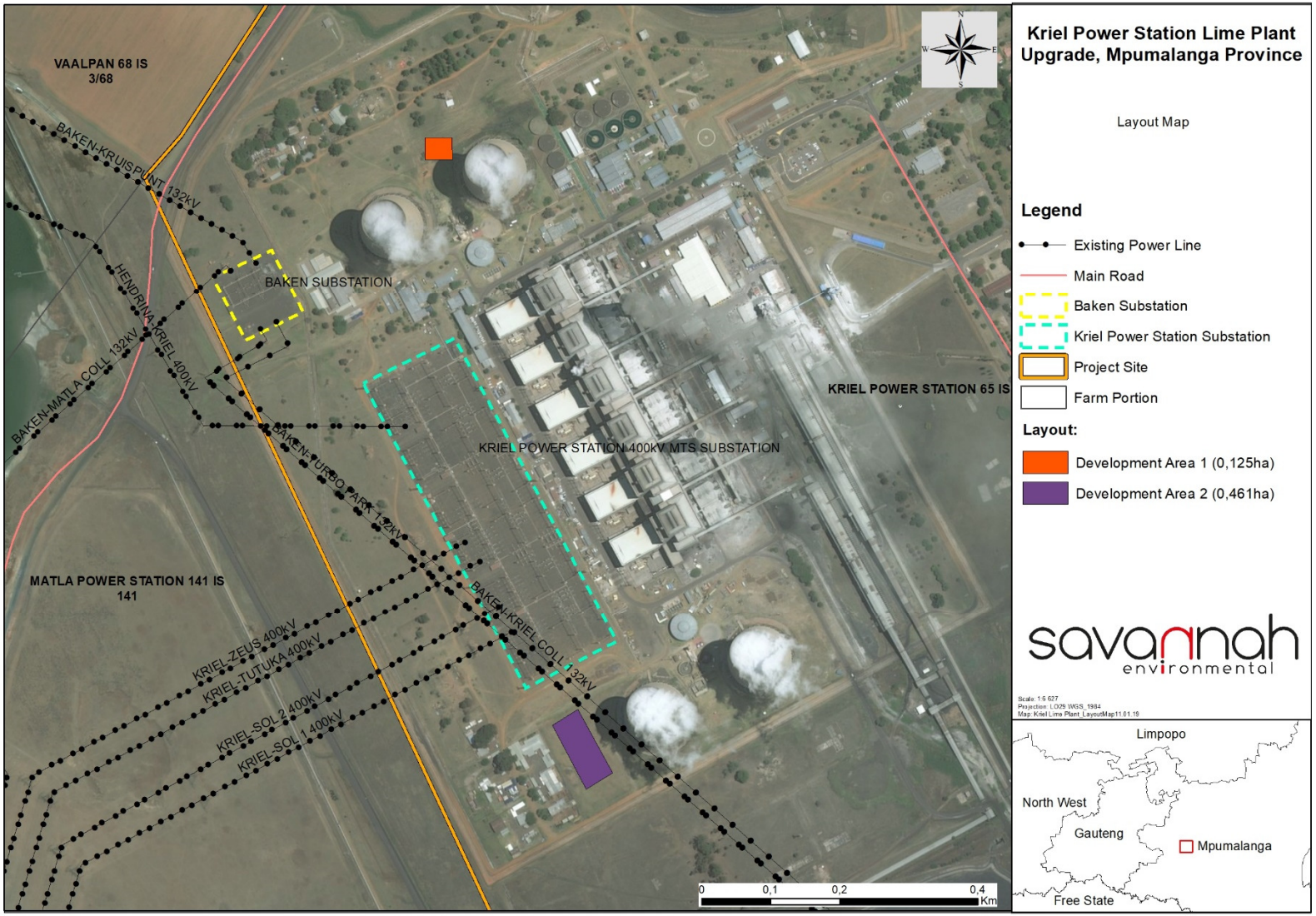

Figure 6.1: A layout map showing the proposed development footprint and associated infrastructure for the Kriel Power Station Lime Plant Upgrade project.

6.4 Environmental Costs of the Project versus Benefits of the Project

Environmental (natural environment, economic and social) costs can be expected at a site level and are considered acceptable provided that the mitigation measures as outlined in the EMPr are adhered to. These include:

- *Impacts on Vegetation:*
  - The proposed development footprint areas currently consists of cultivated and manicured lawns. Thus, during the construction and decomissioning, the lawns will cleared of to make way for the commencement of these phases.

- *Soil Compaction & Erosion:*
  - Activities relating to the excavation and removal of foundations on site will create a soil compaction and erosion impact during the construction and decomissioning phases. Therefore, the movement of traffic, storage of equipment, and stockpiling of any topsoil is regarded as a potential environmental cost to the proposed development. Above all, the removal of the lawns will expose the soil to erosion agents such as wind and surface water run-off, thus increasing the soil's susceptibility to erosion. However, the above-mentioned impacts will be confined within the proposed development footprint and mitigation measures will be implemented in accordance with the EMPr.

- *Solid and Hazardous Waste Generation:*
  - Solid waste will be generated during the construction, operation and decomissioning phases of the proposed development. However, the generation of solid waste will be confined to the proposed development footprint. In addition, mitigation measures will be implemented in accordance with the EMPr (i.e. provision of litter bins).
  - The generation of any hazardous material will be limited to the operational phase of the proposed development, and any hazardous waste material generated from the plants will be disposed of in the ash water dams located on the station.

- *Security Risks:*
  - An influx of labourers will be on the station during the construction and operational phases of the proposed development. Thus, this increases the likelihood of criminal activities (i.e. theft) occuring within the station's footprint. However, all labourers will be subjected or expected to follow the existing safety and security procedures on the station.

- *Traffic impacts*:
  - An increase in vehicular movmement within the station will cause a traffic impact during the construction and decomissioning phase. Therefore, this impact is attributed to the transportation of workers to site, delivery of components, transportation of waste and decomissioned infrastructure. However, it is recommended that the Contractors implement the mitigation measures included above (Section 6.3) in accordance with the EMPr.

These costs are expected to occur at a site level and are considered acceptable provided the mitigation measures as outlined in the EMPr are adhered to.

Benefits of the project include the following:

» *Conservation of Water Resources:*
  * The operation of the Lime Treatment Plant will reduce the need for make-up water in the cooling system at the power station. Therefore, this is considered to be a benefit for water consumption and conservation of natural water resources in the region and nationally since supply pressure on the Vaal Water Scheme will be reduced.

» *Reduction in waste generation and economic benefits for Kriel Power Station:*
  * The proposed upgrades on the Lime Plant will increase the treatment capacity of the existing infrastructure thus reducing the amount of effluent discharged to the wet ash dams from the Water Treatment Plant (WTP).
  * The increment in treatment capacity will significantly mitigate the possibility of any scaling or corrosion potential within the existing and new cooling water infrastructure at the power station. Therefore, this will indirectly have positive cost implications on the need for maintenance and refurbishment of the infrastructure.
  * The construction phase of the proposed development is expected to last for a period of 16 months during which low to semi-skilled workers in the neighbouring communities of Thubelihle and Kriel will be given first preference in employment opportunities. Furthermore, materials will be procured from SMEs within the municipal area.
  * Eskom and Kriel Power Station will save running costs on the station following the proposed upgrades due to the less amount of water that will be required as make-up and on maintenance costs for the existing infrastructure.

The benefits of the project are expected to occur at a national, regional and local level. These benefits offset the localised environmental costs of the project, which are considered to be of low significance since the proposed development will occur within the existing footprint of the power station and provided the proposed mitigation measures in the EMPr are implemented.

6.5 Overall Conclusion (Impact Statement)

The findings of the environmental assessment practitioner undertaken within this BA process assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that:

» Impacts associated with the construction and operation of the Kriel Power Station Lime Upgrade and associated infrastructure are expected to be of medium to low significance with the implementation of appropriate mitigation measures.
» The operation of the project will reduce supply pressure on the Vaal Water scheme.
» The project will minimise the potential of scaling and corrosion within the water treatment infrastructure, hence reducing maintenance and refurbishment costs of the facility at the Kriel Power Station.
» The Kriel Power Station Lime Plant Upgrade will assist the eMalahleni Local Municipality in reducing the level of unemployment through the creation of jobs and supporting local business in a municipality with a 19% unemployment rate.
» The project supports the creation of local employment, business opportunities and skills development for the Thubelihle and Kriel communities.
» No environmental fatal flaws were identified to be associated with the proposed project provided that the recommended mitigation measures are implemented.

The findings of the environmental assessment practitioner (EAP) undertaken within this Basic Assessment to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed Kriel Power Station Lime Plant Upgrade from proceeding, provided that the recommended mitigation and management measures as per the EMPr are implemented. The significance levels of the majority of identified negative impacts have been reduced by implementing the mitigation measures recommended by the EAP during the BA process. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) for the Lime Plant Upgrade which is included within **Appendix D.**

With reference to the information available at this planning approval stage in the project cycle, the environmental assessment practitioner recommends that the Kriel Power Station Lime Plant Upgrade be **authorised**, provided all mitigation measures provided in the EMPr are implemented.

6.6 Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance, the benefits expected, the findings of the BA process, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the project can **proceed** on condition that the mitigation measures specified in **Chapters 6** of the BA Report, and those provided within the EMPr contained within **Appendix D** of this BA report are observed and implemented.

The following key conditions would be required to be included within an authorisation issued for the project:

- All mitigation measures detailed within this report must be implemented.
- The Environmental Management Programme (EMPr) as contained within **Appendix D** of this report must form part of the contract with the Contractors appointed to construct, operate and maintain the Lime Plant upgrades and the Lime Treatment Plant, and must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered key in achieving the appropriate environmental management standards as detailed for this project.

CHAPTER 7 REFERENCES

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