320MW EMERGENCY RISK MITIGATION POWER PLANT (RMPP) AND ASSOCIATED INFRASTRUCTURE NEAR RICHARDS BAY, KWAZULU-NATAL PROVINCE

Environmental Impact Assessment Report

February 2021

DEFF Reference No.: 14/12/16/3/3/2/2041

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PROJECT DETAILS

DEFF Reference No.	:	14/12/16/3/3/2/2041
Title	:	Environmental Impact Assessment Process: Environmental Impact Assessment Report for 320MW Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructure near Richards Bay, KwaZulu-Natal Province
Authors	:	Savannah Environmental (Pty) Ltd Jo-Anne Thomas Jana de Jager
Applicant	:	Phinda Power Producers (Pty) Ltd
Report Status	:	Environmental Impact Assessment Report for Public Review from **19 February 2021 – 23 March 2021**
Date	:	February 2021

When used as a reference this report should be cited as: Savannah Environmental (2021) Environmental Impact Assessment Report 320MW RMPP near Richards Bay, KwaZulu-Natal

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

Phinda Power Producers (Pty) Ltd (the project proponent) (Phinda) proposes to develop an Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructures, with a generating capacity of up to 320MW. The proposed project is to be known as the 320MW RMPP. The Project site is located in Alton core industrial area adjacent to Richards Bay Industrial Development Zone (IDZ), and approximately 8km south west of Richards Bay city centre, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province. The facility will have an installed generating capacity of up to 320MW, to operate with liquified petroleum gas (LPG) as an initial source and will convert to utilising natural gas once this is available in Richards Bay.

The 320MW RMPP has been initiated by Phinda in partnership with Globaleq Africa Limited and Mainstream (hereafter referred to as the Project Consortium), in response to the procurement process initiated by the Independent Power Producer Office (IPP Office) in August 2020 for the procurement of up to 2000MW of dispatchable generation capacity from a range of technologies in the short- to medium-term under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPP). This allocation is in accordance with the new generation capacity required as specified in the Integrated Resource Plan 2019 and accompanying ministerial determination from the Minister for the Department of Mineral Resources and Energy (DMRE) to which the National Energy Regulator of South Africa (NERSA) has concurred. A bid under the RMIPPPP has been submitted by the Project Consortium for the proposed 320MW RMPP as part of a hybrid project solution.

As the 320MW RMPP has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction and operation of the project. The nature and extent of the 320MW RMPP and associated infrastructure, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this EIA Report.

This EIA Report consists of the following chapters:

- **Chapter 1** provides background to the proposed project and the environmental impact assessment process.
- **Chapter 2** outlines the strategic legal context for energy planning in South Africa and the proposed project.
- **Chapter 3** provides a description of the gas to power technology and how it will function as part of a hybrid project.
- **Chapter 4** provides a description of the proposed project, including feasible alternatives identified and considered.
- **Chapter 5** outlines the need and desirability of the proposed project.
- **Chapter 6** describes the existing biophysical and socio-economic environment affected by the proposed project t.
- **Chapter 7** outlines the process which was followed during the EIA Phase of the EIA Process.
- **Chapter 8** provides a description and assessment of the potential issues and impacts associated with the proposed project
- **Chapter 9** provides a description and assessment of the potential cumulative impacts associated with the proposed project
- **Chapter 10** presents the conclusion and recommendations based on the findings of the EIA report.

» **Chapter 11** provides a list of all references used in the compilation of the EIA Report.

The EIA report is available for review from Friday, 19 February 2021 until Tuesday, 23 March 2021. at the following locations**:**
» https://savannahsa.com/public-documents/energy-generation/

Please submit your comments by **Tuesday 23 March 2021** to:
Nicolene Venter PO Box 148, Sunninghill, 2157 Tel: 011-656-3237 Fax: 086-684-0547 Email: publicprocess@savannahsa.com

Comments can be made as written submission via fax, post or email.
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EXECUTIVE SUMMARY

Phinda Power Producers (Pty)(Ltd) (Phinda) proposes to develop an Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructures, with a generating capacity of up to 320MW. The proposed project is to be known as the 320MW RMPP. The Project site is located in Alton core industrial area adjacent to Richards Bay Industrial Development Zone (IDZ), and approximately 8km south west of Richards Bay city centre, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province. The facility will have an installed generating capacity of up to 320MW, to operate with liquified petroleum gas (LPG) as an initial source and will convert to utilising natural gas once this is available in Richards Bay.

The 320MW RMPP has been initiated by Phinda in partnership with Globaleq Africa Limited and Mainstream Renewable Power Developments (hereafter referred to as the Project Consortium), in response to the procurement process initiated by the Independent Power Producer Office (IPP Office) in August 2020 for the procurement of up to 2000MW of dispatchable generation capacity from a range of technologies in the short- to medium-term under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). This allocation is in accordance with the new generation capacity required as specified in the Integrated Resource Plan 2019 and accompanying ministerial determination from the Minister for the Department of Mineral Resources and Energy (DMRE) to which the National Energy Regulator of South Africa (NERSA) has concurred. A bid under the RMIPPPP has been submitted by the Project Consortium for the proposed 320MW RMPP as part of a hybrid project solution.

No environmental fatal flaws were identified in the detailed specialist studies conducted It is recommended that mitigation measures are implemented to reduce impacts to acceptable levels. The potential environmental impacts associated with 320MW RMPP identified and assessed through the EIA process include:

- Impacts on Terrestrial Biodiversity
- Impacts on Wetland and Aquatic Biodiversity
- Impacts on Geo-Hydrology & Surface Water
- Impacts on Air Quality
- Impacts on Climate Change
- Visual impacts
- Impacts on ambient Noise Levels
- Impacts on Archaeology & Palaeontology
- Socio-Economic impacts
- Traffic impacts
- Impact due to unplanned events

Impacts on Terrestrial Biodiversity

The vegetation within the proposed development site was broadly classified into two vegetation communities, namely *Helichrysum - Chrysanthemoides* coastal grasslands, and a small portion (approximately 1,4 hectares) of the development site consisted of *Eucalyptus* plantations. A *Phragmites* -

Typha channelled valley bottom wetland community was recorded outside of the eastern border of the development site. Vegetation on the site was considered to be of medium to low sensitivity.

Potential impacts on the terrestrial biodiversity as determined through the Terrestrial Biodiversity Assessment (**Appendix D**) are expected to be associated with the construction phase and are related to the loss of vegetation and terrestrial habitat. Potentially, this results in a loss of fauna and flora species, migration corridors and the potential loss of protected species and species of special concern. Disturbance of the natural vegetation by the proposed activities may furthermore accelerate the growth of exotic species. However, the proposed development site has a long history of transformation and therefore the impacts on the terrestrial environment are likely to be limited as the species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types.

No protected species were observed during the site visit. A search and rescue operation will however be required during a follow-up site visit, prior to construction, to ensure that none of the potential species prevalent in the area (*Crinum stuhlmannii* and *Zoothera guttata*), and with the potential to be found on the site, are on site or harmed. The specialist concluded that the site was found not to be critical for meeting the biodiversity targets and thresholds required to ensure the persistence of viable populations of species and the functionality of ecosystems within a CBA. In addition, it was determined that the site does not fall within any IFC critical habitat as described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2019).

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts associated with 320MW RMPP can be reduced to medium and low. It is the opinion of the specialists that should the mitigation measures recommended herein be adhered to, the impacts can be reduced to an acceptable level resulting in minimal negative residual biodiversity impacts.

Impacts on Wetland and Aquatic Biodiversity

Four wetland units were identified within the Aquatic Biodiversity Assessment (**Appendix E**) as falling within the Department of Human Settlement, Water and Sanitation's 500 m regulated area. Two were classified as *Phragmites - Typha* channelled valley bottom wetlands; one located to the west of the proposed development site and the other along the eastern border of the site. Two *Imperata cylindrica* depression wetlands are located upstream on Erf 1854 at the northern boundary of the 500 m regulatory area. These depression wetlands will not experience change to any of the four main wetland drivers, viz. habitat, biota, flow and water quality by the proposed development.

The *Phragmites - Typha* channelled valley bottom located at the eastern boundary of the site has experienced a moderate change in ecosystem processes and a loss of natural habitats has taken place but the basic ecosystem functions are still predominantly unchanged. Even though this wetland was artificially channelled in the 1970's, this wetland is ecologically important and sensitive at a local scale. A 29 m buffer has been set for the wetland based on a combination of the EKZNW biodiversity guidelines (EKZNW 2016) and the guidelines for the determination of buffer zones for rivers, wetlands and estuaries by Macfarlane et al. (2017). The proposed development has taken cognisance of the buffer zone, excluding activities from this area.

A risk assessment was also undertaken according to the Department of Water and Sanitation Risk Assessment Guidelines and the results produced were of 'low' impacts in respect of all aspects.

Since the proposed project is located outside the *Phragmites - Typha* channelled valley bottom wetland and the 29m buffer which has been set for the wetland, the impacts on aquatic biodiversity are expected to be negligible with the implementation of mitigation measures. It is the opinion of the specialists that should the recommendations be implemented, the impacts will be at acceptable levels, poses no fatal flaws and the project may be approved.

Impacts on Geohydrology and Surface Water

The following can be deduced from the baseline groundwater and surface water sampling undertaken in the area (refer to **Chapter 7**):

» Non-conformances of borehole water quality to SANS 241:2015 drinking water requirements
» Groundwater contamination is most likely attributed to industrial activities to the north-west and north-east of the site.
» Sources of surface water contamination are likely attributed to industrial activities to the north of the project site. Of particular concern, are the elevated Microbiological Determinants (Total Coliforms, E.coli and Standard Plate Count) suggesting recent and/or long-term sewerage contamination.

The Geohydrological and Surface water Assessment (**Appendix F**) concluded that the degraded ground and surface water quality in the area is most likely attributed to surrounding industrial activities. The impacts of the project on water quality are however of low significance. Implementation of a ground and surface water monitoring programme is recommended during the construction phase of the 320MW RMPP. The monitoring programme will essentially be implemented to document and establish the long-term and historical baseline and/or ambient groundwater and surface water chemistry of the area prior to, and during development of the 320MW RMPP facility.

From a ground and surface water quality perspective, no objections for the project not to proceed was determined, and therefore the development may occur within the proposed development boundaries.

Impacts on Air Quality

The Air Quality Assessment (**Appendix H**) assessed baseline air quality at the site for thoracic particulates (with a diameter less than 10 µm – PM10), inhalable particulates (with an aerodynamic diameter less than 2.5 µm – $PM_{2.5}$), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) using baseline data for the period 2016 to 2019. Impacts are expected during construction and operation.

Construction (and decommissioning) activities are likely to result in emissions of particulate and gaseous pollutants due to civil and building work and from vehicle traffic. The nature of emissions from construction activities is highly variable in terms of temporal and spatial distribution and is also transient. Increased ambient concentrations of fine particulates and gaseous pollutants may result in negative human health impacts. Increased nuisance dustfall is likely as a result of wind-blown dust emissions from the working areas. Increased nuisance dustfall rates will likely result in negative impact on dustfall at nearby residences and on potentially on plants. Unmitigated particulate emissions were conservatively found to exceed

assessment criteria for up to 400 m but not at any residential areas, schools, and/or medical facilities. Areas to the south of the project site are more likely to be affected, especially in the short-term, due to the predominant winds. The impact of gaseous pollutants is likely to be minor.

The normal operation of the proposed 320MW RMPP open cycle power station will result in emission of gaseous and particulate pollutants including: SO_2, NO_2, PM, CO, and VOCs. Increased ambient concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall. Unmitigated emissions of these pollutants were found to comply with the assessment criteria and off-site impacts are unlikely. Residential receptors, schools, and medical facilities are unlikely to be affected. Areas to the north east of the project site are more likely to be affected in the long-term, due to the predominant winds.

The findings from the air quality impact assessment are summarised as follows:

» The stand-alone impact of the 320 MW RMPP on ambient air quality is likely to be low during normal operation and based on mitigation measures included in the proposed plant design.
» The 320 MW RMPP, in isolation, is unlikely to make a substantive (less than 5%) contribution to cumulative ambient air pollutant concentrations. However, the cumulative contribution of gas-to-power projects in the Richards Bay airshed, could – in the medium- to long-term – add up to 14% of the National Ambient Air Quality Standards, most strongly influencing the ambient NO2 concentrations.
» The baseline air pollutant concentrations show exceedances of short-term (hourly and/or daily average) pollutant concentrations due to existing sources of pollution in the airshed. The potential exists, therefore, that the cumulative impact may (in the medium- to long-term) reflect exceedances of the NAAQS but the contribution of the gas-to-power projects will be limited and acceptable.

From an air quality perspective, it is the opinion of the specialist that the project be authorised and licensed to operate, on condition that:

» Emissions be monitored as per standard practice for the appropriate listed activity, controlled emitters, and non-classified boilers.
» Emissions are maintained at or lower than the Minimum Emission Standards appropriate for the listed activity and controlled emitters.
» Conformance with the environmental management programme.

Impacts on Climate Change

The proposed 320MW RMPP's emissions will contribute to climate change on a global scale, which will, ultimately, impact South Africa. South Africa's Nationally Determined Contribution (NDC) submitted in Paris in 2015 sets out the nation's emissions trajectory up to 2050. South Africa's emissions are expected to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter (the 'peak, plateau and decline trajectory'). The country's pledge for the peak, plateau and decline (PPD) trajectory is set to emit between 398 $MtCO_2e$ and 614 $MtCO_2e$ between 2025 and 2030.

As determined through the Climate Change Impact Assessment (**Appendix I**), the magnitude of the impact of the Project in relation to South Africa's carbon budget is considered to be very high over the life of the Project, as the Project's emissions exhaust 0.62% of the carbon budget (where a value greater than

0.227% is considered very high). However, the use of gas as an energy source in electricity generation is less emissions intensive than diesel or coal-based power. Thus, the use of gas for electricity generation will reduce the amount of GHG emissions and pollutants produced in the generation of electricity. The inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid if the corresponding amount of renewable electricity generation capacity is installed.

Based on the findings of the climate change assessment, it is the opinion of the specialist that the 320MW RMPP be authorised and licensed to operate on condition that all recommendations are implemented prior to, or as conditions to the approval of, the EIA.

Visual Impacts

The Visual Impact Assessment (**Appendix K**) undertaken determined that the 320MW RMPP is not expected to have a significant visual impact within the larger study area. Due to the general absence of sensitive visual receptors within closer proximity to the power plant, with the exception of observers travelling along the R34 arterial road, there are no areas of significant potential visual impact. The R34 road is therefore the only receptor identified as having a potential visual impact of higher significance. Even then it is unlikely that observers would be exposed to the infrastructure due to the depressed nature of the road and the vegetation cover north of the road.

The anticipated visual impacts , post mitigation, range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed power plant.

Considering all factors, it is recommended that the 320MW RMPP project as proposed be supported, subject to the implementation of the recommended mitigation measures and management programme.

Noise Impacts

The study area has an industrial character, with various active industrial activities and night-time sound levels typical of urban area (with main roads, business and workshops). The existing night-time sound levels at the site are higher than the recommended sound levels for residential use (i.e. 55 dBA). As a result, the criteria considered to determine whether a noise impact would result from the development was that the proposed project should not change the existing ambient sound levels with more than 3 dB.

The Noise Impact Assessment (**Appendix J**) included the conceptualisation of potential scenarios for the future proposed construction and operational phases, with the output of the modelling exercise indicating a potential noise impact of low significance for the construction and operational phases. No mitigation or management measures are required or recommended to reduce noise levels.

Similarly, no additional acoustic studies are recommended for this development, and it will not be required to develop or implement an environmental noise monitoring programme considering:

» the developmental character of the area;
» the results from the night-time ambient sound level measurements;
» the projected low significance of the noise impacts

It is therefore recommended that the proposed 320MW RMPP gas to power project be authorized from an acoustic perspective.

Impacts on Archaeology and Palaeontology

No heritage resources of significance were recorded within the study site. The desktop study indicated that several human settlements have the potential to occur in the general study area; however, none occurred within the 320MW RMPP project area. The study area consists of old agricultural fields.

Although considered unlikely, the main issue for this project from a heritage perspective will be the potential to intersect human remains during excavations for the development of the 320MW RMPP (**Appendix G**). The impact significance is assessed as low. No impacts on archaeological and palaeontological resources are expected in this project study area.

The specialist study recommended that the proposed 320MW RMPP road should be authorised from an archaeological perspective with the implementation of the recommended mitigation measures, when required.

Socio-economic Impacts

The Socio-economic Impact Assessment (**Appendix M**) identified both positive and negative impacts to be associated with both the construction and operation phases of the project.

During the construction phase, the positive impacts expected to occur include impact on production, impact on GDP, employment creation, skills development, and improvements of household income and standard of living. The significance of the positive construction phase impacts ranges from high to medium, following the implementation of the recommended enhancement measures.

Negative impacts expected to occur during construction include those associated with in-migration of people, safety and security impacts, impacts on daily living and movement patterns, and nuisance impacts associated with noise and dust. The significance of the negative construction phase impacts is expected to be low, following the implementation of the recommended mitigation measures. No negative impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, mainly only positive impacts are expected and include impact on production, impact on GDP, employment creation, skills development, improvements to household income and standard of living, increased government revenue, improvement in energy sector generation and economic and social upliftment. The significance of the impacts for the operation phase are medium to high, following the implementation of the recommended enhancement measures.

The only negative impacts identified for the operational phase relates to impacts on sense of place. As a result of the industrial nature of the area within which the project is proposed, the impact is expected to be of low significance.

Overall, numerous positive socio-economic impacts will occur as a result of the 320MW RMPP and these positive impacts far outweigh any potential negative impacts that might occur. It was concluded by the specialist that the development of the 320MW RMPP is supported from a social perspective.

Traffic Impacts

Impacts on traffic are expected along routes used for delivery of project components, construction equipment and materials during operation and along routes used for delivery of LPG during operation. The Traffic Impact Assessment (**Appendix L**) identified that the main potential traffic impacts will occur during the construction and decommissioning phases where the delivery and decommissioning of the components of the proposed facility will generate significant traffic. The duration of these phases is short term, i.e. the impact of the traffic generated during the construction and decommissioning phases of the proposed facility on the surrounding road network is temporary, and will be low significance with implementation of mitigation measures. The operational phase of the proposed facility, which includes the delivery of LPG to the site, will not add any significant traffic to the road network.

The proposed access point is deemed feasible as it follows an existing road and allows direct access to the proposed site. The proposed emergency access is deemed acceptable as it will not be used as an access point to the proposed site.

Based on the outcome of the assessment, the impacts associated with the 320MW RMPP are considered acceptable from a traffic impact perspective with the implementation of the recommended mitigation measures and the specialist concluded that it can therefore be authorised.

Impact of Unplanned Events

The Quantitative Risk Assessment (QRA) assessed the risk impacts of the 320MW RMPP associated with the project site for the life-cycle of the project. The following installations were considered for analysis:

- LPG installation, including road tanker offloading bay, LPG storage bullets, LPG vaporisers and pipeline to the respective gensets.
- Battery Energy Storage System (BESS)
- Diesel Storage and Offloading

The main risks identified for the 320MW RMPP in the QRA (**Appendix N**) due to loss of containment of hazardous components include exposure to thermal radiation from fires and overpressure from explosions. A large release of LPG could extend to the Alton industrial area and could reach the Mondi site to the west. No residential area or vulnerable institutions would be seriously impacted with the construction and operation of the 320 MW RMPP. Impacts assessed for the LPG, diesel and BESS installations were determined to be of low significance.

No fatal flaws were identified that would prevent the project proceeding to the detailed engineering phase of the project and the specialist concluded that they support the project subject to the mandatory completion of a Major Hazard Installation (MHI) risk assessment prior to construction of the 320MW RMPP.

Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the 320MW RMPP throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The assessment of the cumulative impacts was undertaken through the consideration of impacts in isolation and compared to the cumulative impacts of the 320MW RMPP and other industrial developments at a scale specifically identified by each specialist (refer to **Appendix D** to **Appendix N** and Chapter 9 of the EIA).

The significance of the cumulative impacts associated with the development of 320MW RMPP ranges from low to high, depending on the impacts being considered.

Based on the specialist cumulative assessment and findings, the development of the 320MW RMPP, other industrial activities, RMPP projects, and gas power developments within a 10km radius, it can be concluded that cumulative impacts will be of a low to medium significance, depending on the impact being considered. Impacts associated with climate change are potentially high but less than what would result from the alternative use of coal or diesel and can be mitigated through avoided emissions as the addition of the 320MW RMPP to the national grid has the potential to enable the expansion of South Africa's renewables generation capacity in execution of South Africa's energy transition strategy. There are no impacts or risks identified to be considered as unacceptable with the development of 320MW RMPP when considered together with other developments within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

The limited potential for cumulative impacts and risks makes the location of this project within the identified site of the Alton Industrial area a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

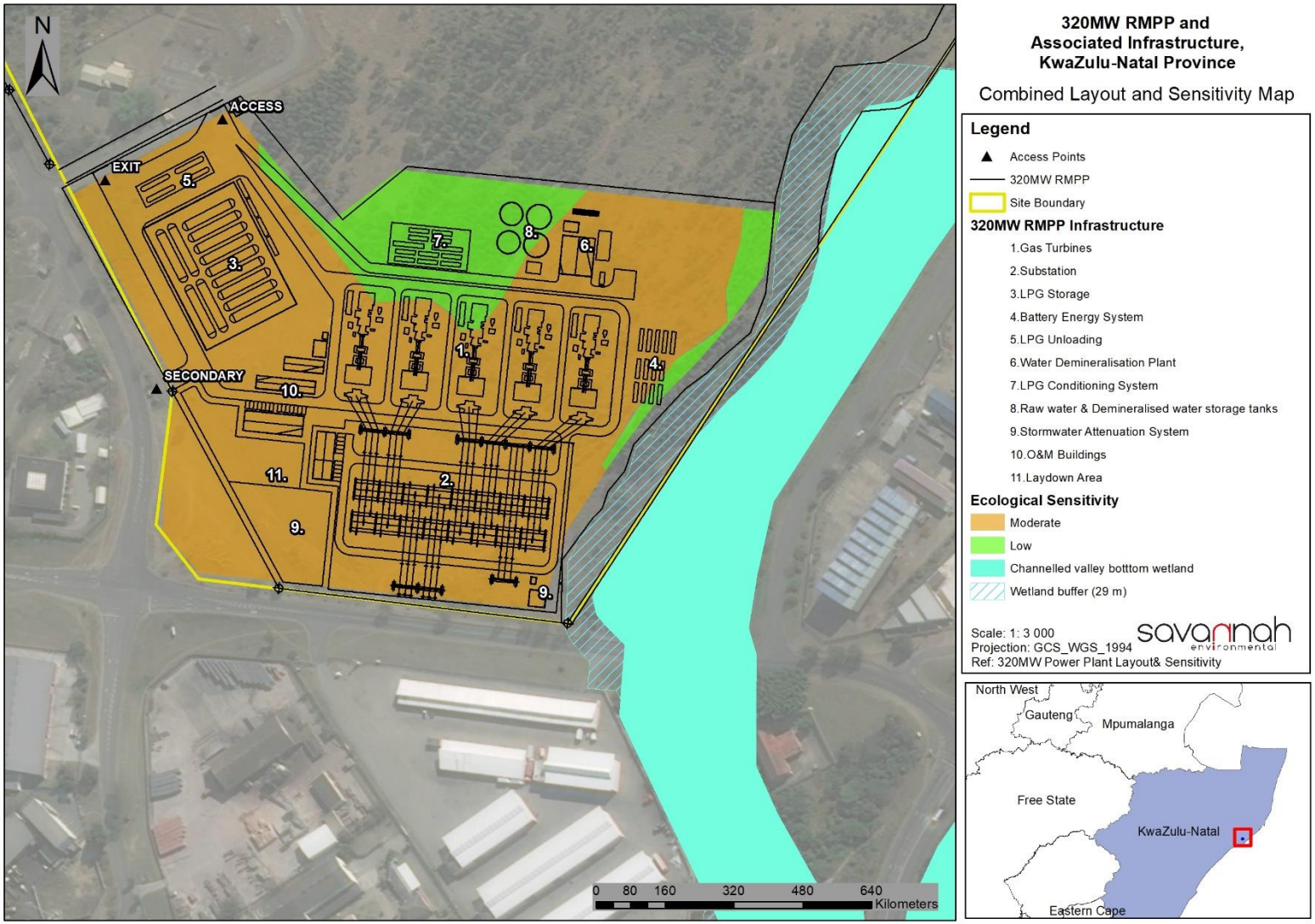

Figure 1: Sensitivity map overlain with Layout of the 320MW RMPP

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.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

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.

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.

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.

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' 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.

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.

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 hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

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.

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

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).

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

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.

Waste: means—

a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister

Watercourse: as per the National Water Act means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Wetlands: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEFF	Department of Environment, Forestry and Fisheries (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
LNG	Liquid Natural Gas
m	Metre
m^2	Square meters
m^3	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)

NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
ONA	Other Natural Area
PA	Protected Area
RMIPPP	Risk Mitigation Independent Power Producer Procurement
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

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APPENDICES LIST

CHAPTER 1 INTRODUCTION

Phinda Power Producers (Pty) Ltd (the project proponent) (Phinda) proposes to develop an Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructures, with a generating capacity of up to 320MW. The proposed project is to be known as the 320MW RMPP[1]. The Project site is located in Alton core industrial area adjacent to Richards Bay Industrial Development Zone (IDZ), and approximately 8km south west of Richards Bay city centre, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province. The facility will have an installed generating capacity of up to 320MW, to operate with liquified petroleum gas (LPG) as an initial source and will convert to utilising natural gas once this is available in Richards Bay.

The 320MW RMPP has been initiated by Phinda in partnership with Globaleq Africa Limited and Mainstream (hereafter referred to as the Project Consortium), in response to the procurement process initiated by the Independent Power Producer Office (IPP Office) in August 2020 for the procurement of up to 2000MW of dispatchable generation capacity from a range of technologies in the short- to medium-term under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPP). This allocation is in accordance with the new generation capacity required as specified in the Integrated Resource Plan 2019 and accompanying ministerial determination from the Minister for the Department of Mineral Resources and Energy (DMRE) to which the National Energy Regulator of South Africa (NERSA) has concurred. A bid under the RMIPPPP has been submitted by the Project Consortium for the proposed 320MW RMPP as part of a hybrid project solution.

As the 320MW RMPP has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction and operation of the project. The nature and extent of the 320MW RMPP and associated infrastructure, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this EIA Report.

This EIA Report consists of the following chapters:

- **Chapter 1** provides background to the proposed project and the environmental impact assessment process.
- **Chapter 2** outlines the strategic legal context for energy planning in South Africa and the proposed project.
- **Chapter 3** provides a description of the gas to power technology and how it will function as part of a hybrid project.
- **Chapter 4** provides a description of the proposed project, including feasible alternatives identified and considered.

[1] The capacity of the thermal power plant has been reduced from the previously estimated 450MW sizing per the final scoping report to 320MW due to the requirement of the RMIPPPP RFP for the thermal power plant to be commissioned by no later than 31 December 2022. Given the short timeline to commissioning, the availability gas turbines and other long lead items has dictated the choice of technology and final thermal power plant sizing

- **Chapter 5** outlines the need and desirability of the proposed project.
- **Chapter 6** describes the existing biophysical and socio-economic environment affected by the proposed project t.
- **Chapter 7** outlines the process which was followed during the EIA Phase of the EIA Process.
- **Chapter 8** provides a description and assessment of the potential issues and impacts associated with the proposed project
- **Chapter 9** provides a description and assessment of the potential cumulative impacts associated with the proposed project
- **Chapter 10** presents the conclusion and recommendations based on the findings of the EIA report.
- **Chapter 11** provides a list of all references used in the compilation of the EIA Report.

1.1. Legal Requirements as per the EIA Regulations for the undertaking of an EIA Report, 2014 (as amended)

The EIA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (and amended on 07 April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the EIA Report includes the following information required in terms of Appendix 3: Content of the Environmental Impact Assessment Report:

Requirement	Relevant Section
(a)(i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae	The details of the EAP and the expertise of the EAP have been included in section 1.4 and **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 and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	The location of the project site proposed for the development of the 320MW RMPP is included as **Figure 1.1** and **Figure 1.2** and in **Appendix B**. The details of the affected properties including the property names and numbers, as well as the SG-codes are included in **Table 1.1**.
(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; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	The locality of the project site is illustrated on a locality map included as **Figure 1.1** and **Figure 1.2** and in **Appendix B**. The corner point co-ordinates of the project site are included in **Appendix B**.

1.2. Project Overview

As a fast-emerging economy, South Africa needs to balance the competing need for continued economic growth with its social needs and the protection of the natural environment. South Africa needs to grow its electricity generation capacity to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. The South African energy sector is dominated by coal, which contributed around 69% to the total primary energy supply in 2016. Apart from this, South Africa gets energy

locally from biomass, such as wood and dung, natural gas, hydro-power, nuclear power, solar power and wind (Department of Energy, 2019)[2].

The Integrated Resource Plan (IRP) 2019, developed by the Department of Energy, includes a diversified energy mix to meet the requirements of the country's need for economic and social growth up to 2030. The IRP (2019) considers gas fired electrical generation capacity to have significant potential to add to the energy mix. To achieve this diversified mix and harvest the benefits of gas to energy, the IRP includes the allocation of 3000MW of new capacity using this technology.

In addition, the IRP includes provision for emergency generation capacity to meet the current electricity supply deficit and to supplement Eskom's declining plant performance, and to reduce the extensive utilisation of diesel peaking generators in the immediate to medium term.

It includes a requirement for additional generation capacity of between 2000MW and 3000MW from any technologies capable of meeting the technical requirements as specified under the RMIPPPP. Ministerial determinations in this regard were gazetted on 7 July 2020.

The Minister of Mineral Resources and Energy (DMRE) in consultation with the National Energy Regulator of South Africa (NERSA) has determined that the Department is to procure 2000MW of new generation capacity from a range of energy source technologies. The RMIPPPP has been designed by the department to fulfil the Minister's directive. The Project Consortium is proposing the development of the 320MW RMPP as part of this programme.

The 320MW RMPP is proposed to be located on Remainder of Erf 1854 and Portion 2 of Erf 1854, an area of 49,42ha with a development footprint of 8.29ha.[3] The affected property of the 320MW RMPP site is privately owned by associated group companies of the project proponent. Table 1.1 provides an overview of the proposed 320MW RMPP site.

Table 1.1: Overview of the project site identified for the development of the 320MW RMPP

Province	**KwaZulu-Natal**
District Municipality	King Cetshwayo District Municipality
Local Municipality	City of uMhlathuze Local Municipality
Ward number(s)	26
Nearest town(s)	Alton, Richards Bay, Arboretum, Empangeni, Ichubo
Farm name(s) and number(s)	» Remainder of Erf 1854 » Portion 4 of Erf 1854
SG 21 Digit Code (s)	» N0GV04210001137600002 » N0GV04210001137600004
Current zoning	Industrial Use

[2] Department of Energy. The South African Energy Sector Report. 2019

[3] The LPG storage is located on the same property as the 320MW RMPP and not on an adjacent property as per the final Scoping Report thus, the development footprint of the proposed facility has been reduced.

Current land use	General Industrial[4]

The main infrastructure associated with the facility includes the following:

- Main Power Island consisting of aeroderivative gas turbines operated in open cycle comprising of air intake, air filter structures and exhaust stack for the generation of electricity using LPG.
- Battery storage system and emergency generator for start-up power to the first gas engine / turbine.
- Auxiliary transformers.
- Balance of Plant systems.
- Dry Cooling systems.
- Auxiliaries.
- Four LPG truck unloading gantries connected onsite by pipeline to the LPG storage.
- LPG storage comprising of up to 10 000m^3 of storage in total, comprising of 13 bullets.
- LPG vaporisation and onsite piping to deliver gas to the turbines.
- Demineralisation water treatment plant.
- Clarified water storage tanks and demineralised water storage tanks.
- Three effluent reticulation systems - 1) sanitary wastewater system; 2) zero liquid discharge system for treatment of demineralisation plant effluent and 3) oily water separator and storm water drainage system including attenuation basin.
- 132kV interconnecting substation and power lines connecting to the grid transmission infrastructure (The power lines to the grid transmission structure have been applied for under a separate environmental approval process).

[4] In terms of City of uMhlathuze 2019 Land Use Scheme Viewer

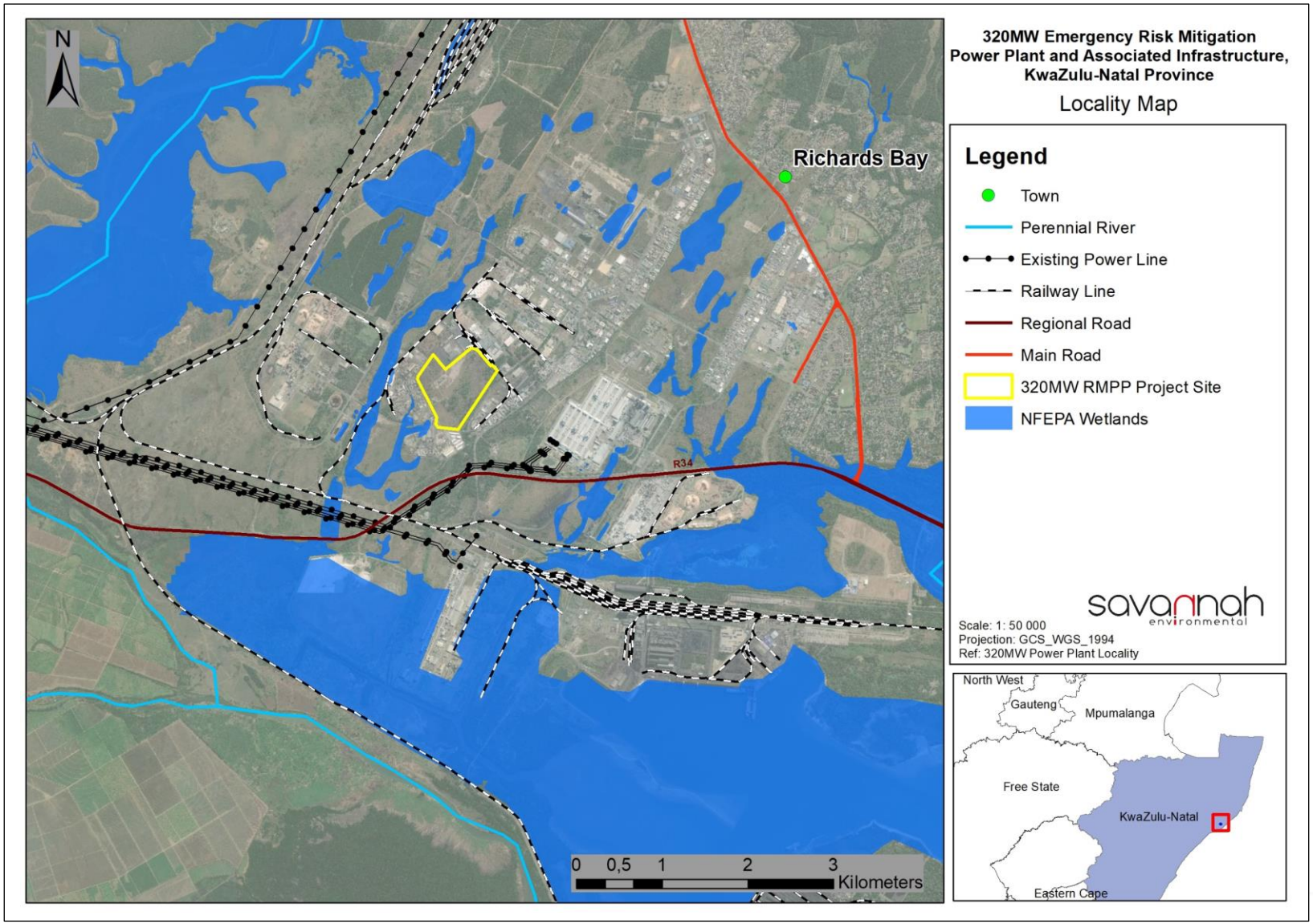

Figure 1.1: Locality map showing the area proposed for the establishment of the 320MW RMPP within the Richards Bay area (**Appendix B1**)

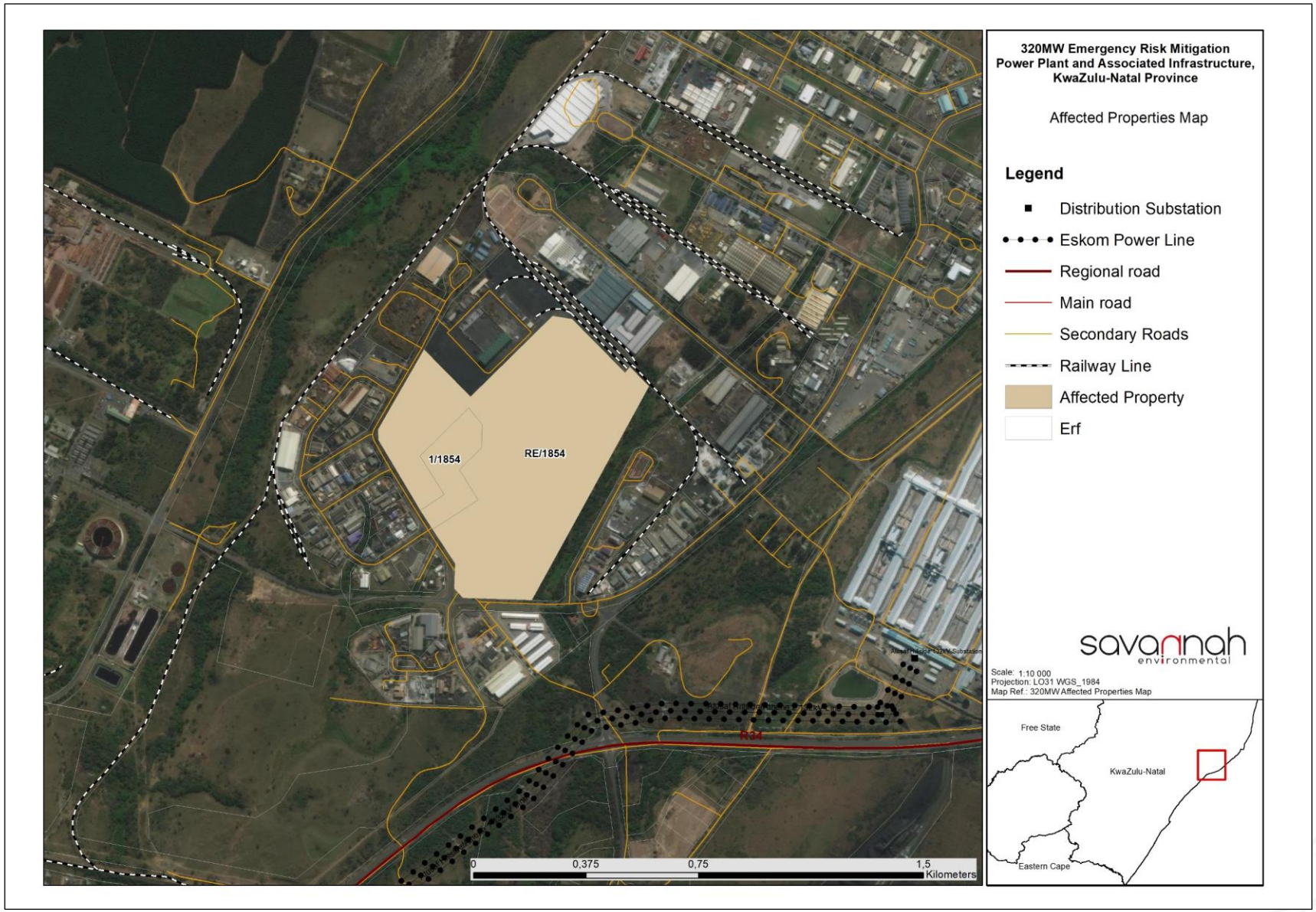

Figure 1.2: Locality map showing the affected properties within the project site

Once imported liquified natural gas (LNG) is available in Richards Bay, the 320MW RMPP will be converted from utilising LPG to the use of re-gasified LNG by means of a new dedicated natural gas pipeline which will replace or supplement the LPG supply to the power plant (The approval for the pipeline will be subject to separate approval process once imported LNG becomes available in Richards Bays).

A comprehensive description of the key infrastructure components associated with the development of the 320MW RMPP is provided in Chapter 4 of this draft EIA Report.

1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed 320MW RMPP is subject to the requirements of the 2014 EIA Regulations, as amended in April 2017, published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. This section provides a brief overview of the EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of deciding on environmental authorisations. In terms of GN R779 of 1 July 2016, the Minister of the Department of Environment, Forestry and Fisheries (DEFF) is the Competent Authority for all activities relating to the Integrated Resources Plan (IRP) of 2010 – 2030 (and any updates thereto) that require environmental authorisation. The DEFF is therefore the Competent Authority for this project, and the KwaZulu-Natal Department of Agriculture, Environmental Affairs and Rural Development (EDTEA) will act as a commenting authority.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of the activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental specialist studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information to make an informed decision. Phinda Power Producers (Pty) Ltd appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent environmental consulting company to conduct an EIA process for the proposed project and Application for Environmental Authorisation.

An EIA 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 fore-warned of potential environmental issues, and allows for the resolution of issues reported on in the Scoping and EIA Reports as well as a dialogue with interested and affected parties (I&APs).

The EIA process being undertaken for the proposed 320MW RMPP comprises two phases – i.e., Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in these two phases is as follows:

» The **Scoping Phase** includes the identification and description of potential impacts associated with the proposed project through a desktop study and consultation with affected parties and key

stakeholders. This phase considers the broader site in order to identify and delineate any potential environmental fatal flaws, no-go or sensitive areas, as well as project alternatives in order to determine which should be assessed in more detail in the EIA Phase. Following the public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance and approval to continue with the EIA phase of the process. The Final Scoping Report and Plan of Study for proposed project was submitted to DEFF on **22 January 2021** and acceptance was received on **18 February 2021**, thus marking the start of the EIA Phase.

» The **EIA Phase** involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers the proposed development footprint and includes detailed specialist investigations (including field surveys), consideration of feasible alternatives and public consultation. Recommendations of practical and achievable mitigation and management measures are included in an Environmental Management Programme (EMPr) considering all phases of the project. Following a review of the EIA report and EMPr by stakeholders, this phase culminates in the submission of a Final EIA Report and EMPr to the competent authority for review and decision-making.

1.4. Details of the Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

In accordance with Regulation 12 of the 2014 EIA Regulations (GN R326), Phinda has appointed Savannah Environmental as the independent environmental consultant to undertake the Scoping and EIA process for the 320MW RMPP and its associated infrastructure. Neither Savannah Environmental nor any of its specialists are subsidiaries of/or are affiliated to Phinda. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed 320MW RMPP project.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-Based Black Economic Empowerment (B-BBEE) Contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management and has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation and transmission.

The Savannah Environmental team comprises:

» **Jo-Anne Thomas.** She holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with SACNASP and

a registered Environmental Assessment Practitioner (EAP) with EAPASA (2019/726). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. She has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

» **Jana de Jager**. She holds a bachelor's degree in Environmental Science, an Honours degree in Geography & Environmental Science and is currently undertaking her M.S.c in Ecological Water Requirements. She has 3 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, GIS mapping, public participation, environmental management plans and programmes. She is registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP).

» **Nicolene Venter.** She is a 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 of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

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

CHAPTER 2 POLICY AND LEGISLATIVE CONTEXT

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

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

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	The policy and legislative context for the development of the 320MW RMPP has been considered throughout this chapter on a national, provincial, and local level.

2.2 Energy Policy and Planning

The energy sector in South Africa has been, and continues to be, at the centre of the economic and social development. The industry directly affects the economy by using labour and capital to produce energy. As the country`s economy continues to grow, the Department of Mineral Resources and Energy (DMRE) is mandated to ensure that energy resources are available, and that there is access to energy services in an affordable, reliable, and sustainable manner, while minimizing the associated adverse environmental impacts (Department of Energy, 2019)[5].

The expansion of electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the DMRE. The hierarchy of policy and planning documentation that supports the development of a diversified mix of energy projects, such as gas to power plants and requirement for emergency generation capacity as specified within the IRP is illustrated in Figure 2.1. These policies are discussed in more detail in the following sections, along with the provincial and local policies and plans that have relevance to the development of the 320MW RMPP and associated infrastructure.

[5] The South African Energy Sector Report. Department of Energy. 2019

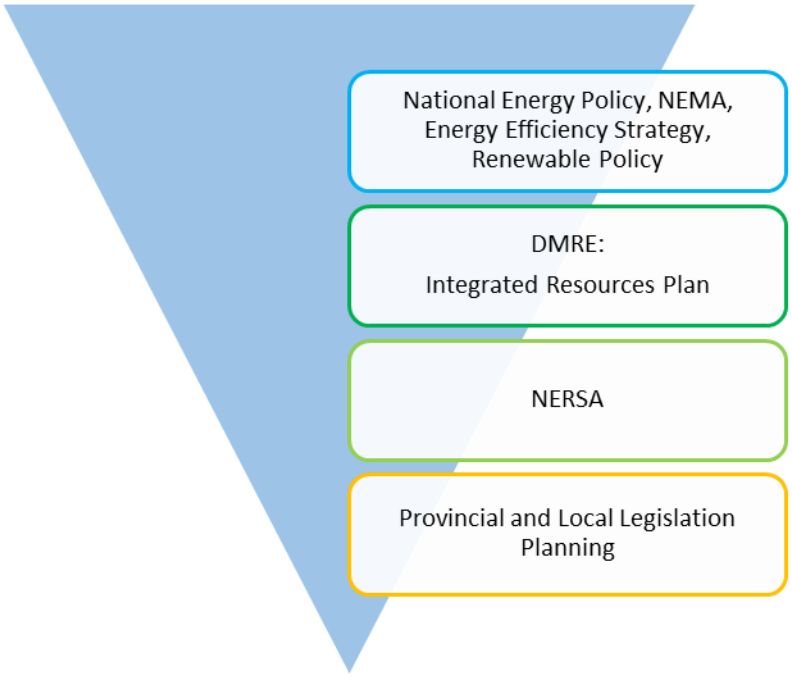

Figure 2.1: Hierarchy of electricity policy and planning documents

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project such as that being considered in this Scoping Report consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As gas to energy developments are multi-sectoral (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process of a gas to power project and the related statutory environmental assessment process. These policies are discussed in more detail in the following sections, along with the provincial and local policies and plans that have relevance to the proposed development.

At **National Level**, the main regulatory agencies are:

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity and, since merging with the Department of Mineral Resources (DMR), is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resource that may occur within the broader study area and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity and for the construction and operation of fuel storage facilities linked to these IPP projects.
- **Department of Environment, Forestry and Fisheries (DEFF):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DEFF is the competent authority for this project (as per GNR 779 of 01 July 2016), and is charged with granting the EA for the project under consideration. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Human Settlements, Water and Sanitation (DHSWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Rural Development and Land Reform (DARDLD):** This Department is the custodian of South Africa's agricultural resources and is responsible for the formulation and implementation of policies governing the agriculture sector and the initiation, facilitation, coordination and implementation of integrated rural development programmes.

At **Provincial Level**, the main regulatory agencies are:

- **KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (EDEAT):** This Department is the commenting authority for the Scoping and EIA process for the project.
- **Ezemvelo KZN Wildlife (EKZN):** is responsible for the management of nature conservation and protected areas in KwaZulu-Natal and issuing of other biodiversity and conservation-related permits.
- **AMAFA (KZN Heritage Authority):** This Department identifies, conserves and manage heritage resources throughout the KwaZulu-Natal Province.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the KwaZulu Natal Province, both the local and district municipalities play a role. The local municipality includes the **uMhlathuze Local Municipality** which forms part of the **King Cetshwayo District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

2.3 National Policy and Planning Context

2.3.1 The National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and , appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research.

The Act provides the legal framework which supports the development of power generation facilities, such as the 320MW RMPP and associated infrastructure.

2.3.2 White Paper on the Energy Policy of South Africa, 1998

The White Paper on the Energy Policy, published by the then Department of Minerals and Energy (DME) in December 1998 was developed so as to clarify government policy regarding the supply and consumption of energy for the next decade. It was intended to address all elements of the energy sector as practically as it could. The main objectives of the White Paper are the following:

- Increasing access to affordable energy services.
- Improving energy sector governance.
- Stimulating economic development.
- Managing energy-related environmental impacts.
- Securing supply through diversity.

In order to meet these objectives and the developmental and socio-economic objectives of South Africa, the country needs to optimally use available energy resources. The South African Government is required to address what can be done to meet these electricity needs both in the short and long-term. The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversifying South Africa's electricity mix.

The White Paper on Energy Policy (1998) promotes diversification of generation technologies in the South African energy mix, and recognises natural gas as an attractive option for South Africa. It also provides the basis for the development of the Integrated Energy Plan (IEP).

2.3.3 The Electricity Regulation Act (No. 04 of 2006) (ERA)

The Electricity Regulation Act (No. 04 of 2006) as amended by the Electricity Regulation Act (No. 28 of 2007), replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry.

The ERA establishes a national regulatory framework for the electricity supply industry and made NERSA custodian and enforcer of the National Electricity Regulatory Framework. The ERA also provides for licences and registration as the manner in which the generation, transmission, distribution, reticulation, trading, and import and export of electricity is regulated.

2.3.4 The Infrastructure Development Act (IDA) 2014

The IDA is to provide for the facilitation and co-ordination of public infrastructure development which is of significant economic or social importance to the Republic; to ensure that infrastructure development in the Republic is given priority in planning, approval and implementation; to ensure that the development goals of the state are promoted through infrastructure development; to improve the management of such infrastructure during all life-cycle phases, including planning, approval, implementation and operations; and to provide for matters incidental thereto.

The objectives of the IDA include

the identification and implementation of strategic integrated projects which are of significant economic or social importance to the Republic, thereby giving effect to the national infrastructure plan;
the alignment and dedication of capabilities and resources for the effective implementation and operation of strategic integrated projects across the state in order to ensure coherence and the expeditious completion of infrastructure build and maintenance programmes;
processes and periods of time applicable to the implementation of strategic integrated projects;
a statutory instrument by which any approval, authorisation, licence, permission or exemption required in terms of other legislation can be facilitated and expedited;
a statutory instrument by which obstacles to the expeditious implementation of the national infrastructure plan can be unblocked; and
generally, practices and procedures which seek to ensure that infrastructure development is not undertaken merely in a transactional manner, but in a manner which seeks to advance national development goals, including local industrialization, skills development, job creation, youth employment, small business and cooperatives development, broad-based economic empowerment and regional economic integration.

The IDA had identified 36 strategic integrated projects (SIPs). The 320MW RMPP project triggers two infrastructure development projects discussed below.

2.3.5 The National Development Plan (NDP) 2030

The National Development Plan (NDP) 2030 offers a long-term plan for the country. It defines desired destinations where inequality and unemployment are reduced and poverty is eliminated so that all South Africans can attain a decent standard of living. Electricity is one of the core elements of a decent standard of living.

While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

» Raising employment through faster economic growth
» Improving the quality of education, skills development and innovation
» Building the capability of the state to play a developmental, transformative role

In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

» Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.
» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
» Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system looks very different to the current

situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role.

2.3.6 Integrated Energy Plan (IEP), November 2016

The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

- To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
- To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
- To guide investment in and the development of energy infrastructure in South Africa.
- To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others.

The 8 key objectives of the integrated energy planning process are as follows:

- Objective 1: Ensure security of supply.
- Objective 2: Minimise the cost of energy.
- Objective 3: Promote the creation of jobs and localisation.
- Objective 4: Minimise negative environmental impacts from the energy sector.
- Objective 5: Promote the conservation of water.
- Objective 6: Diversify supply sources and primary sources of energy.
- Objective 7: Promote energy efficiency in the economy.
- Objective 8: Increase access to modern energy.

2.3.7 Integrated Resource Plan (IRP) for Electricity 2010 - 2030

The Integrated Resource Plan (IRP) for Electricity is a subset of the IEP and constitutes South Africa's National electricity plan. The IRP is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment. The primary objective of the IRP is to determine the long term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.

The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development.

Following the promulgation of the IRP 2010–2030, implementation followed in line with Ministerial Determinations issued under Section 34 of the Electricity Regulation (Act No. 4) of 2006. The Ministerial Determinations give effect to planned infrastructure by facilitating the procurement of the required electricity capacity.

Since the promulgated IRP 2010–2030, the following capacity developments have taken place:

- A total 6 422 MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 876 MW operational and made available to the grid.
- IPPs have commissioned 1 005 MW from two Open Cycle Gas Turbine (OCGT) peaking plants.
- Under the Eskom build programme, the following capacity has been commissioned:
  - 1 332 MW of Ingula pumped storage, 1 588 MW of Medupi, 800 MW of Kusile and
  - 100 MW of Sere Wind Farm.
- 18 000MW of new generation capacity has been committed to.

Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality and water availability have come to the fore.

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with INDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from year 2025 decline.

Following consideration of all these factors, the following Plan was promulgated.

	Coal	Coal (Decommis-sioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed/Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

Figure 2.2: IRP 2019 as promulgated in October 2019[6]

This plan provides for the development of 3000MW of new capacity from gas to power projects and made provision an "Allocation to the extent of the short-term capacity and energy gap", which was estimated in the IRP 2019 as being between 2000MW to 3000MW. The 320MW RMPP project, comprising of both gas to power technology and a mix of off-site renewable energy technologies, would contribute towards the alleviating the short-term capacity and energy gap for which the RMIPPPP has been initiated.

i) Independent pPwer Producer (IPP) Procurement Programmes

Procurement processes for new generation capacity as specified in the approved IRP 2019 are initiated by the DMRE Minister making a so called "Ministerial Determination" in accordance with Section 34 of the Electricity Regulation Act (Act No. 4) of 2006 (Electricity Act). Such Ministerial Determination will indicate how much electricity generation capacity is to be procured, from what specified technology and who the

[6] source: https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

procurer (DMRE), buyer (Eskom or other designated party) and seller (Eskom or independent power producer) will be.

The administration of the procurement processes on behalf of the DMRE, as procurer in respect of independent power producer projects, are administered by the Independent Power Producer Office (IPP Office).

The DMRE Minister has issued two Ministerial Determinations in respect of the IRP 2019, which collectively approve for procurement all the new generation capacity contemplated in the IRP 2019, with the National Energy Regulator of South Africa (Nersa) having concurred with both of these Ministerial Determinations as required by the Electricity Act, being:

» GNR753 of 07 July 2020: detailing the requirement for 2000MW of new generation capacity to be procured from IPPs via a variety of technologies.
» GNR1015 of 25 September 2020: detailing the requirement for the procurement of new generation capacity from IPPs to contribute towards energy security, including the provision for 3000MW of new generation capacity from gas generation technologies.

The IPP Office initiated the procurement of up to 2000MW of dispatchable generation capacity from a range of technologies in accordance with the IRP 2019 in August 2020. The procurement programme titled the *Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP)* is intended to fill the current short term supply requirements for electricity, alleviate the current electricity supply constraints and reduce extensive utilisation of diesel peaking generators. In terms of this programme, the 2 000 MW of new generation/supply capacity will be procured from a range of energy technologies and are based on the following criteria:

» It will be technology agnostic with a maximum capacity per project of 450MW.
» It is based on the plant-performance needs of the electricity system operator.
» The plant is to operate in such a manner that it can go from being switched off to operating at 100% of its output within 15 minutes and provide various other "ancillary services" in support of the stable operation of the national grid
» Plant to only generate electricity between 05:00 and 21:30 daily, operating on average for a minimum of 12 hours each day during this period.
» It must have an AGC load following ability, flexible capacity factor and must be "scalable" with changing capacity requirements.
» The plant is to operate for 20 years with last date for connection to the grid of the constructed project of 31 December 2022.
» All thermal power plants procured under the RMIPPPP must be capable of conversion to operate on natural gas with little or no further investment.

The 320MW RMPP has been bid into the RMIPPPP procurement programme and, if selected as a preferred bidder, can be brought online and connected to the grid prior to 31 December 2022 utilising LPG as the fuel source until natural gas is available in Richards Bay.

2.3.8 New Growth Path (NGP) Framework, 23 November 2010

The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. The framework identifies investments in five key areas namely: energy, transport, communication, water, and housing. Sustaining high levels of public investment in these areas will create jobs in construction, operation and maintenance of infrastructure. The framework states that public investment can create 250 000 jobs per annum in energy, transport, water, communications infrastructure, and housing. These jobs are said to be in four activities, the construction of new infrastructure; the operation of new facilities; expanded maintenance; and the manufacture of components for the infrastructure programme.

2.3.9 National Climate Change Bill, 2018

On 08 June 2018, the Minister of Environmental Affairs published the National Climate Change Bill (the Bill) for public comment. The purpose of the Bill is to build an effective climate change response and ensure the long-term, just transition to a climate resilient and lower carbon economy and society. This will be done within the context of sustainable development for South Africa and will provide for all matters related to climate change.

The National Climate Change Bill addresses issues related institutional and coordination arrangement across the three spheres of government namely national, provincial, and local. It further highlights the need the spheres of government and entities, sectors as well business to respond to challenges of climate change. The bill further addresses the matters relating to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill:

a) Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance;
b) Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response;
c) Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner.

2.3.10 National Climate Change Response Policy, 2011

South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based

on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.

2.3.11 National Climate Change Adaptation Strategy (South Africa), 2020

South Africa's National Climate Change Adaptation Strategy (NCCAS) supports the country's ability to meeting its obligations in terms of the Paris Agreement on Climate Change. It gives effect to the National Development Plan's vision of creating a low-carbon, climate resilient economy and a just society. The commitment to the Paris Agreement and its implementation is in line with the principles and provisions of the UNFCCC will ensure the balance between adaptation and mitigation, and adequate financial, technological and skills support for South Africa to enhance their efforts against climate change.

2.3.12 Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 36 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 9 and SIP 20 (a) (In terms of Section 8(1)(a) read with Section 7(1) of the Infrastructure Development Act, as amended, 2014 (Act no. 23 of 2014)) of the energy SIPs support the development of the gas proposed power plant and specifically such development under the RMPPP:

- SIP 9: Electricity generation to support socio-economic development: The proposed 320MW RMPP is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2019 to meet the needs of the economy and address historical imbalances.
- SIP 20 (a): Emergency /Risk Mitigation Power Purchase Procurement Programme (2000MW): The proposed 320MW RMPP has been bid into the RMIPPPP in order to alleviate the frequent load shedding being experienced in South Africa at present and can be brought onto the grid as quickly as possible (by 31 December 2022) if selected as a preferred bidder.

The 320MW RMPP qualifies as a SIP 20 project under the legislation and will qualify to be registered as a SIP project should it be selected as preferred bidder by the DMRE. The project would then contribute to the above-mentioned SIPs.

2.3.13 Industrial Policy Action Plan (IPAP), 2018 / 2019 – 2020 / 2021

The Industrial Policy Action Plan (IPAP) 2018/2019 – 2020/2021 represents a significant step forward in scaling up the country's efforts to promote long-term industrialisation and industrial diversification. It is recognised that Southern Africa is fast transforming into an oil and gas jurisdiction due to significant gas discoveries and developments in progress that create the potential for the expansion of imports of natural gas resources from Mozambique in particular, that will build on the volumes already being imported via the ROMPCO pipeline from the Pande and Temane fields operated by Sasol. From a South African perspective, the scale of the gas reserves in Mozambique is of particular significance. Accordingly, the

plan states that a key industrial growth path is gas-based industrialisation (Department of Trade and Industry, 2018).

The expansion of gas supply into the South African market - via the development of domestic resources and the expansion of volumes from Mozambique - should produce affordable gas prices capable of underpinning a significant natural gas-based reindustrialisation of the South African economy. In the longer term (15 years +) the main objective is a vibrant gas industry delivering affordable and secure gas supply to the heavy industry, manufacturing, and transport sectors (Department of Trade and Industry, 2018).

The establishment of the 320MW RMPP will assist in the creation of a power plant capable of being converted to operate on natural gas, thus providing a base level of annual gas demand that can assist in driving these initiatives.

Gas Utilisation Master Plan (GUMP)

The Gas Utilisation Master Plan (GUMP) was created to assist in achieving the objectives of the IRP by driving the development of the gas-to-power industry in South Africa. According to the GUMP, the social economic advantages of establishing a large gas-to-power industry include job creation (during construction and operation), industrial development, the potential to use imported liquified natural gas (LNG) instead of diesel, and a source of cheaper energy. South Africa's gas-to-energy development plan spans 30 years, in which gas supply is envisaged to include local indigenous supply as well as imports through pipelines and by ship.

The GUMP identifies challenges facing the development of the gas industry in South Africa. These are: limited domestic supply; no immediate gas demand as yet; lack of gas infrastructure (no LNG import terminal yet); no gas master plan. It is envisaged that by the time construction of the proposed development is complete, more gas infrastructure will be available, such as the LNG import terminal at the Richards Bay port. GUMP identifies that there are potential gas reserves in the Karoo basin, deep offshore, and at the Ibhubesi basin. Through the local pipeline infrastructure, the gas-fired power station in Richards Bay could acquire local gas cheaply if the infrastructure to obtain it is developed. However, as identified, the lack of said infrastructure is currently a constraint. The timing of the development will likely fall in-line with the development of other gas-related infrastructure such as the LNG port in Richards Bay and the extension of gas pipelines from Mozambique. Therefore, the proposed 320MW RMPP supports the implementation of GUMP as the facility intends to ultimately transition from the utilisation of LPG as the primary fuel source, to natural gas.

Provincial Policy and Planning Context

2.4.1. KwaZulu-Natal Provincial Growth and Development Plan (PGDP) (2019)

The KwaZulu-Natal Provincial Growth and Development Plan (PGDP) aims to curb poverty, inequality and achieve shared growth. The PGDP has identified spatial marginalisation as one of the key issues to be addressed through ensuring economic opportunities that will meet the majority of the population's needs. The plan states that alternative sources of energy are a priority and must become a reality. This energy is anticipated through gas and diesel turbines which were anticipated to be on-line in 2016 (Provincial Planning Commission, 2016).

2.4.2. KwaZulu-Natal Provincial Growth and Development Strategy (PGDS) (2016)

The Provincial Growth and Development Strategy (PGDS) for KZN addresses the triple challenge of poverty, inequality and unemployment. The KZN provincial government's vision is for the province to maximize its position as a gateway to South and Southern Africa, as well as its human and natural resources to create a safe, healthy and sustainable environment by 2035; eliminating poverty, inequality, unemployment and the current disease burden in the province. Through the seven strategic goals the KZN PGDS aims to achieve its vision by 2035, including:

1) Inclusive economic growth (expanded and sustained economic output is the fundamental driver for job creation)
2) Human resource development (he human resource capacity of KZN is relevant and responsive to the growth and development needs of the province)
3) Human and community development (reduce poverty and inequality in KZN)
4) Strategic infrastructure (strategic infrastructure provides for social and economic growth and development needs of KZN)
5) Environmental sustainability (reduce global greenhouse gas emissions and create social-ecological capacity to adapt to climate change)
6) Governance and policy (effective and efficient government systems)
7) Spatial equity (increased spatial access to goods and services)

The proposed 320MW RMPP will result in the creation of job opportunities, human resource development, and strategic infrastructure for social and economic growth which will contribute towards reducing poverty and inequality in KZN. This development will therefore assist the province in achieving the aims of the PGDS to some extent.

2.4.3. KwaZulu-Natal Provincial Spatial Economic Development Strategy (2016)

The Provincial Spatial Economic Development Strategy (PSEDS) serves as a framework for the prioritisation of spatial economic development initiatives in the province. It is meant to capitalise on complementarities and facilitate consistent and focused decision making. In addition, the purpose of the strategy is to ensure that investment occurs in the sectors that provide the greatest socio-economic return to investment (Department of Economic Development, 2016).

Figure 2.3 demonstrates that the 320MW RMPP project site within the Richards Bay area is located in an area demarcated as having economies of scale. Economies of scale are achieved when the number of units produced or the volume of services sold are at such a large scale that it allows for the reduced production costs, ultimately increasing the competitiveness of the product or service. High demand for the product or a service is a prerequisite for economies of scale; this implies that the area where the 320MW RMPP is to be built has a high demand for selected goods and services, including electricity. The area is already highly industrialised and hosts an IDZ nearby, which continuously seeks new investments in ICT, agro-businesses, and metals beneficiation. Therefore, the project is to be located in a potentially high economic growth region.

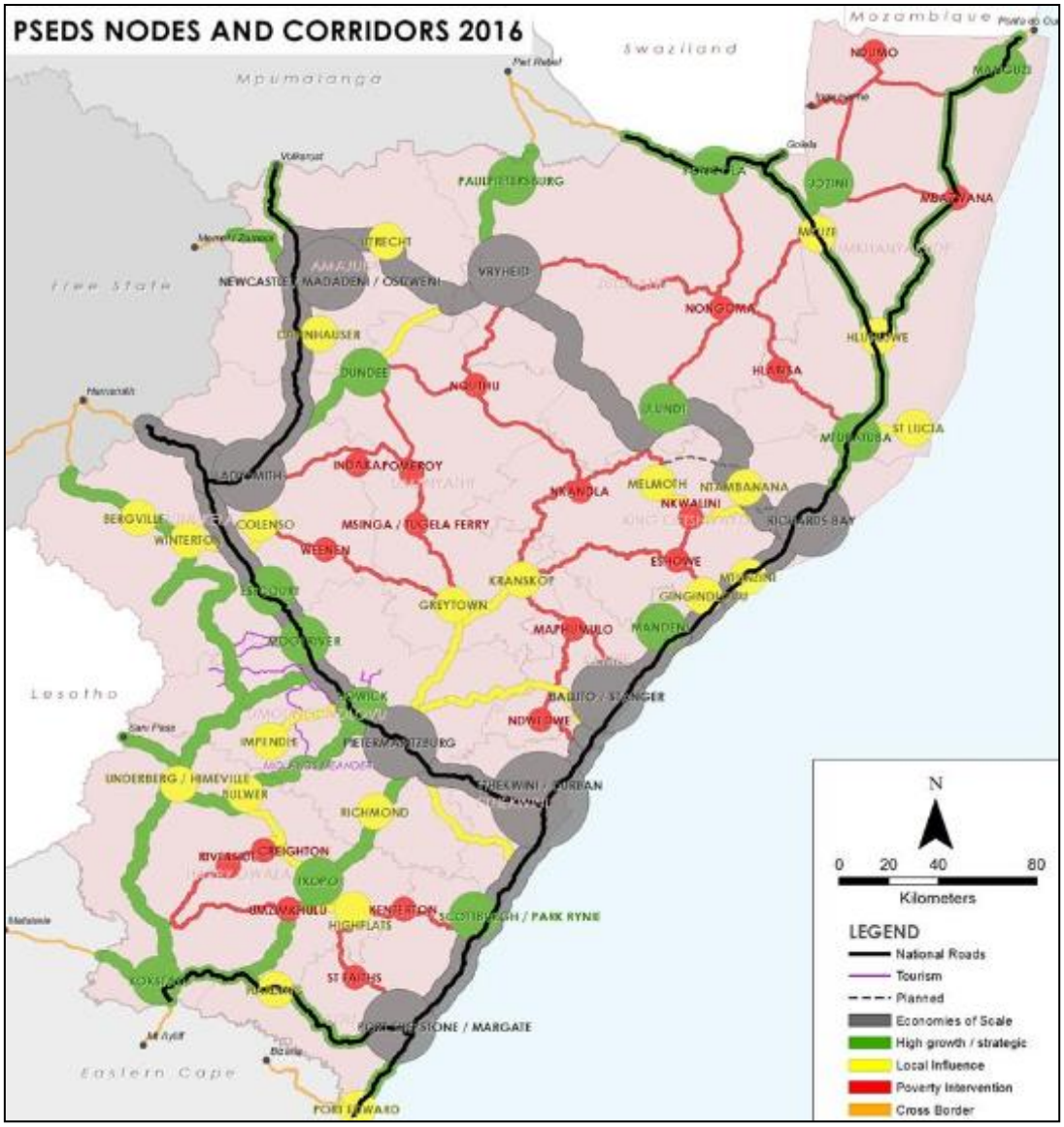

Figure 2.3: KZN Spatial Economic and Development Strategy nodes and corridors

The development of the 320MW RMPP will drive economic growth, infrastructural transformation and development. The area for development is seen as a favourable area for investment and development.

2.4.4. KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs Revised Strategic Plan 2015 - 2020

The strategic focus for the KZN EDTEA during the 2020 planning period will be building a resilient KZN provincial economy that can respond to global factors, stimulating provincial economic development, alignment of functions and purpose of all economic development entities as well as building a vibrant organisation. The vision of the strategic plan is 'leading the attainment of inclusive growth for job creation and economic sustenance.' The mission of the strategic plan is to 1) develop and implement strategies that drive economic growth; 2) be a catalyst for economic transformation and development; 3) provide leadership and facilitate integrated economic planning and development; and 4) create a favourable environment for investment. The main objectives of the strategy that relate to the proposed project are as follows:

- To facilitate the creation of new markets;
- To drive growth of the KZN provincial economy;
- To enhance sector and industrial development through Trade, Investment and Exports Logistics, ICT, Manufacturing, Green economy, agri-business, Tourism, Creative Industries, Maritime, Aerotropolis, Aviation;
- To investigate and develop viable alternative energy generation options.

The 320MW RMPP is in alignment with these objectives.

2.4.5. KwaZulu-Natal Provincial Spatial Development Framework (PSDF)

The KZN Provincial Spatial Development Strategy has been developed in order to achieve the goals and objectives of the PGDS in a targeted and spatial co-ordinated manner. Spatially, it is vital to consider general accessibility as a cross-cutting variable which impacts all three pillars of sustainable development and as a result the four main spatial variables informing the provincial spatial development framework include:

- Environmental Sensitivity;
- Economic Potential;
- Social Needs; and
- Urban Accessibility.

The PSDF spatial variables were considered collectively and a ranking order to key elements used to formulate a composite Provincial Spatial Development Framework which identifies Broad Provincial Spatial Planning Categories such as:

- Conservation Corridors;
- Biodiversity Priority Areas;
- Areas of Economic Value adding;
- Areas of Economic support;
- Areas of Agricultural Development;
- Areas of High Social Need; and
- Mandated Service Delivery Areas.

Areas of Economic Support resemble a region of good economic potential in more than just one of the key provincial economic sectors. Typical interventions in these areas would include economic prioritisation of development, labour force interventions (e.g. skills development), key economic infrastructure investment and area promotion. The development of the 320MW RMPP will contribute towards economic value, economic support and economic growth in the area.

2.4.5. KwaZulu-Natal Climate Change Response and Sustainable Development Plan

In September 2012, the KwaZulu-Natal Provincial Government became the first provincial government to establish a Climate Change and Sustainable Development Council, which boosts multi-stakeholder membership (http://www.theclimategroup.org/who-we-are/our-members/the-province-of-kwazulu-

natal). The Council has set up three Working Groups, namely Policy and Regulatory Alignment Working Group; Adaptation and Mitigation Working Group and Renewable Energy Working Group.

The province is in the early stages of developing the Climate Change Response and Sustainable Development Plan which is guided by, among others, the national strategy and the KwaZulu-Natal Growth and Development Strategy which has among its goals environmental sustainability as well as:

» Provision of 100% energy access in KZN Province by 2030, i.e. an additional 600 000 households or some 3 million people.
» Implementation of a number of significant renewable energy and energy efficiency projects.

The development of the 320MW RMPP will promote access to energy through the use of a fuel resource other than coal. The use of LPG initially and ultimately natural gas once available and combined with a hybridised energy solution that utilises renewables electricity generation to offset utilisation of the 320MW RMPP as far as possible, offers reduced emissions when compared to the use of coal or diesel for electricity generation. The implementation of the 320MW RMPP will also ensure a seamless conversion of the fuel source from LPG to natural gas once available in liquid form in Richards Bay.

Local Policy and Planning Context

The strategic policies at the district and local level have similar objectives for the respective areas, namely to accelerate economic growth, create jobs, uplift communities and alleviate poverty. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

2.5.1. King Cetshwayo District Municipality Draft Integrated Development Plan (2020/21 – 2021/22)

The vision for the King Cetshwayo District Municipality Integrated Development Plan IDP 20/21 – 21/22 is to create a 'safe and healthy environment which promotes sustainable, radical, and inclusive economic and social development reinforced by service excellence' (KCDM, 2020: 34). As indicated in the vision, one of the goals is infrastructure development and service delivery. The Richards Bay Industrial Development Zone (RBIDZ) is identified as a catalytic project (KCDM, 2020: 69). The objective is to promote economic growth in the District and improve the socio-economic conditions of residents.

A catalytic project is defined as a project of significant scale and scope that will make a substantial impact and contribution to the achievement of the vision and goals of the Province. The Richards Bay Industrial Development Zone (IDZ) is defined as a game changer in the context of catalytic projects. The proposed 320MW RMPP will be located adjacent to the IDZ on a property zoned for industrial use, thereby contributing to and providing an extension of catalytic projects to the IDZ.

2.5.2. King Cetshwayo District Growth and Development Plan, 2015

The King Cetshwayo District Growth and Development Plan (DGDP) has an integral role in the integration and alignment of the goals of the NDP at national level and PGDP at provincial level. Therefore, the purpose of the DGDP is to translate the Provincial Growth and Development Plan into a detailed implementation plan at a district level (Uthungulu DM, 2015). One strategic intervention identified by the plan is the implementation of the roll-out programme for alternative sources of energy supply in the district

where the gas-fixed electricity generation is classified as alternative energy supply. The proposed project will therefore assist with this programme.

2.5.3. uMhlathuze Municipality Integrated Development Plan (IDP), 2019/2020

The objective of the IDP is to promote economic growth in the District and improve the socio-economic conditions of residents (uMhlathuze LM, 2019). The unsustainable use of resources, including energy, will ultimately compromise the Municipality's energy security. Challenges similar to these prompted the IDP to focus on sustainable solutions to the energy crisis. Therefore, the aim is to reduce the demand for energy and simultaneously investigate alternative energy sources.

An intervention proposed by the City of uMhlathuze to meet the sustainable development goal of ensuring access to affordable, reliable and modern energy for all, is the generation of 2000MW Gas to Power (uMhlathuze LM, 2019:34). The development of the 320MW RMPP will assist with this goal of enhancing energy security within the area. The development will also create employment opportunities which will strengthen the current socio-economic conditions of the area, as well as improve the standard of living.

Conclusion

The findings of the review of the relevant policies, programmes and documents pertaining to the energy sector indicate that the 320MW RMPP is supported at a national, provincial, and local level, and that the development will contribute towards the various targets and policy aims.

CHAPTER 3 TECHNOLOGY DESCRIPTION

This chapter provides an overview of the gas to power technology and the varying components associated with the technology. The technology alternatives for the 320MW RMPP are further detailed in Chapter 4 of this EIA report.

3.1. Gas to Power Technology

Emergency and grid balancing power plants are designed and developed as power balance systems to manage electricity demand during peak periods to stabilize the grid through the supply of capacity, energy and ancillary services. The characteristics of emergency and grid balancing power plants are as follows:

- Operates in multiple start/stops per day.
- Be synchronised to the grid in as little as 5 minutes and enable 100% of the power plant's output to be available on the grid within 15 minutes of start-up.
- Be very flexible allowing for rapid ramp rate and turn down of output.
- Provide instantaneous reserves within seconds of being called on to do so.
- Provide regulating reserves to rapidly raise or lower output within seconds when called on to do so.
- The system sizes are small with medium capacity factors of between 10 to 60%, but are capable of operating as base load electricity supply for short periods of time.
- Low heat rate to improve efficiency typically ~40%.
- Multiple units are installed together for improved turn down rates and increased operational flexibility.
- The power plant must be on demand and dispatchable either remotely or by an inhouse operator or by the system operator.
- Capable of operating in multiple regimes: Peaking, Mid-Merit and Baseload.
- Good load following capability to balance wind and solar and the ancillary service market.
- Enables fuel flexibility as most systems can operate on diesel, LPG and natural gas .

The proposed 320MW RMPP will be operated in a simple cycle system, with no secondary steam driven turbine component, comprising of five (5) gas turbines[7] that meet the criteria above for emergency and grid balancing power plants. The 320MW RMPP will operate as a hybrid power solution, being coupled with roughly equally sized renewable energy generation capacity located in the northern Cape. The operation of the 320MW RMPP will be to the extent required to meet any deficit in electricity production from the renewable generation capacity of the hybrid project.

[7] The scoping report included consideration of either gas turbine or gas engine technology. Due to availability and emergency demand,the gas turbine technology is being considered for the project as the preferred alternative . Further detail on alternatives is provided for in Chapter 4.

3.1.1. Gas Turbine Technology

Gas turbines used in electricity generation are typically small compact turbines, similar to the ones used in the aircraft industry, but can vary greatly in size for different applications. The gas turbines are mounted in line with a generator .

The gas turbine compresses air and mixes it with fuel which is combusted to produce high temperature combustion gases. The high temperature combustion gases pass through a gas turbine resulting in the rotation of the turbine blades. The rotational movement of the turbine blades at a high speed drives a generator which converts a portion of the energy produced by the rotational blades into electricity. The principles of operation of the gas turbine power plant is illustrated in the figure below. The blue shading indicates the cold air section and red section illustrates the exhaust path.

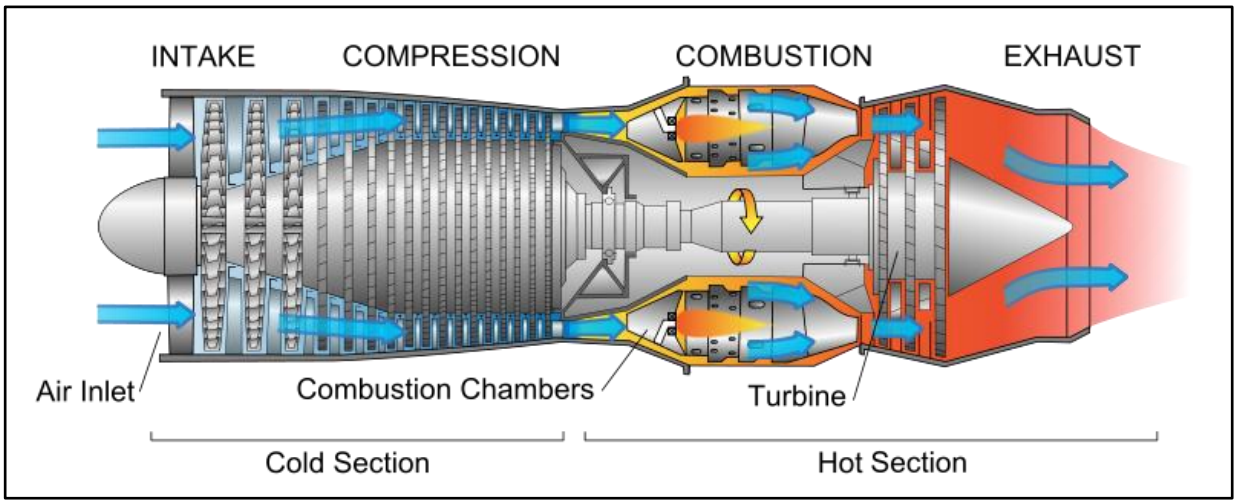

Figure 3.1: Typical configuration of the major components in the gas turbine engine

The benefit of a gas turbine power plant is that it can be fitted with several auxiliary systems to improve performance, reduce emissions and prolong maintenance. A dry low NO_x emission combustion chamber also supports dual fuel sources such as LPG or natural gas. The following auxiliary systems can be fitted to the 320MW RMPP to improve performance and reduce emissions:

- Leading edge guide vanes to improve air intake flow rate.
- Evaporative coolers to lower the ambient temperature of the inlet air, resulting in high combustion efficiency.
- Water injection systems to reduce formation of thermal NO_x in the exhaust gas.
- Heat recovery systems to extract heat energy from the exhaust plume to boil water to form steam. This steam is fuel for a steam turbine that is coupled to a generator. This second steam cycle will not be used in the 320MW RMPP as the electricity dispatch regime anticipated is not suited to combined cycle technologies.

The configuration of a typical aero derivative gas turbine used for power generation is shown in the figure below.

Figure 3.2: Example of the typical setup of a open cycle aero derivative gas turbine power plant used for electricity generation

The general process followed by the operation of a gas turbine power plant, which increases energy efficiency of a power resource and electrical output, is described below:

1) The project will comprise of five air intake structures and major equipment to generate 320MW of output.
2) The turbine air inlet system receives, filters, and directs the ambient air flow into the inlet of the compressor section of the gas turbine.
3) The gas turbine compresses the inlet air in the compressor section.
4) The air is then mixed with fuel in the combustion chamber.
5) Demineralised water is injected directly into the combustion chamber to prevent the formation of thermal NOx (NOx is the key pollutant from gas turbines).
6) The hot gases from the combustion expands over the turbine section and rotates the turbine blades.
7) The hot exhaust gas then flows to the exhaust section.
8) The gas turbine is coupled to an electricity generator.

Gas turbines are the only technologies capable of utilising LPG and/or Natural Gas or Diesel in utility scale power generation.

Small scale technologies (low kW range) that can convert LPG to electricity such as fuel cell technology cannot be scaled to utility size plants that support an output capacity more than a few 100 megawatts or meet the system flexibility requirements. Other generation technology using LPG in an LPG fired steam boiler to drive a steam turbine is not as efficient at generating power as the steam cycle requires large amounts of cooling in the air-cooled condenser and balance of plant systems.

In addition to the introduction of much needed new electricity generation capacity that can be brought onto the grid using gas to power technologies, the technologies proposed for the 320MW RMPP provides an opportunity for the future importation of natural gas into the Richards Bay region as the power plant will provide a base level of natural gas demand that can support the establishment of the LNG import infrastructure. The project will also provide much needed direct investment into the Richards Bay area and will stimulate additional business in and around the power station in support of its operations.

CHAPTER 4. PROJECT DESCRIPTION

This chapter provides an overview of the 320MW RMPP project proposed by Phinda in partnership with Globeleq Africa Limited (Globeleq) and Mainstream Renewable Power Developments (the Consortium). The 320MW RMPP components and infrastructure presented in this chapter are aimed at enabling the reader to obtain an understanding of the proposed project. The technology proposed and final thermal sizing has been defined based on the availability of gas turbines and other long lead items to meet the requirement of the RMIPPPP RFP for the thermal power plant to be commissioned by no later than 31 December 2022.

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

This chapter of the EIA report includes the following information required in terms of Appendix 3: Content of the EIA Report:

Requirement	Relevant Section
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	Details on the location and development footprint are included in Section 4.2.1 and Table 4.1
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale	A Layout Map of the project site is included in Section 4.2.3 and in Figure 4.6
(d) a description of the scope of the proposed activity, including— (ii) a description of the associated structures and infrastructure related to the development;	A description of project components and infrastructure is included in Section 4.2.2
(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 is included Section 4.3.2.
(h)(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	The identification of the preferred project site is included in Section 4.4
(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	No project site alternatives are considered for the 320MW RMPP. Technology alternatives considered for the development of the 320MW RMPP are considered within Section 4.7. The motivation behind the exclusion of site alternative have been included in Section 4.4.

4.2 Description of the Project

The proposed project comprises of a dispatchable 320MW gas plant and associated infrastructures, to be located in Alton, near the Richards Bay Industrial Development Zone (RBIDZ). The 320MW RMPP is planned

to operate on a mid-merit[8] basis at an average annual minimum dispatch rate of ~50% (i.e. operational between 5am and 9:30pm daily and being deployed on average for a minimum 72% over the year during this time period) and has been designed and developed as a power balance system to manage electricity demand during peak periods to stabilise the grid, as well as provide back up support for base load generation in the event of unscheduled maintenance on the existing coal fired power stations. The power station will have a net dispatchable capacity of up to 320MW, to be operated on LPG and is capable in future of being converted to natural gas. The LPG will be supplied to the 320MW RMPP project site via road tankers from the LPG import terminal located in the port of Richards Bay.

Once imported LNG is available in Richards Bay, the intention would be to convert the 320MW RMPP from LPG to natural gas, with the natural gas being supplied via a pipeline to the 320MW RMPP from the supply take-off point at the Richards Bay Harbour. The LNG terminal infrastructure, regassification infrastructure and supply infrastructure at the port and the relevant pipelines do not form part of the scope of this assessment, whereas LPG infrastructure does form part of this assessment.

The 320MW RMPP will be included and operated as part of a larger hybrid project being developed by the Consortium in response to the RMIPPP Programme. The hybrid project will be made up of the 320MW RMPP gas plant, and roughly the same capacity of renewable facilities (comprising of a 250MW solar PV and 96MW of wind generation capacity, all located in the northern Cape). Together these facilities will constitute the Hybrid Project. The renewable facilities which make up the hybrid project, have all been permitted under separate EIA applications and are not the subject of this assessment.

This innovative approach is aimed at increasing the infiltration of renewables and reducing overall energy costs and lowering carbon emissions from what would otherwise be a pure thermal power plant, all whilst still guaranteeing reliable, flexible, dispatchable and on demand power electricity supply into the national grid as required in terms of the RMIPPPP. The supply of electricity from the Hybrid Project to the national grid will be controlled by an operating system integrating the operation of all facilities comprising of the Hybrid Project, with the objective of maximising the utilisation of the renewable generation capacity and thus minimizing utilisation of the 320MW RMPP in the deployment of the Hybrid Project.

In addition to the 320MW RMPP (the subject of this EIA application), the project will require electricity evacuation infrastructure, which is being assessed under a separate basic assessment.

4.2.1. 320MW RMPP Project Location

The 320MW RMPP is proposed on Remainder of Erf 1854 and Portion 2 of Erf 1854. The site is located in Alton, near the RBIDZ, approximately 8km south west of Richards Bay which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province. The affected property is privately owned by associated group companies of the project proponent.

[8] Mid-merit electricity generation capacity refers to the generation of electricity which is adjusted according to the fluctuations in demand in the national grid. Baseload electricity generating capacity refers to the generation of electricity continuously for all hours of the day and night in order to satisfy the minimum demand required in the national grid.

Table 4.1: Project location

Location of the site	» **Remainder of Erf 1854 and** » **Portion 2 of Erf 1854.**	
Landowner	The affected property of the 320MW RMPP are privately owned by associated group companies of the project proponent.	
Municipal Jurisdiction	King Cetshwayo District Municipality and the City of uMhlathuze Local Municipality	
Total Extent of project site	49ha	
Extent of the 320MW RMPP footprint	Up to 9.4ha (considering the Power Plant, LPG storage and vaporiser and 132kV substation)	
320MW RMPP Coordinates	**Centre**	28°46'0.60"S 32° 0'41.09"E
	Corner 1	28°45'55.53"S 32° 0'32.58"E
	Corner 2	28°45'53.75"S 32° 0'36.00"E
	Corner 3	28°45'55.77"S 32° 0'38.47"E
	Corner 4	28°45'55.08"S 32° 0'39.93"E
	Corner 5	28°45'55.01"S 32° 0'48.09"E
	Corner 6	28°46'2.61"S 32° 0'44.25"E
	Corner 7	28°46'3.19"S 32° 0'38.09"E

4.2.2. Project Components

The 320MW RMPP will operate as an open cycle gas turbine (OCGT) facility. The 320MW RMPP comprises of five gas turbines using LPG as a fuel. As detailed above, the 320MW RMPP will be contracted to operate for a minimum of 12 hours per day and a maximum of 16.5 hours per day (operating only between the hours of 05:00 and 21:30), 365 days per a year, excluding shutdowns. The EIA assessment has been undertaken assuming 16.5 hours full load operation of the 320MW RMPP i.e. the worst case scenario for air and noise emissions. However, in practice, the 320MW RMPP as part of the Hybrid Project coupled with equally sized renewables generation capacity, will operate fewer hours providing supply only to the extent required to meet any shortfall in electricity production from the renewables facilities in meeting the maximum output of the Hybrid Project of 320MW.

The components of the 320MW RMPP are summarised in **Table 4.2** and illustrated in **Figure 4.1**.

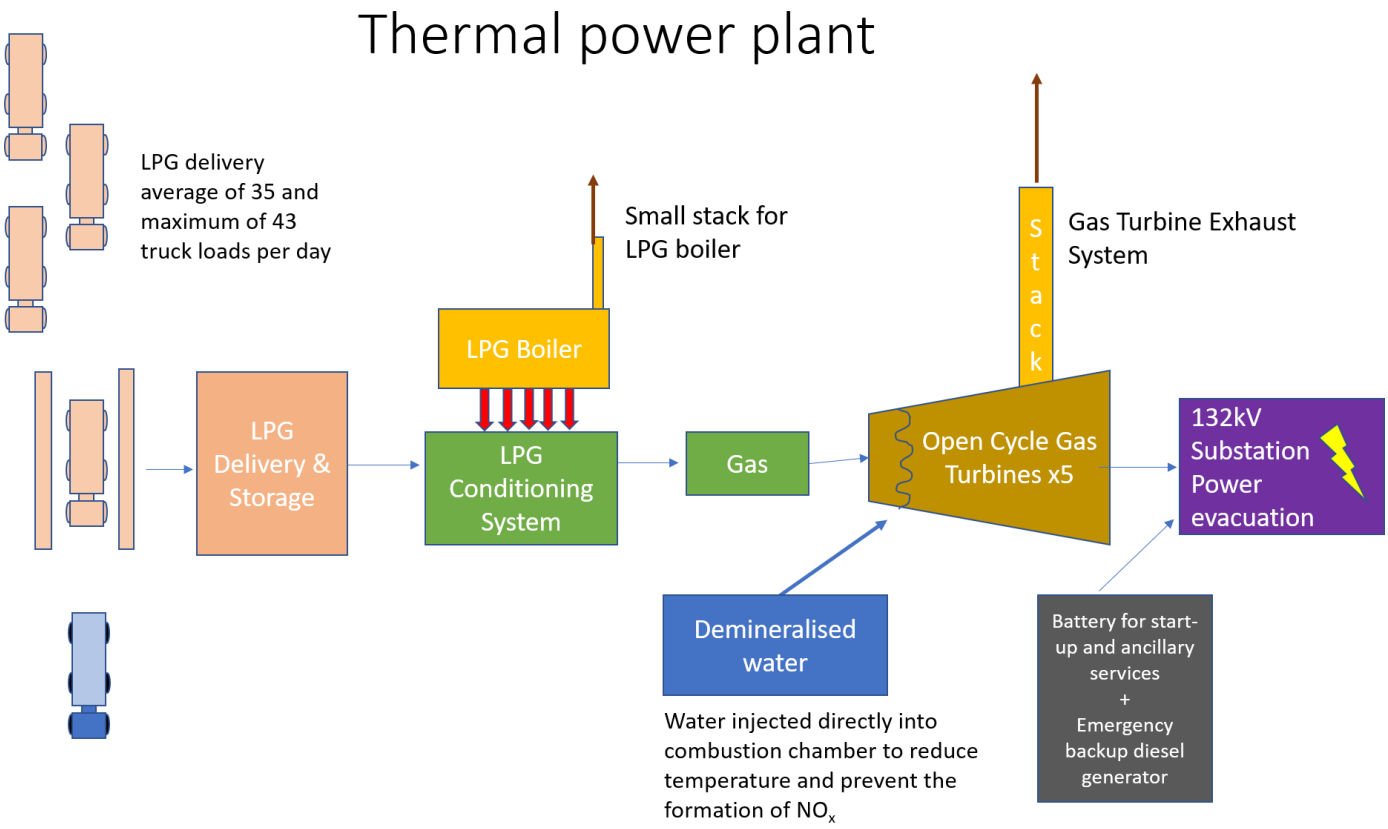

Figure 4.1: 320MW RMPP power plant block flow process diagram

Table 4.2: Main 320MW RMPP Project Components

Project Components	Description
Electricity Generating capacity	320MW
Proposed technology	Open Cycle Gas Turbine technology
Gas Turbine	Five gas turbines comprising of a total of 320 MW capacity.
Gas Turbine Exhaust System	Exhaust from each gas turbine will be discharged to the atmosphere at a high level via a 20m exhaust stack at the outlet of the gas turbine. The exhaust emissions composition will be monitored continuously via Continuous Emissions Monitoring System ("CEMS") to ensure that the emissions limit of 50 mgNm^3 NO_x is maintained.
Closed Cooling Water System	A closed cooling water system will be provided to supply cooling water to the various plant equipment.
Compressed Air System	The compressed air system will consist of instrument air and service air. The compressed air is generated in a centralized compressor station which supplies the two different air qualities. The instrument air is filtered and dried and the service air is just filtered.
LPG Delivery and Storage	LPG will be delivered to site via road tankers from the Richard's Bay port's import facility. The LPG will be unloaded via 4 gantries, stored under pressure in up to 13 bullets with a total capacity of 10 000m^3.

Project Components	Description
LPG Conditioning System	» LPG will be vaporized by heating it immediately prior to delivery into the gas turbines via an onsite pipeline. The LPG will be heated by a boiler operated using LPG.
Associated infrastructure	» Internal roads » Internal water, air and gas pipelines » Control and electrical buildings, including a central control room » Warehousing and administrative buildings » Firefighting systems » Bulk water storage » Water demineralisation plant » Storage facilities for fuels, gas and chemicals » 25MW solid-state battery system as part of the start-up system to provide power to the grid during the 4-minute lag period it takes for the gas turbines to start-up. » Emergency back-up generators » Stormwater management system » Sanitary wastewater system with municipal connection » Zero Liquid Discharge Vaporisation and Crystallisation System » Dry Cooling systems » Balance of plant systems » Generator and Auxiliary transformers » Electricity substation » Temporary construction laydown area
Buildings	Buildings will include a clarified water treatment plant building, fire protection pumphouse, workshop building, warehouse, common administrative offices and control building, and guard house.
Plant Electrical System	The gas turbines will be connected to step-up transformers via a generator circuit breaker and isolated phase bus ducts (one separate system for each).
Distributed Control System	A plant distributed control system to provide common human machine interface for the operator in the control room. This will be located within the office building.
Power Evacuation and Transmission	Power will be evacuated via new 132kV substation on site. Underground transmission lines will be constructed, connecting the project to the unutilised 132kV distribution lines located approximately 1.8km to the south of the site, commonly referred to as the Bayside transmission lines. This is part of a separate basic assessment environmental application.
Demineralisation Water Treatment Plant	Clarified water supplied by Mhlathuze Water will be further treated by filtration and reverse osmosis treatment to produce demineralized water suitable for use by the 320MW RMPP plant equipment.

Project Components	Description
	» Multimedia filtration system which conditions water prior to entering clarified water storage tanks. » The demineralisation plant has been designed to provide a maximum demand of 1500m^3 of demineralised water per day
Raw/Process-Water Storage Reservoir	» Clarified water and demineralised water will stored on site in 2 x 2 200m^3 and 2 x 1 900m^3 steel tanks, respectively. » Water for fire-fighting purposes will be located on site
Zero Liquid Discharge Vaporisation and Crystallisation System	» No process effluent discharge will take place from site. Brine from the demineralized water treatment plant will be directed to the ZLD system where it will be evaporated and crystallised. » These crystalised solids are collected in a container and will be disposed of every two weeks by a licenced waste contractor. Approximately 3-4m3 of solid waste is produced per day by the ZLD (based on operating at 100% load for 16.5hrs).
Stormwater Management System	» The stormwater management system will be designed to attenuate water to pre-development run off rates. » Any rainwater that may have been polluted by oil will be diverted to an oily water separator designed to clean water to achieve no more than 2.5mg/l of oil in the treated water. » Clean rainwater will be collected from the site and discharged back to the surrounding environment. An attenuation basin will be designed to ensure flows do not exceed maximum pre-development rainwater runoff rates to the surrounding environment.
Oily Water Separator	» When the plant is operating, the clean water from the oil separator can be directed back to the water treatment plant to be recycled and used in the process, alternatively the clean water will be discharged to the stormwater system. » Oily water collected in the separator will be removed from the site for disposal by a licensed third party service provider in terms of South African legislation.
Fire Protection System	Fire Protection System is provided to ensure that all equipment, instrumentation, human, and properties inside and around the Plant and ancillaries surrounding possess equipment to fight a fire incident. It consists of fire water pumping system, deluge system and CO_2 system.
Site Access	Main access to the project site will be via the existing access points on Kabelring Road and Kraft Link Road.
Services	» Waste disposal - all waste material generated from the development will be collected by a suitable contractor and the waste will be disposed of at a licensed waste disposal site off site. This service will be

Project Components	Description
	arranged with the municipality or an independent waste management service provider when required. » Sanitation – during construction, all sewage waste will be collected by a contractor to be disposed of at a licensed waste disposal site. This service will be arranged with the municipality or an independent waste management service provider when required. During operation, the facility will be connected to the municipal sewer system. » Water – Water is to be sourced from the Mhlathuze Water. The construction phase of the 320MW RMPP will require approximately 200m^3 for construction per day (anticipated construction period is 18 months). Water volumes for gas turbines (at full load of 16.5 hours per day with no renewables offset) is approximately 700 to 980 million litres per annum for emission control depending on the level of dispatch of the power plant from the expected average minimum to average maximum. » Electricity - The electricity requirements for this facility are to be obtained from the municipality (during construction) and from Eskom (during operation). These services will be arranged with the municipality and Eskom when required. » Agreements for the majority of the above services have been agreed in principle with the various service providers.

More detail regarding the project components is provided in the sections below.

i) OCGT Process

An OCGT process consists of a gas turbine and a generator. The gas turbine comprises of a compressor, combustion system and a power turbine section driving the electricity generator. The gas turbine compressor draws in fresh air and raises the air pressure by compressing it. Fuel is added to the compressed air in the combustion chamber of the gas turbine, together with water for NOx abatement, and ignited. The resulting expanding burning gases turn the power turbine which is connected to the generator thereby creating electricity.

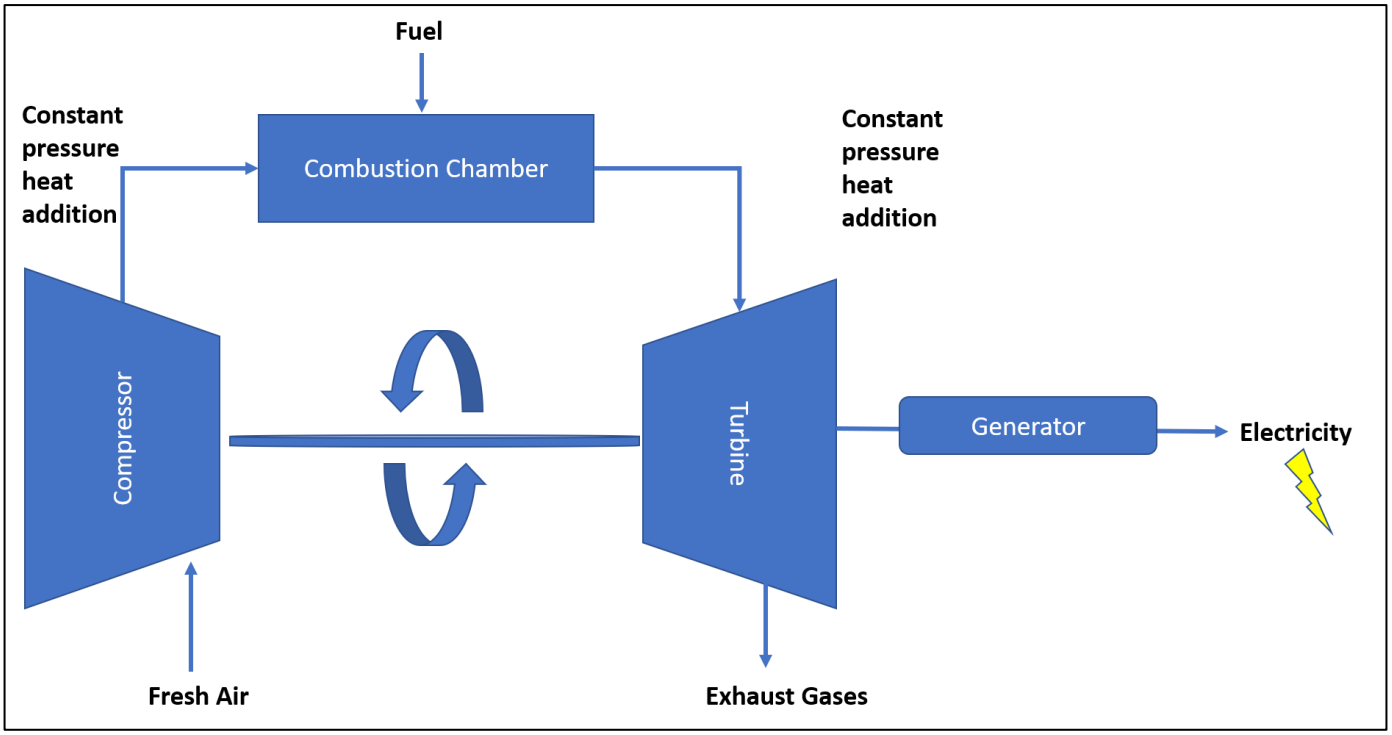

Figure 4.2: A Graphical Representation of the OCGT Power Generation Process

The 320MW RMPP will use aeroderivative gas turbines. The guaranteed minimum emission levels for the gas turbines are presented in **Table 4.3**. The exhaust gases from combustion will be discharged via separate 20m stacks for each gas turbine.

Table 4.3: Emission Parameters for gas turbines

	LPG	Natural gas
Noise (dB)	85	85
NOx (mg/Nm^3)	50	50
CO (mg/Nm^3)	100	100
SOx (mg/Nm^3)	-	-

Source: Government Notice No. 248 on 31 March 2010 publishing listed activity 10 (Category 1: Combustion Installations), (4) Subcategory 1.4: Gas combustion installations, in terms of the National Environmental Management: Air Quality Act, 2004

It should be noted that the South African legislation for NOx emissions is very stringent, being 1/3rd the level of emissions allowed under international standards (the World Bank's IFC Guidelines. The 320MW RMPP will therefore operate at an emissions level that exceeds international best practice.

ii) LPG Delivery

LPG is the term applied to those hydrocarbons which are vapours at room temperature and can be liquefied by moderate compressing. When LPG is liquefied, its volume decreases considerably so that it requires much less storage space. LPG is composed of a mixture of mainly propane and butane (approximate ratio 70:30 by mass; but can be up to 100% propane) but may contain some propylene and butylene as well as traces of ethane, ethylene, pentane, and butadiene. LPG is colourless and odourless. Commercial LPG is doused with a substance called ethyl mercaptan to give it a characteristic odour. This process occurs at the LPG supply terminal. No ethyl mercaptan will be stored on site.

LPG will be sourced from the LPG import terminal located at the Port of Richards Bay, approximately 12km away from the project site. LPG will be delivered to the project site via road tankers. At maximum demand (full thermal load for 16.5 hours with no renewables offset) the project will require approximately 1100 tonnes/day, this equates to 43 tanker loads (using 26 tonne capacity tankers). On average, the fuel demand will be much less and is expected to require no more than 35 tanker loads on average.

One round trip takes about 4 hours in total, considering filling at the port, offloading, documentation, and travel time. There will be approximately 16 dedicated tankers delivering LPG to site from the import terminal daily, each tanker undertaking approximately three round trips.

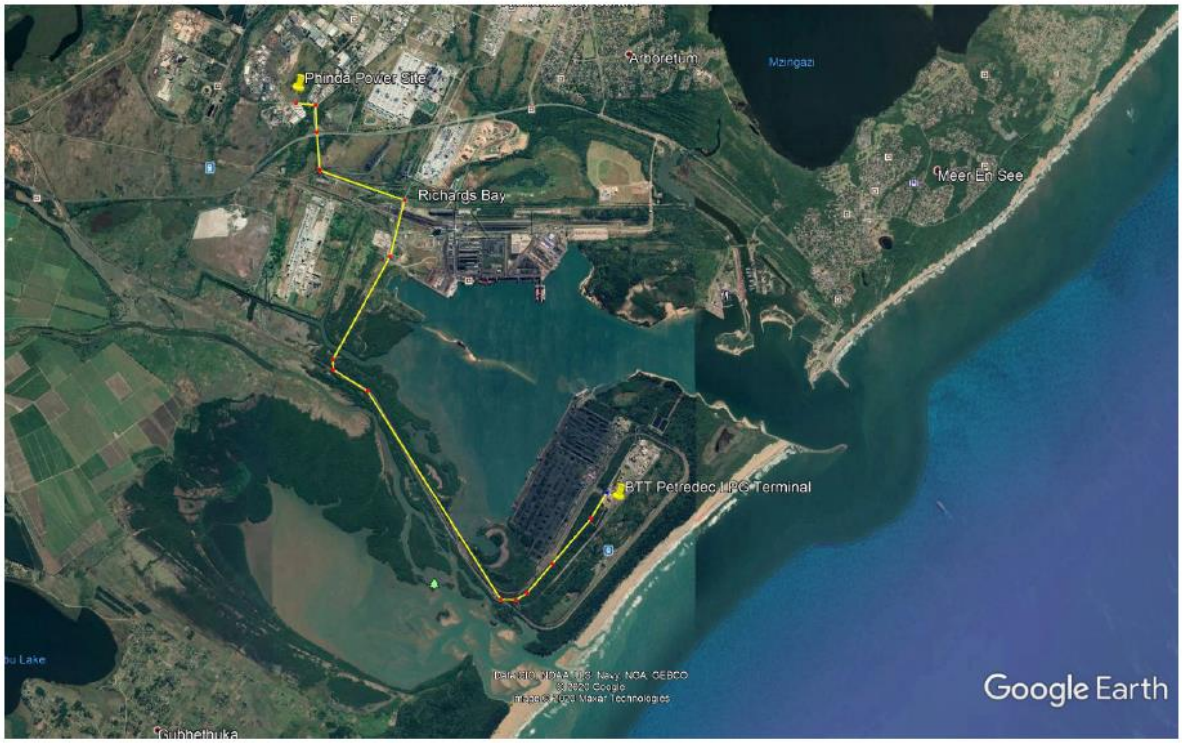

Figure 4.3: LPG delivery route to be used by road tankers

A transfer, unloading and storage facility will be provided to allow road tankers to safely discharge and transfer the LPG to the onsite storage bullets. The project site will have four dedicated road offloading bays located within the project footprint. These bays will enable the tankers to be offloaded safely and efficiently directly to onsite storage. It is anticipated that each offloading will take approximately 60 minutes. Immediately after this road tanker connection, an isolation valve is installed to protect the storage facility in the event of fire or explosion.

iii) LPG Storage

The LPG storage system will be designed in accordance with internationally recognised standards meeting the requirements of SANS 347, SANS 10131 and SANS 10087-3. A total of 10 000m^3 of LPG storage will be required at site. The fuel will be stored under pressure in 13 bullets. Each bullet is a surface mounted container. Each tank will be filled to a maximum of 90% of its liquid capacity due to potential expansion of its contents at higher temperatures. This is to prevent the uncontrolled discharge of LPG through the pressure release valve.

iv) LPG Conditioning System

Prior to being combusted by the Gas Turbines, LPG must be converted back into a gas. The fuel is passed through a vaporisation skid which heats the liquid fuel, converting it back to a gas. The vaporisation skids shall be designed to provide a fuel gas suitable for the gas turbine. The vaporisation system requires an LPG boiler to warm water and provide the energy required for the vaporisation process. The boiler will consume approximately 2 000 tonnes LPG per year, based on 16.5hr power plant operation.

v) Water Supply and Consumption

Potable water usage will be minimal and provided by the existing municipal water supply servicing the site. Approximately 10m^3 of potable water per day will be required during the operational phase for sanitary purposes supplying admin buildings and the workshop. During the construction phase water demand of approximately 200m^3 per day will be met by the same municipal water supply connection.

Clarified water will be supplied by Mhlathuze Water via an existing bulk water pipeline. The project will tie into and connect to an existing line at the South West boundary of the site (maximum 50m connection required). Water will be stored in two 2 200m^3 tanks. The stored water will be used for both service and fire protection supply.

Water will be used for a number of processes, but the most significant demand and consumption of demineralised water is for NO_x abatement. Demineralised water is injected into the gas combustion chamber through the fuel nozzles to regulate the combustor flame temperature and lower NO_x emissions (https://www.ge.com/power/services/gas-turbines/upgrades/water-injection-for-nox-reduction).

In addition, minimal amounts of water will be used for wet compression and air cooling, gas turbine compressor wash system, make-up water for the closed cooling system. It is also used for fire-fighting water. A maximum of 2 000m^3 per day of clarified water is required by the plant. The water consumption of the plant will be directly related to the number of operating hours.

Before the clarified water can be used in the power plant systems it must be treated further to produce demineralised water. The demin water treatment plant has been designed to treat 2 000m^3 of clarified water per day, producing 1 500m^3 per day of demineralised water. Demineralized water will be stored in two tanks of 1 900 m^3 each.

vi) Demineralized Water Treatment Plant

A multimedia filtration system will be used to condition water prior to entering the clarified water storage tanks. Water will then be further treated using micro filtration, before being sent to the reverse osmosis (RO) system. At this point the water will be chemically treated by dosing with:

- Acid dosing
- Scaling inhibitor dosing
- Reducer agent dosing

Following RO and dosing, the water is deionised via a resin ion exchange system.

The demineralisation plant has been designed to provide a maximum demand of 1 500m^3 of demineralised water per day. Demand is directly dependant on the operating hours of the project, as the main source of the water requirements are to enable the abatement of NO_x during combustion.

Demineralising clarified water creates brine as an effluent waste stream, this brine essentially has the same characteristics as the clarified water, but concentrated 7 times. All effluent from the water treatment plant is directed to the zero liquid discharge system.

vii) Zero Liquid Waste System

The 320MW RMPP has been designed to minimise production of wastewater and eliminate the need to discharge any wastewater from site. In order to have a zero liquid discharge (ZLD) system, the effluents of the water treatment plant will be treated by means of one additional reverse osmosis pass and one vaporization and crystallization system. This ZLD will also include one dewatering unit, one boiler and one cooling tower. The boiler will utilise LPG, and assuming full 16.5 hr operation, will consume 1 200 tonnes per year.

The ZLD system produces a solid waste stream instead of an effluent stream, consisting of solids in the form of salts and minerals. These solids are collected in a container and will be disposed of every two weeks by licenced waste contractor. Approximately 3-4m^3 of solid waste is produced per day by the ZLD (based on operating at 100% load for 16.5hrs).

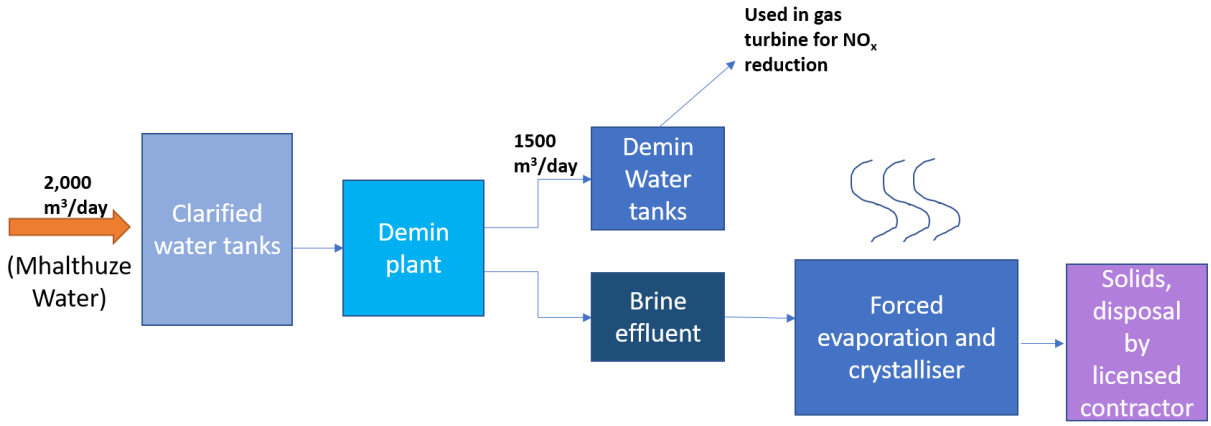

Figure 4.5: Zero Liquid Discharge

viii) Stormwater and Oil Separator

Rainwater falling on site internal roads, carpark and roofs will be directed to the stormwater management system. The stormwater management system is designed to attenuate water discharge to predevelopment run off rates through use of storm water attenuation basin to regulate discharge of surface water offsite. The majority of the site will not be covered by hard surfaces, however a conservative estimate of 50% of the site has been assumed to design the stormwater management system.

Any rainwater that may have been polluted by oil will be diverted to an oily water separator designed to clean water to achieve no more than 2.5mg/l of oil in the treated water. The effluent enters into a first settling vessel, from this vessel passes by gravity to the second one through a coalescent plate's package where the oil floating drops are separates. The underside of each parallel plate provides more surface for

suspended oil droplets to coalesce into larger globules. Oil sludge wastes collected from the oil separators will be removed and disposed of by licensed waste contractors.

When the plant is operating the clean water from the oil separator can be directed back to the water treatment plant to be recycled and used in the process, alternatively the clean water will be discharged to the stormwater system.

ix) Oily Water Collection System

Oily water will be collected from all areas, buildings and surfaces where oil can spill. These are:

- The oily water from around the engine/turbine and from the auxiliary floor is collected to the floor pits, which are connected to the nearest oily water collecting sump.
- Oily water from Fuel Treatment and other buildings with oily water pits / channel is lead to nearest oily water collecting sump.
- Oily water from the clean and used oil storage bunds.
- Oily water from the oil cooling systems.
- Oily water from workshops.

The oil water will be collected in an oily water sump tank and will be emptied as and when needed, either biweekly or monthly basis with trucks by licensed waste disposal contractor.

x) Chemical Handling and Storage Management

During construction activities, fuel oil, lube oil, paints, and maintenance products are likely to be required. Chemical handling and storage practices will be in line with good industry practice. Storage areas will be bunded and secured and all chemicals will be clearly labelled and managed and handled in accordance with requirements of material safety data sheets.

During operations, limited quantities of chemicals are likely to be stored on-site which mainly includes demineralised water treatment chemicals, fuel oil, lube oil, paints and solvents, and maintenance products. Storage areas will be bunded and secured and all chemicals will be clearly labelled and managed and handled in accordance with requirements of material safety data sheets. Apart from LPG, approximately 50m^3 of diesel fuel will be stored on site. No bulk storage of chemicals is anticipated.

xi) Battery System and Emergency Diesel Generator

The operating regime of the 320MW RMPP, due to its renewable hybrid component, will enable the partial or full shutdown of the 320MW RMPP during periods where the renewables are partially or fully able to meet the dispatch instruction from Eskom. A 25MW solid-state battery system and emergency diesel generator are proposed as part of the facility. The primary purpose of this infrastructure will be to bridge the start-up time of the 320MW RMPP, where the gas turbines are off and ancillary service dispatch instructions are received from Eskom. To enable the 320MW RMPP to respond immediately with the ancillary services to the Eskom, the BESS (or emergency generator) will provide power to the grid during the 4-minute lag period it takes for the gas turbines to start-up. Whilst the 320MW RMPP is idle, fuel consumption, water consumption, and the associated atmospheric discharges will be completely avoided resulting in a more environmentally friendly and economical outcomes.

xii) Access Roads

The site is bounded by Eutectic Point to the east, Kraft Link to the south and Geleier Gang to the west. The R34 is located to the south near the proposed site. The R34 is a 4-lane dual carriageway carrying high volumes of heavy vehicles travelling to and from the Port of Richards Bay, which accommodates one of the largest LPG import terminals in South Africa. The site is deemed well located and connected for its purpose.

During both construction and operation, the site will be accessed via existing roads. The project entrance and exit will be located along an existing private road at the northwest of the site.

xiii) Temporary Laydown Area for Construction

A temporary laydown area will be required during the construction phase. The northeast corner of the project site has been designated for construction laydown, as detailed in the project layout (**Figure 4.6**). This area will be landscaped on completion of the construction phase. No onsite accommodation will be developed for the construction phase. It is expected that workers will mainly come from the local area or be temporarily housed in available existing accommodation locally.

xiv) Sanitary Wastewater

The sanitary wastewater system is separated from rainwater and oily water sewage to minimize flow and pollution loads. Sanitary wastewater will be discharge into the municipality's sewage lines running next to the site.

xv) Security

The Project site will be secured by a permanent fence at an early stage of construction. Security systems and guardhouse with permanent guards will be posted at the site entrance. All vehicles entering and leaving the site will be screened and searched. All personnel will be required to display personal identification and all visitors will be required to sign in. The Contractor(s) will be responsible for site security during construction.

4.2.3. Layout

A facility layout has been developed by Phinda for consideration within the EIA process. This layout is shown in **Figure 4.6.** The final design and layout of the facility is discussed in **Section 4.3.2** below.

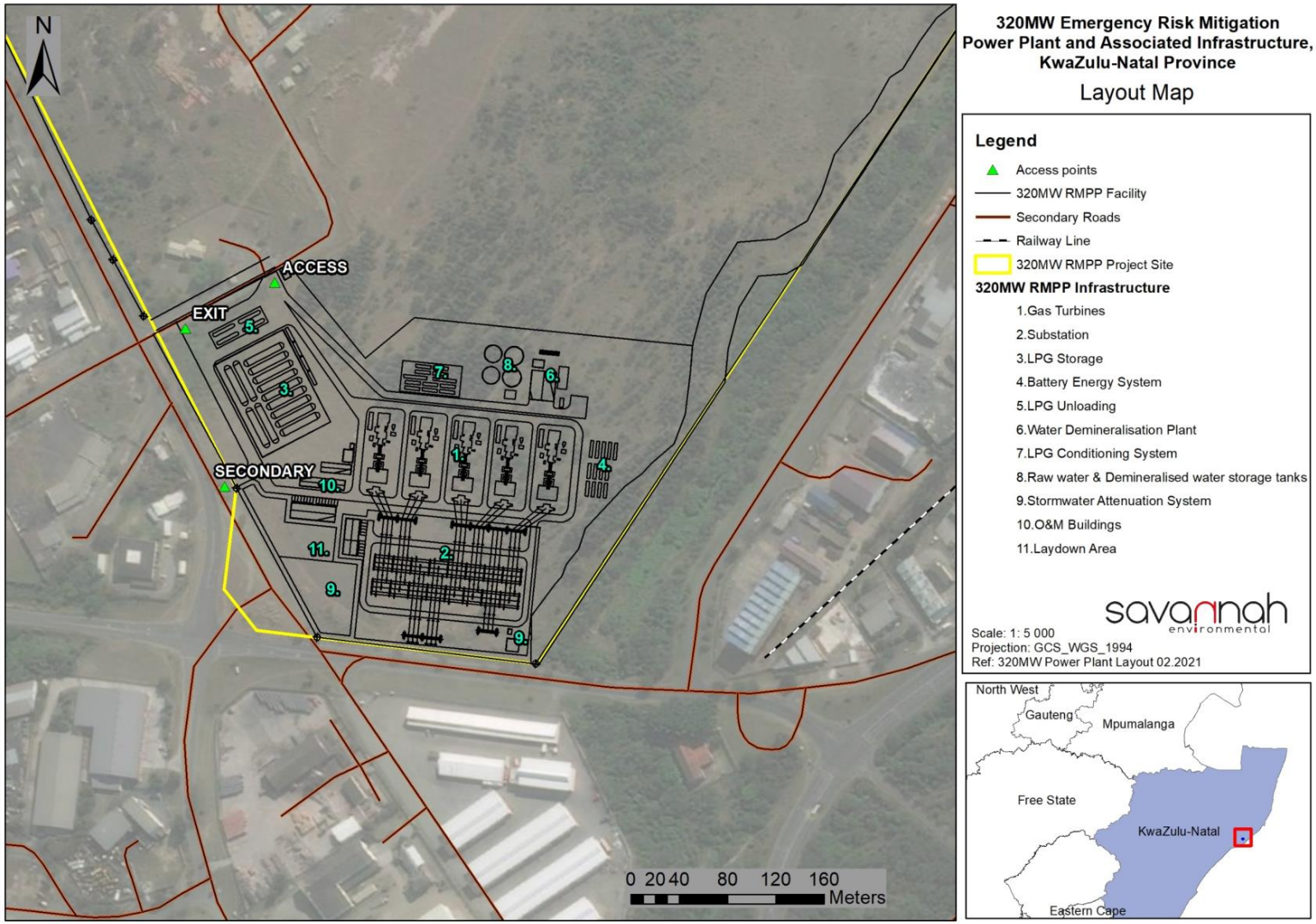

Figure 4.6: Layout of the 320MW RMPP and associated infrastructure

4.3. Project Alternatives

In accordance with the requirements of Appendix 3 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives including site and technology alternatives, as well as the "do-nothing" alternative should be considered. Alternatives are required to be assessed in terms of social, biophysical, economic, and technical factors.

As per the definition of alternatives as per the Environmental Impact Assessment (EIA) Regulations (GNR 326); "alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:
(a) property on which or location where the activity is proposed to be undertaken;
(b) type of activity to be undertaken;
(c) design or layout of the activity;
(d) technology to be used in the activity; or
(e) operational aspects of the activity;
and includes the option of not implementing the activity;

Most guidelines use terms such as "reasonable", "practicable", "feasible" or "viable" to define the range of alternatives that should be considered. Essentially there are two types of alternatives:

- **Incrementally different** (modifications) alternatives to the project.
- **Fundamentally (totally) different** alternatives to the project.

4.3.1. Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level, and project-specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. Electricity generating alternatives have been addressed as part of the IRP 2010 – 2030. In this regard, the need for a diversification of the technology mix for power generation has been considered and determined. The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of both gas generated energy and highly flexible generation capacity has been defined. Therefore, fundamental alternatives to the proposed project, including that of alternative energy development options, were not considered within the EIA report.

4.3.2. Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives to:

- The property on which, or location where the activity is proposed to be undertaken.
- The technology to be used in the activity.
- The design or layout of the activity.

In addition, the option of not implementing the activity (i.e. the "do-nothing" alternative) must also be considered.

The following project alternatives were previously considered during the scoping phase. A consideration of these alternatives in arriving at the final design parameters of the 320MW RMPP are set out below.

» Design and layout alternatives
  - The final design and layout of the 320MW RMPP has been determined based on the number of gas turbines required to generate 320MW, the optimal utilisation of space to accommodate other ancillary infrastructure, access for LPG truck deliveries, LPG storage, access to the power evacuation route, and the environmental sensitivities identified (i.e. the 29m wetland buffer identified for the adjacent wetland during the Scoping Phase).
» Fuel alternatives
  - The fuel alternatives of naphtha and LNG, as alternatives to LPG, were initially considered in the scoping phase of the EIA. Both naphtha and LNG were discarded as alternative fuel sources as the import infrastructure for both of these fuel alternatives could not be developed and commissioned within the time requirements for commissioning as set out in the RMIPPPP RFP. LPG was chosen as the only fuel source as there is an existing large scale LPG import infrastructure already established in the Port of Richards Bay. The 320MW RMPP has however been designed such that it can be converted to use regassified LNG in future should this fuel become available in Richards Bay.
» Gas to power technology alternatives
  - Both gas engine and gas turbine technologies were considered during the scoping phase.
  - Gas turbine technology was selected as the preferred technology alternative, as compared to gas engines, due to a combination of:
    - Gas turbines having lower emission levels of greenhouse gasses as compared to gas engine technologies; and
    - gas engine technologies not being capable of being constructed within the time limits imposed in the RMIPPPP RFP.

Alternatives considered during the EIA phase are discussed below.

4.4. Site Alternatives

Richards Bay has been identified by Phinda Power Producers (Pty) Ltd as the preferred area for the development of the 320MW RMPP due to:

» it being a location with existing large heavy industries and is specifically targeting the attracting of additional heavy industries through the Richards Bay Industrial Development Zone (RBIDZ), which attraction of new industries has been hampered by the unavailability of power to support these planned developments;
» the location of the Port of Richards Bay in close proximity to the industrial areas for the importation of fuel to supply the 3200MW RMPP, including the existing LPG import facilities and the future planned LNG import facilities;
» its location in relation to Mozambique, the current exclusive natural gas supplied to South Africa, and the potential to connect Richards Bay to the gas reserves in the north of Mozambique via a new natural gas pipeline which is in accordance with Governments long term energy planning;
» the existence of a large-scale electricity distribution and transmission network connecting to Richards Bay with a capacity of ~3,5000MW to facilitate the evacuation of electricity production with the least investment in additional;

- the close proximity (<2km) of the project site to the existing unutilised 132kV transmission infrastructure that previously provided electricity to the Bayside aluminium smelter which has been closed; and
- the close proximity of the project site to Mhlathuze Water's water processing plant (<3km) to facilitate bulk water supply as well as the location on the project site boundary of the existing bulk water supply pipeline connecting to Mhlathuze Water's processing plant.

Phinda Power Producers (Pty) Ltd identified their privately owned property (owned by an associate group company) located in the greater Richards Bay area for the development of the proposed 320MW RMPP, the property being one of the last industrial zoned undeveloped large land parcels in Richards Bay outside of the RBIDZ suitable for the development of a power plant. Following consideration of various technical aspects, the site for the 320MW RMPP, LPG Storage and related infrastructure was deemed suitable for the project. No alternative sites have been identified.

The site is located approximately 12km from the existing LPG import terminal in the Port of Richards Bay, which is within 500m of the preferred location for the future LNG import terminal. Accessibility to the site is possible via existing access points along Kabelring Road and Kraft Link Road. Regional roads also provide access which includes the R34 and the R619 which is linked to the N2. Smaller secondary roads within the area provide direct access to the sites which are linked either to the N2 or the regional roads, i.e. R34 and R619.

The preferred development area for the 320MW RMPP (9.4 ha) is considered as the most feasible and appropriate location for the 320MW RMPP, based on the following considerations:

i) Phinda Power Producers (Pty) Ltd, the proponent to this application for environmental authorisation and is an affiliate of the respective property-owning companies for the 320MW RMPP; and
ii) the development area is considered suitable for the development of the 320MW RMPP and associated infrastructure from a technical and land use perspective to ensure the success of the development.

No feasible alternative site has been identified for the proposed project.

4.5. Design and Layout Alternatives

The 320MW RMPP will have a development footprint of approximately 9.4ha, to be located within the project site of approximately 49ha. Specialist field surveys and assessments were undertaken as part of the EIA process to provide the proponent with site specific information regarding the study area and the development area considered for the development (refer to **Appendices D-N**). A layout has been developed by the Project Proponent taking all identified environmental sensitivities into consideration, specifically ensuring no encroachment into the 29m buffer zone separating the 320MW RMPP from the wetland located along the eastern boundary of the project site (refer to Figure 4.6).

No feasible design or layout alternatives were identified for the proposed project.

4.6. Fuel Alternatives

Gas to power technology as proposed for this project is ideally placed, and is able to operate using various fuel sources, depending on availability. The 320MW RMPP is proposed to operate using LPG, comprising principally of propane, with conversion to regassified imported Liquified Natural Gas (LNG) once piped

supply is available in Richards Bay. Only LPG is considered within this EIA process as LNG is not currently available in the area, and Naphtha is considered a heavy fuel source.

Diesel fuel will only be used by the emergency generator in the event that the battery system is unable to provide the start-up power to the first gas engine/turbine.

4.7. Gas to Power Technology Alternatives

The 320MW RMPP will be operated as an open cycle system, with no steam driven turbine component, using gas turbines. The power plant proposed for the 320MW RMPP will comprise of 5 gas turbine sets. Alternative technology considered included gas engines, however based on the construction timelines and planned operating regime, available fuel, and emissions to air, gas turbines provide the best technology choice. No feasible alternatives have been identified for the proposed project.

4.8. Cooling Technology alternatives

Only gas turbine technology is considered feasible for the proposed project. All cooling of turbines is done with air cooled system where ambient air is drawn over finned tubes containing the medium (oils and water) that must be cooled. The air is forced over the tubes via fans. To minimize water usage the open cycle generator and all auxiliary equipment including the oil coolers, the gas compressor coolers, and other balance of plant auxiliary equipment requiring cooling would utilize closed loop air-cooled heat exchangers.

4.9. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the proposed 320MW RMPP on the project site within the Alton Industrial area. Should this alternative be selected, there would be no environmental impacts on site or social and economic benefits as a result of construction and operation activities associated with the 320MW RMPP. The 'do-nothing' alternative has been assessed as part of the EIA Phase (refer to Chapter 8 and Chapter 10 of this EIA Report).

4.10. Development Phases of the 320MW Emergency Risk Mitigation Power Plant (RMPP)

4.10.1. Construction Phase

Construction of the 320MW RMPP is expected to take up to 18 months. The construction activities involve the following:

- Demarcating the area to be cleared and establishing fencing and other security controls to get access to the site.
- Clearance of vegetation.
- Excavation works and backfill.
- Levelling of the site.
- Access, provision and maintenance of safe temporary roads and footpaths to provide continuous and safe access to the Site during construction period.
- Steel works/platform/masonry/cladding, etc.
- Foundation work including pilling activities.

- Installation of site drainage and erosion protection and equipment installation.
- Installation of support facilities including waste and wastewater management equipment, diesel-powered generators, lighting, fuel tanks and storage areas.
- Final paved vehicular and pedestrian accesses between new facilities and the surrounding area roads and paths.
- Underground buried conducts systems for all the designed Plant utilities (electricity, different types of water supply, wastewater sewers, drainage, firefighting, earth network, etc).
- Reinforced concrete and Steel structures (foundations, piles, beams, frames, purlins, decks, slabs, etc) for all the industrial equipment (Turbines, transformers, stacks, etc), encasing and auxiliary buildings.
- Architectural works for different types of facilities buildings (warehouse, gas turbines shelter, shelter, administration & control building, etc), including: construction, enclosures, cladding, partitions walls, masonry, plumber, electrical, etc.
- Perimeter fencing and landscaping according expected security and environmental necessities.

Once excavation work is completed, the site will need to be levelled to accommodate the power plant equipment. Levelling the site will require the first 0.5m of soil to be removed, equating to approximately 40 000m^3 of spoil. Topsoils will be kept separate and stocked temporarily for reuse in final rehabilitation and landscaping. The site is not anticipated to be raised above existing levels.

Excavations will require cut and fill to install foundations, anticipated that approximately 25 000m^3 will be excavated. Excess material will be used to backfill as well as level any areas of the site as required. Estimated that no more than 10 000m^3 of excess spoil will be generated requiring disposal offsite by licensed contractors.

Excavators, graders, rollers, tipper trucks and bobcats will be needed during soil works, excavation/ compaction of foundations; dumpers will bring small materials / equipment's from laydown / storage area to site; cranes will lift metallic structures / equipment to final locations; flat bed truck will be used to transfer equipment from laydown area to construction site; telehandlers and cherry pickers will be used to support the work at heights. Large equipment (abnormal loads) will likely be delivered to Port in Durban and then onwards by truck to the site.

Site preparation works will also include the development of a site drainage system and erosion protection including grading of surfaces to manage stormwater and installation of surface drains to convey run-off storm water to suitable discharge points.

Once the site has been levelled and backfilled, piling will be carried out in areas where ground-bearing capacity is insufficient. Once the area is infilled, graded to the correct level and the piles in place, a layer of capping material consisting of graded fill material will be used to form a stable and suitable base upon which to assemble the main equipment (Gas Turbines and transformers). Once the initial civil works are completed, Gas Turbines and other large items of equipment will be delivered and installed.

On completion of main civil works, steel works will commence to erect the key structures housing plant equipment. Mechanical and electrical work will be undertaken simultaneously with the installation of key plant equipment, and laying of cabling systems throughout the site.

i) Staffing

a) Main Contractor

The power plant will be delivered under a fully wrapped Engineering, Procurement and Construction (EPC) contract, with performance guarantees, by an EPC Contractor. The EPC Contractor will be responsible for managing the construction as well as all design and procurement in accordance with the project specifications.

The construction phase is estimated to employ up to 600 people at peak workforce, with an average of 400 workers over the construction period. Due to the short construction timeframe, it is more likely that the peak workforce will be required for much of construction. In addition to employment, the Project will need to procure goods and services. Although the source of these has not yet been determined, the Project will prioritise local procurement where feasible.

b) Owner's Construction Management

The project company will have their own supervising teams onsite to oversee the EPC Contractor and verify project is being undertaken in accordance with the required specification. Supporting the project company will be an Owner's Engineer (OE), comprising of technical specialists support to review engineering drawings, application of specifications, and site conditions. Owners construction management team will comprise of a number existing project company staff members, as well new recruits (up to half). Excluding the OE, the team will comprise of approximately 10 site based personnel during construction.

4.10.2. Commissioning Phase

Prior to operations, the power plant will undergo a number of start-up commissioning tests bringing online all of the individual systems as well as the gas turbines. These commissioning tests are supervised by independent auditors to confirm the contractor has met all the performance and operational guarantees of the project. Commissioning can take up to one month, which includes a required 15-day reliability test run.

4.10.3. Operational Phase

In accordance with the RMIPPPP RFP the project schedule has been developed to achieve commercial operation by 31 December 2022, with a contracted life cycle of 20 years from this date.

i) <u>Operating Regime</u>

As the Dispatchable Facility of the Hybrid Power Project solution, the 320MW RMPP could be required to operate 16.5 hours a day, 7 days a week (6000 hours per year and 365 starts per year of operation), if the renewables facilities (Non-Dispatchable) are unable to meet demand. Based on the modelling undertaken, it is anticipated that the renewables will be regularly dispatched such that the anticipated daily average operation of the 320MW RMPP will be approximately 7hrs per day.

Assuming operation at full capacity for 16.5 hour day operation, the 320MW RMPP will utilise 1 100 tons/day of LPG, or 401 500 tons/year.

ii) Operating Activities

Certain maintenance cycles are required after every 1000 hours of operation of the 320MW RMPP. During commercial operations (excluding fuel deliveries and staffing) there will be some traffic delivering supplies to the power plant, estimated to be no more than 10 heavy goods vehicles deliveries or waste removals per week. This will increase during shutdowns and periods of major maintenance.

iii) Scheduling and Dispatch Control System (SDCS)

For the Hybrid Project to operate in accordance with the RFP obligations, the grid code and in a cost-optimised manner, there will be a single overarching control system (the Scheduling and Dispatch Control System or SDCS). Broadly speaking the SDCS will receive Dispatch Instruction from Eskom and issue appropriate instructions to the 320MW RMPP and each of the separate renewable facilities based upon each of the facility's availability, facility forecasted yield (in the case of Non-Dispatchable Facilities) and in the most cost-effective manner.

The SDCS will dispatch the renewables facilities first. The 320MW RMPP Dispatchable Facility will then be dispatched to make up any shortfall between the required output and the output achievable by the renewable facilities. The SDCS will also act to consolidate all of the separate facilities data to determine Hybrid Project-level performance metrics.

The system will have redundancy built in to ensure it remains operational in the instance of any single point of failure.

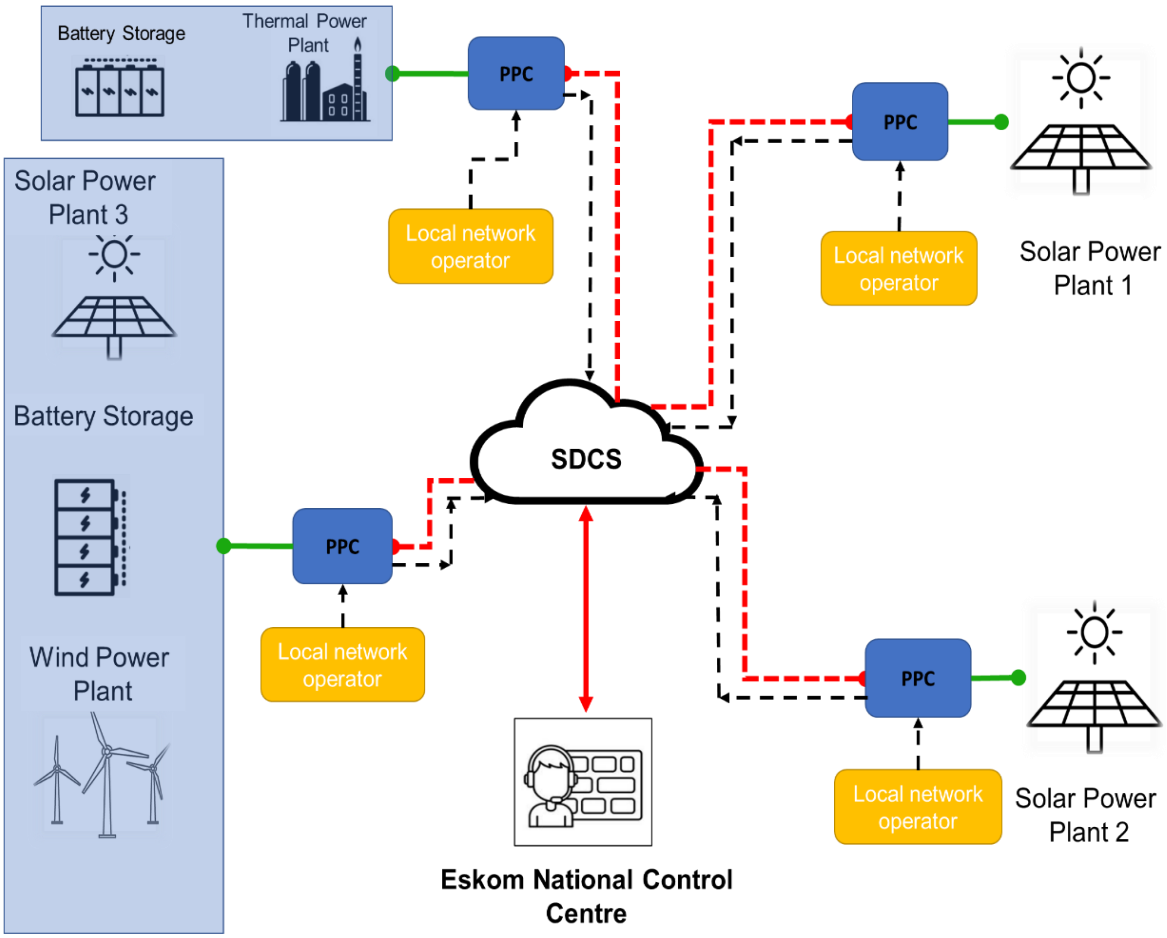

Figure 4.8: Control System Structure

iv) Staffing & Operating Costs

The 320MW RMPP will employ a core technical team of 35 people, with an additional 10+ people providing cleaning, admin, and security services. The site will operate 2 shifts, with core daytime shift comprising of nearly the full team, and night-time shift consisting of 4-6 members of the core technical team.

The annual operating costs for the project are expected to be approximately R250 million.

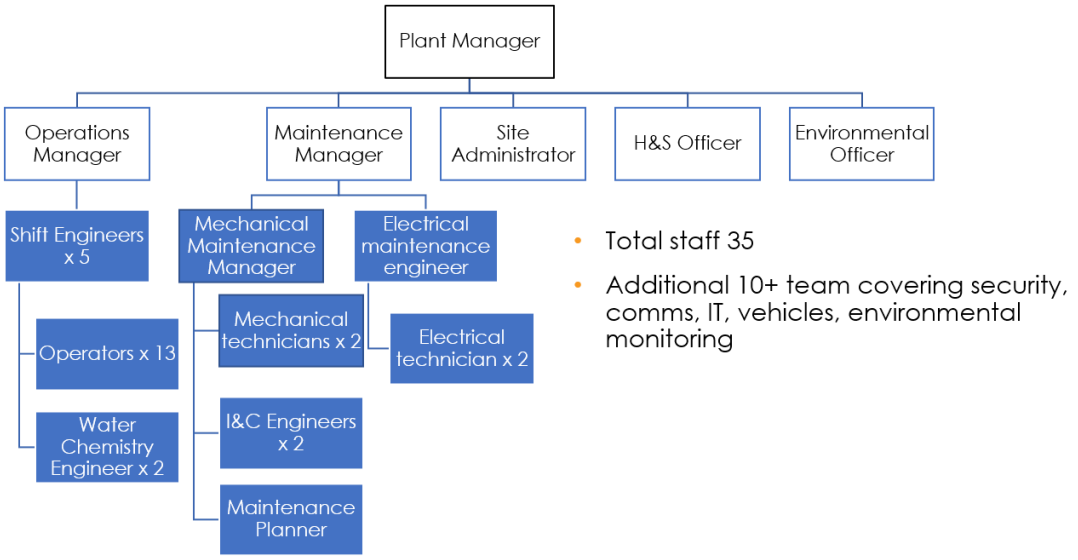

Figure 4.9: Operational staffing requirements

4.10.4. Decommissioning Phase

The lifespan of the proposed 320MW RMPP will be at least 20 years from date of commissioning. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or if it is no longer required. Upgrade of the 320MW RMPP technology could be possible after the initial 20-year operational life should an extension of operational life be required, as it is common for gas turbines to have longer operational lives than 20 years. Should the 320MW RMPP be decommissioned, the fuel supply infrastructure would similarly need to be decommissioned (LPG and natural gas should this switch have taken place during the 20-year operational life).

It is most likely that decommissioning activities of the facility and associated infrastructure will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, fuel storage tanks and pipelines, removal of waste from the site and rehabilitation to the desired end-use.

Future use of the site after decommissioning of the 320MW RMPP could possibly form part of another energy generating project or an alternative industry that would be able to utilise some of the existing infrastructure associated with the RMPP. This would however be dependent on the development plans of the area at the time.

CHAPTER 5. NEED AND DESIRABILITY

Appendix 3 of the EIA Regulations, 2014 (as amended) requires the inclusion of 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. The need and desirability of a development needs to consider whether it is the right time, taking into account the interests and needs of the broader public and right place for locating the type of land-use/activity being proposed, taking into account the principles of sustainable development,. Need and desirability is therefore equated to the wise use of land and should be able to answer the question of what the most sustainable use of land is.

This Chapter provides an overview of the anticipated suitability of the 320MW RMPP being developed at the preferred location from an international, national, regional, and site-specific perspective. It also provides an overview of the need and desirability of the project specifically.

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

This chapter of the EIAreport includes the following information required in terms of Appendix 3: Content of the Environmental Impact Report:

Requirement	Relevant Section
(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;	The need and desirability for the development of the proposed 320MW RMPP is included in Section 5.2.

5.2 Need and Desirability for the Proposed Gas to Power Station

5.2.1. Need and Desirability from a National Perspective

The National Development Plan (NDP) envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. South Africa's current energy mix is highly carbon intensive with the majority of the country's electricity from coal resources (Stats SA, 2016), resulting in a large carbon footprint. In 2016, South Africa had a total generation capacity of 237 006GWh. Approximately 85.7% (equivalent to 203 054GWh) of this figure was generated by coal (predominantly located in Mpumalanga and Limpopo) and 3,2% (equivalent to 7 584GWh) was generated by natural gas (refer to **Figure 5.1**).

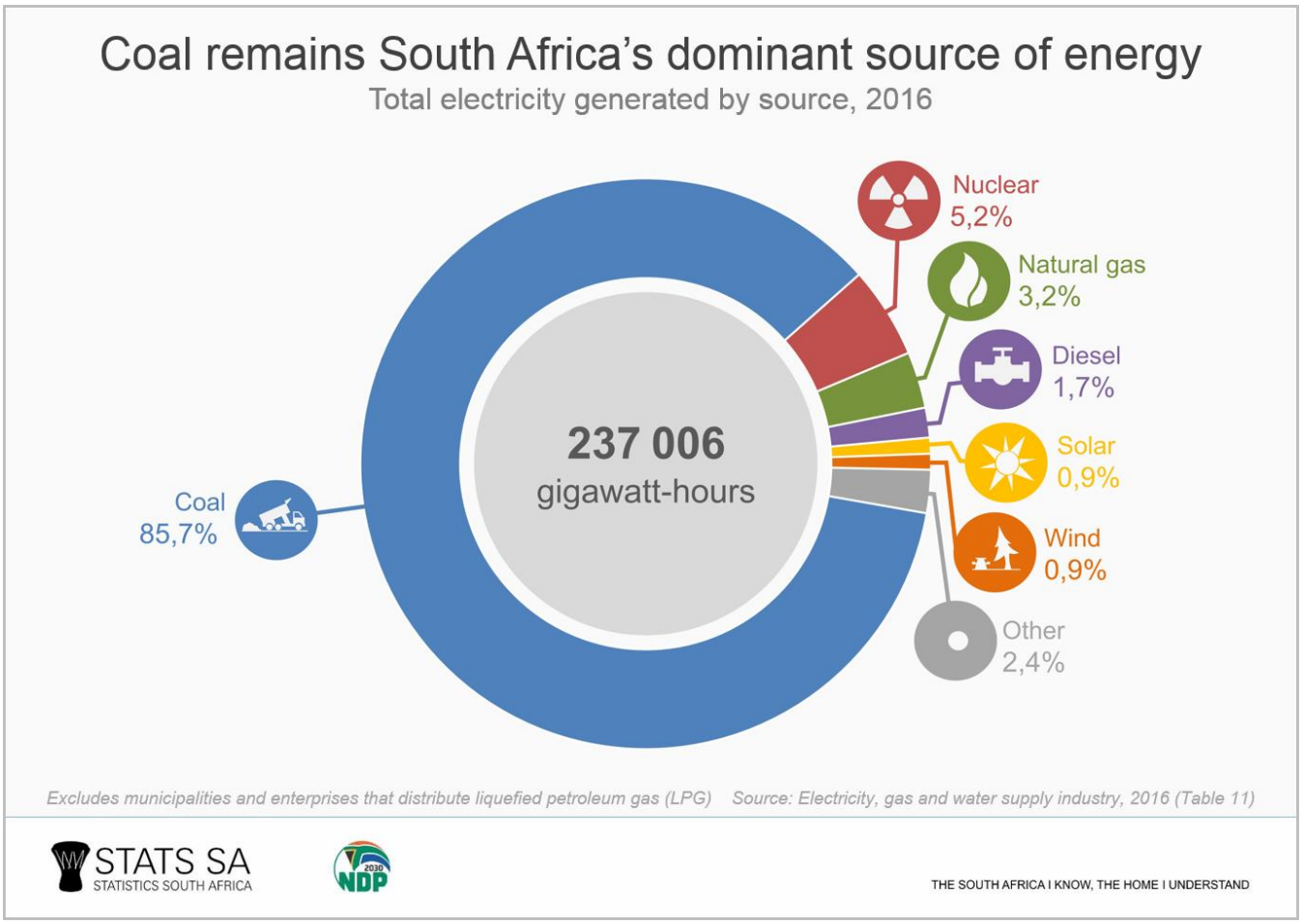

Figure 5.1: Overview of South Africa's electricity generation by source (Source: StatsSA, Electricity, gas and water supply industry report for 2016).

The dominance of a single energy system, which is highly reliant on fossil fuels, inevitably places an excessive burden on the environment. Taking into consideration the need to ensure adequate supply of electricity, minimise environmental impact and meet international obligations in terms of addressing climate change, the Government of South Africa has identified the need to diversify the energy mix within the country.

As detailed in Chapter 2, the following key policies have been developed by Government to take into account South Africa's current energy production and projected future demands, and provides the necessary framework within which energy generation projects can be developed:

» Integrated Energy Plan (IEP)
» Integrated Resource Plan (IRP)

The above-mentioned plans have been extensively researched and are updated on an on-going basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector planning and dictate national priorities for energy production.

The IEP is intended to provide a roadmap of South Africa's future energy landscape which guides future energy infrastructure investments and policy development. In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding the contribution of gas technologies to the diversified energy mix:

"Conventional and unconventional natural gas should play a more prominent role in South Africa's future energy mix both in the electricity sector and in the liquid fuel sector. Natural gas is a cleaner energy source than coal; it can be used as a primary energy source for power generation and for liquid fuel production and directly in enduse applications such as thermal."

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP, and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs.

The promulgated IRP 2010–2030 identifies the preferred generation technologies required to meet expected demand growth up to 2030. It incorporates government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. In terms of the technology mix, 3000MW is allocated to gas to power technology up until 2030. The IRP 2019 recognises that Gas Fired technologies present the most significant potential for developing the gas market in South Africa. In addition, gas can provide readily dispatchable, lower carbon supply capacity as more cyclical renewable energy supply is added to the generation mix. The need for new gas to power generation has therefore been identified and assessed by government at a national scale considering the national energy requirements as well as international commitments in terms of addressing climate change issues.

The IRP 2019 further identified that there is short term generation capacity shortfall approximately 2000MW - 3000MW, and concludes as follows in section 5.3.1 entitled "Immediate Term Security Supply":

"In the short-term supply and demand side interventions will have to be deployed to minimise the risk of load shedding and/or extensive usage of diesel peaking plants. The short-term gap in this regard is estimated to be about 2 000MW. A medium-term power purchase programme (MTPPP) similar to that adopted following the IRP 2010 must be considered with the goal of avoiding extensive diesel usage and load shedding."

1) In this regard, the Minister of Mineral Resources and Energy ("Minister") issued a determination for the procurement of 2000MW of new generation capacity should be procured from a range of energy source technologies and the IPP Office initiated the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP).

The 320MW RMPP is being developed in response to this programme and has been bid as an innovative hybrid solution comprising of gas to power technology (this project), initially using LPG as fuel source before transitioning to natural gas once supply is made available in Richards Bay via imported LNG, and a set of off-site renewable energy sources (separate projects considered through various separate EIA processes). This project therefore aims to meet both the short-term requirements of providing affordable dispatchable

generation capacity, but also meet the long-term goal of operating on natural gas. The chosen technology solution meets the RMIPPPP objectives as:

» The identified technology solution is 100% dispatchable at short notice, able to provide electricity supply into the grid as and when required at 100% of output within 15 minutes of being required.
» The identified technology is flexible and capable of operating across a wide variety of dispatch profiles, from base load to peaking

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans and has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic recovery will rely on a massive investment in infrastructure, including in energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy.
2. Enabling conditions for growth: these are the growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

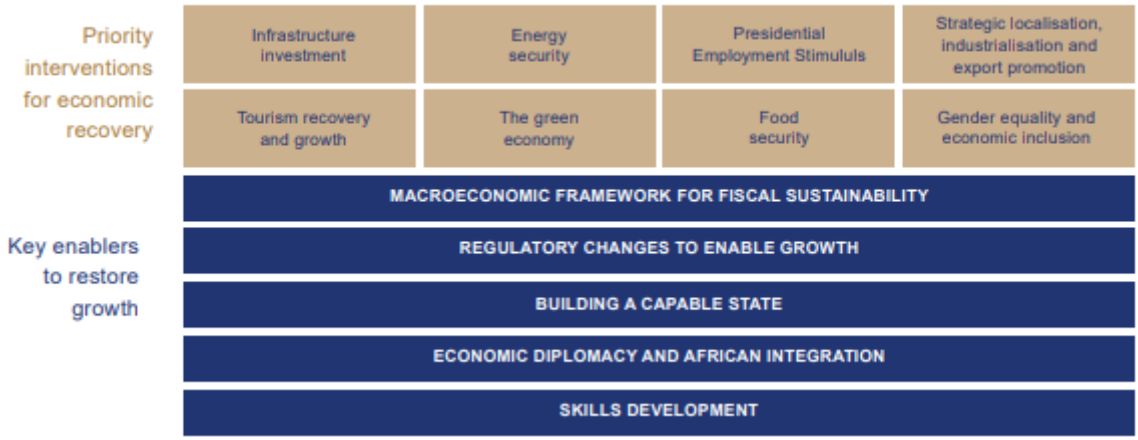

Figure 5.2: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda. One of the key commitments of the plan is therefore to achieve sufficient, secure and reliable energy supply within two years by improving Eskom's performance and rapidly expanding generation capacity through a diverse energy mix. The Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) is identified as a key mechanism for securing additional power generation capacity.

The Energy Sector Economic Recovery Strategy released by Business for South Africa (2020) has highlighted the need for alignment of the energy sector, with a combined solution for electricity, gas, and liquid fuels. A number of constraints are identified, which if addressed could facilitate the energy sector playing a dual role in driving South Africa's economic recovery, primarily as a catalyst for growth in the economy but also as a driver of direct and indirect jobs.

The need for new power generation fromgas has therefore been identified and assessed by Government at a national scale considering the national energy.. The 320MW RMPP is proposed in specific response to the need to diversify the energy mix of the country as per the requirements set out in the IRP 2019. As a result, the need and desirability of the project from a national perspective can largely be assimilated from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in Chapter 2). Considering the above, it can be concluded that the implementation of the proposed project has the potential to contribute positively towards the identified need at a national level, while simultaneously contributing to job creation and socio-economic development. As gas technologies can successfully support the roll-out of renewable energy while ensuring a stable supply of electricity, the project would contribute positively towards reducing South Africa's GHG emissions and as the 320MW RMPP is part of a hybrid project comprising wind and solar generation capabilities, the hybrid project will have reduced GHG emissions as compared to a pure thermal 320MW power plant. In addition, the project would have reduced water requirements, when compared with coal technologies, in alignment with one of the vision 2030 themes of DWS's National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

5.2.2. Need and Desirability of the project from a Regional Perspective

Whereas the majority of South Africa's electricity generation infrastructure is currently located within the provinces of Limpopo and Mpumalanga due to the location of coal resources within these provinces, KwaZulu-Natal Province has been identified as an area where the development of gas to power facilities is a feasible and suitable option for electricity generation given both the availability of ports for the importation of LNG and the availability of existing large scale electricity users.

The Richards Bay area has been ear-marked as a hub for the development of gas to power projects as it is one of the preferred locations for the for the import of Natural Gas in liquid form. Richards Bay is considered to be 'energy-hungry' due to the nature of the heavy industries in the vicinity. Richards Bay is currently the only port with the ability to connect imported natural gas into existing gas pipeline transmission networks to enable the supply of regasified LNG to gas users. There is also the ability to supply LNG to non-pipeline connected users utilising the operation of LNG transhipment vessels and land-based LNG distribution solutions.

The 320MW RMPP will initially make use of LPG as its fuel supply whilst the necessary LNG import infrastructure is established in Richards Bay. The largest LPG import terminal in South Africa is located within Richards Bay, thus providing a stable fuel supply to the power plant.

As detailed in Chapter 2, the 320MW RMPP is aligned with the KwaZulu-Natal's Provincial Growth and Development Strategy (PGDS) to address the triple challenge of poverty, inequality and unemployment by creation of 300 job opportunities during the construction phase and 40 job opportunities during its operational lifespan. The project will contribute to human resource development, and strategic

infrastructure for social and economic growth which will contribute towards reducing poverty and inequality in KZN. The development of the 320MW RMPP will also drive economic growth, infrastructural transformation and development and is seen as a favourable area for investment and development in terms of the KwaZulu-Natal Provincial Spatial Economic Development Strategy. The project will also contribute towards economic value, economic support and economic growth in Richards Bay in support of the KwaZulu-Natal Provincial Spatial Development Framework. The project will also support the attraction of industries to the Richards Bay Industrial Development Zone, the development of which has been hampered by the lack of electricity supply to support the establishment of new industrial activities. The use of LPG initially and ultimately natural gas once available, in the development of the 320MW RMPP will result in reduced emissions when compared to the use of coal or diesel for electricity generation in line with the KwaZulu-Natal Climate Change Response and Sustainable Development Plan.

Considering the above, it can be confirmed that from a regional perspective the project is supported from an infrastructural and policy perspective.

5.2.3. Receptiveness of the proposed project site to development of the 320MW RMPP

Richards Bay has been identified by Phinda Power Producers (Pty) Ltd as the preferred area for the development of the 320MW RMPP due to:

- it being a location with existing large heavy industries and is specifically targeting the attracting of additional heavy industries through the Richards Bay Industrial Development Zone (RBIDZ), which attraction of new industries has been hampered by the unavailability of power to support these planned developments;
- the location of the Port of Richards Bay in close proximity to the industrial areas for the importation of fuel to supply the 320MW RMPP, including the existing LPG import facilities and the future planned LNG import facilities;
- its location in relation to Mozambique, the current exclusive natural gas supplied to South Africa, and the potential to connect Richards Bay to the gas reserves in the north of Mozambique via a new natural gas pipeline which is in accordance with Governments long term energy planning;
- the existence of a large-scale electricity distribution and transmission network connecting to Richards Bay with a capacity of ~3,5000MW to facilitate the evacuation of electricity production with the least investment in additional;
- the close proximity (<2km) of the project site to the existing unutilised 132kV that previously provided electricity to the Bayside aluminium smelter which has been closed; and
- the close proximity of the project site to Mhlathuze Water's water processing plant (<3km) to facilitate bulk water supply and the location on the south eastern boundary of the project site of an existing bulk water line connecting to Mhlathuze Water.

Phinda Power Producers (Pty) Ltd identified their privately owned properties (owned by associated group companies) located in the greater Richards Bay area for the development of the proposed 320MW RMPP, these properties being one of the last industrial zoned undeveloped large land parcels in Richards Bay outside of the Richards Bay IDZ suitable for the development of a power plant. Following consideration of various technical aspects, the site for the 320MW RMPP and related infrastructure was deemed technically suitable for the project. The following was considered:

Extent of the site: The 320MW RMPP and associated infrastructure requires an area of land approximately 8,6ha in extent. The project site is approximately 49ha, which is sufficient to accommodate the proposed project while still allowing for the avoidance of environmental sensitivities.

Site access: Access to the site is available via the existing access points on Kabelring Road and Kraft Link Road.

Current land use considerations: The properties comprising the project site are privately owned by associated group companies of the project proponent. The properties are located within the Alton industrial area adjacent to the Richards Bay Industrial Development Zone (IDZ) and are zoned for industrial use. The proposed development is therefore considered to be compatible with the surrounding land use.

Fuel resources:

- **LPG**: LPG, which is considered as an interim fuel source for the 320MW RMPP until natural gas is available, will be delivered to the site from existing LGP import facilities located within Richards Bay and stored on site.
- **Natural gas:** The location of the site within Richards Bay was selected due to its location in relation to the port of Richards Bay, where plans for the importation and regassification of LNG are underway, and Mozambique which is home to some of the world's largest undeveloped gas reserves, with current development of the Mozambique LNG Gas Project by Exxon Mobil and Eni (estimated completion 2025[9]) creating the potential for pipeline supplied natural gas.

Environmental sensitivity of the site: The EIA process conducted for the project to date has identified no fatal flaws which could restrict the development of the proposed project at the preferred site, rendering the site a desirable site. Sensitive areas which have been identified onsite will be excluded from the development footprint (refer to **Chapter 10**).

[9] Sources: https://sassda.co.za/mozambiques-128-billion-gas-project-could-be-a-lifeline-for-sa-stainless/ https://www.exxonmobillng.com/en/Case-studies/LNG-incountry?gclid=EAIaIQobChMIiKuhq_ny7QIVT9TtCh1rignZEAAYASAAEgK4kPD_BwE

CHAPTER 6. APPROACH TO UNDERTAKING THE EIA PROCESS

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 facility is a listed activity requiring environmental authorisation. The Application for Authorisation is required to be supported by a Scoping & EIA process.

This EIA process for the proposed 320MW RMPP is being undertaken in accordance with the Section 24 (5) of the National Environmental Management Act (No 107 of 1998). In accordance with these Regulations, this EIA process aims at identifying and assessing direct, indirect, and cumulative environmental impacts associated with the proposed project. This was achieved through an assessment of the proposed project involving detailed specialist studies, as well as a consultation process with the Interested and Affected Parties (I&APs), including the decision-making 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 EIA Phase.

6.1. Legal Requirements as per the EIA Regulations for the undertaking of a Scoping Report, 2014 (as amended)

This chapter of the EIA report includes the following information required in terms of Appendix 3: Content of the EIA Report:

Requirement	Relevant Section
(d) a 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 320MW RMPP and a description of the activities which form part of the development of the 320MW RMPP have been included in section 6.1 and Table 6.1.
(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 EIA process for the 320MW RMPP has been described and is included in section 6.4.2
(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 6.4.2. A Comments and Responses report including all comments and responses has been included in **Appendix C8**.

6.2. Relevant legislative permitting requirements

6.2.1. National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(5) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. In terms of Government Notice 779 of 01 July 2016, the National Department of Environment, Forestry and Fisheries (DEFF) is the competent authority for all energy related projects. As the project is located within the KwaZulu-Natal Province, the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) is the commenting authority for the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project and Application for Environmental Authorisation.

The EIA process being conducted for the 320MW RMPP is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for Environmental Authorisation, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

In terms of the EIA Regulations, 2014, of GN R324, GN R325 and GN R327, the following 'listed activities' are triggered by the proposed facility:

Table 6.1: Listed activities triggered by the 320MW RMPP

Indicate the number and date of the relevant notice:	**Activity No (s) (in terms of the relevant notice) :**	**Describe each listed activity as per project description**
GN 983, 04 December 2014 (as amended by GN 327 on 07 April 2017)	11	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. ***The project includes the construction and operation of a 132kV substation.***
GN 983, 04 December 2014 (as amended by GN 327 on 07 April 2017)	12	The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more where such development occurs (a) within a watercourse or (c) if no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse. ***No wetlands occur within the project development footprint of the 320MW facility. The 320MW facility and associated infrastructure will however be located within 32 meters of wetlands.***
GN 983, 04 December 2014 (as amended by GN 327 on 07 April 2017)	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. ***The development of the 320MW facility and associated infrastructure will result in the clearance of more than 1ha of indigenous vegetation.***
GN 983, 04 December 2014 (as amended by	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Describe each listed activity as per project description
GN 327 on 07 April 2017)		farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes. ***The site for the 320MW RMPP was utilised for agriculture on or after 01 April 1998. It is now zoned General Industrial and is currently surrounded by development zoned as General Industrial within the Alton Industrial area.***
GN 984, 04 December 2014 (as amended by GN 325 on 07 April 2017)	2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more ***The development will have an installed generating capacity of up to 320MW, using LPG fuel source until natural gas is available.***
GN 984, 04 December 2014 (as amended by GN 325 on 07 April 2017)	4	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 more than 500m^3 ***The storage of dangerous goods (e.g.; oils, diesel, LPG storage tanks) will be required. The capacity of the containers will be more than 500m^3.***
GN 984, 04 December 2014 (as amended by GN 325 on 07 April 2017)	6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of the national or provincial legislation governing the generation or release of emissions, pollution or effluent. ***The development of the 320MW facility will require an air emissions license as per the NEM:AQA.***
GN 985, 08 December 2014 (as amended by GN 324 on 07 April 2017)	2 (d)(viii)	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres (d) KZN (viii) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***A water reservoir (i.e., steel tanks of combined capacity of 8 200m^3) required on site. The project site is located within an area classified by the EKZNW Conservation Plan as Critical Biodiversity Area (CBA).***
GN 985, 08 December 2014 (as amended by	4 (d)(viii)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (d) KZN viii) Critical biodiversity areas as

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Describe each listed activity as per project description
GN 324 on 07 April 2017)		identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***No public roads are required to be developed. Internal roads are required to be developed as part of the project. These will be 6m to 8m wide. The project site is located within an area classified by the EKZNW Conservation Plan as Critical Biodiversity Area (CBA).***
GN 985, 08 December 2014 (as amended by GN 324 on 07 April 2017)	12 (d)(iv)	The clearance of an area of 300 square meters or more of indigenous vegetation (d) KZN (iv) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment, 2004 ***The development of the 320MW RMPP facility and associated infrastructure will require the clearance of an area of 300 square metres or more of indigenous vegetation and is located within an endangered ecosystem due to the presence of the Maputaland Wooded Grassland.***
GN 985, 08 December 2014 (as amended by GN 324 on 07 April 2017)	14 (ii)(c)(d)(vii)	The development of (ii) infrastructure or structures with a physical footprint of 10 square meters or more where such development occurs (c) within 32 meters of a watercourse, measured from the edge of a watercourse (d) KZN (vii) Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans ***Wetlands occur outside the boundaries of the development footprint for the 320MW RMPP site. The development will be located within 32 meters of these wetlands. The project site is located within an area classified by the EKZNW Conservation Plan as Critical Biodiversity Area (CBA).***
GN 985, 08 December 2014 (as amended by GN 324 on 07 April 2017)	18 (d)(vii)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1-kilometre (d) KZN (viii) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans ***Existing roads may need to be widened for the project. The project site is located within an area classified by the EKZNW Conservation Plan as Critical Biodiversity Area (CBA).***

On the basis of the above listed activities, a Scoping and an EIA process is required to be undertaken for the development. This process is to be undertaken in two phases as follows:

- The Scoping Phase includes the identification and description of potential impacts associated with the proposed project through a desktop study and consultation with affected parties and key stakeholders. This phase considers the broader site to identify and delineate any environmental fatal flaws, no-go or sensitive areas, as well as project alternatives in order to determine which should be assessed in more detail in the EIA Phase. Following the public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance and approval to continue with the EIA phase of the process.
- The EIA Phase involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint and includes detailed specialist investigations (including field surveys), consideration of feasible alternatives and public consultation. Recommendations of practical and achievable mitigation and management measures are included in an Environmental Management Programme (EMPr) considering all phases of the project. Following a review of the EIA report and EMPr by stakeholders, this phase culminates in the submission of a Final EIA Report and EMPr to the competent authority for review and decision-making.

6.2.2. National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department of Human Settlements, Water and Sanitation) unless listed in Schedule 1. Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 6.2 lists the possible Water Uses associated with the proposed project and identified in terms of the NWA identified as being relevant for the project. The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 6.1: List of Water Uses published under Section 21 of NWA, as amended

Activity No.	Description of Water Use
Section 21 (c)	Impeding or diverting the flow of water in a watercourse. ***The development footprint considered for the establishment of the 320MW RMPP is located within the 500m regulated area of identified wetlands.***
Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The development footprint considered for the establishment of the 320MW RMPP is located within the 500m regulated area of identified wetlands.***

It has been confirmed by DHSWS that a General Authorisation (GA) is applicable for the project.

6.2.3. National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM: AQA)

In accordance with the National Environmental: Air Quality Act (No. 39 of 2004) (NEM: AQA) and the associated Listed Activities (GNR 893 of November 2013), an Air Emissions License (AEL) is required for activities identified as having a potential significant detrimental effect on the environment, including health, social conditions, economic conditions and ecological conditions or cultural heritage. The 320MW RMPP is a new facility and does not yet have an AEL. As a gas-fired power station with capacity greater than 50MW, the project will require an AEL to operate. Emissions from the power station will be required to comply with the new plant Minimum Emission Standards (MES). The applicable listed activities categories are detailed in **Table 6.3**.

Table 6.3: Listed activities in terms of NEM: AQA triggered by the 320MW RMPP

Activity No(s):	**Listed activities as set out in GN 893, 2013 of the NEMAQA.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
1. Combustion Installations 1.4. Gas combustion installations	Gas combustion installations (including gas turbines burning natural gas) used primarily for steam raising or electricity generation.	All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used. *The proposed project consists of 5 open cycle gas turbines with a generation capacity of approximately 320MW using LPG as fuel source.*
2. Petroleum Industry 2.4. Storage of Petroleum Products	Petroleum product storage tanks and product transfer facilities, except those used for liquefied petroleum gas.	All loading/ offloading facilities with a throughput greater than 50 000 m^3 per annum. *LPG will be delivered by truck from the LPG terminal and offloaded at the 320MW RMPP site prior to storage*

6.2.4. National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

<u>Section 38: Heritage Resources Management</u>

1). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –

- *a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *b. the construction of a bridge or similar structure exceeding 50m in length;*
- *c. any development or other activity which will change the character of a site –*
  - *i). exceeding 5 000m² in extent; or*
  - *ii). involving three or more existing erven or subdivisions thereof; or*
  - *iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - *iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the 320MW RMPPs, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).

6.3. Overview of the Scoping Phase

The Scoping Phase aimed to:

- Identify, describe and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed facility (including design, construction, operation and decommissioning) within the site through a desk-top review of existing baseline data and desk-top specialist studies.
- Identify potentially sensitive environmental features and areas within the broader site to inform the design process of the facility.
- Define the scope of studies to be undertaken within the EIA process.
- Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

Within this context, the objectives of the Scoping Phase were to, through a consultative process:

- Identify the policies and legislation relevant to the project.
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location.
- Identify and confirm the preferred project and technology alternative.
- Identify and confirm the preferred site.
- Identify the key issues to be addressed in the EIA phase.
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site.
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

The Scoping Study considered an estimated capacity of 450MW for the thermal plant. The capacity of the thermal plant has been subsequently reduced to 320MW as detailed in Chapter 1 of this EIA Report. The broader project site was considered during the Scoping Study to identify and delineate any environmental fatal flaws, "no-go" or sensitive areas which should be avoided. This was undertaken through specialist

studies and a process of consultation. The preparation and release of the Scoping Report for a 30-day public review period provided stakeholders and I&APs with an opportunity to verify that the issues they had raised during the Scoping process had been captured and adequately considered and provided a further opportunity for additional key issues to be raised for consideration in the EIA Phase of the process. The Final Scoping Report and Plan of Study for EIA was submitted to DEFF on 22 January 2021, and acceptance was received on 18 February 2021 thus marking the start of the EIA Phase (refer to Appendix C6). Additional information requested by the DEFF in the Acceptance of the Scoping Report and the location of the requested information in this EIA Report is detailed in Table 6.2.

Table 6.2: DEFF requirements and reference to Section in the EIA Report

DEFF Requirement for EIA	Response / Section in this EIA Report
Listed Activities 1. The EIAr must assess the correct sub-activity for each listed activity applied for: a) Listing Notice 1, Item 28: Please confirm whether the site identified for the proposed development is inside or outside an urban area and choose the relevant sub-activity triggered by the proposed development;	The listed activity has been updated within the EIA Report to reflect the correct sub-activity.
b) Listing Notice 3, Item 14: The activity as quoted in the application form and final SR is incomplete. Please indicate the relevant sub-activity triggered by the proposed development.	The listed activity has been updated within the EIA Report to include the correct sub-activity.
2. The Liquefied Petroleum Gas (LPG) internal supply pipeline is not mentioned in the table of listed activities project descriptions. Confirm whether the pipeline is included as part of this application for the proposed development, or if it will be applied for under a separate environmental approval process.	No internal gas distribution pipelines are associated with the facility that would trigger a listed activity as they fall below the relevant threshold. The infrastructure required for the handling and movement of LPG within the site starting at the discharge gantries and moving in sequence to the LPG storage bullets, LPG vaporisation facility and finally to the gas turbines are integrated into the design and operation of the facility. Although the LPG will be moved via pipelines between these infrastructure stages, this does not constitute a separately identifiable pipeline. There is no pipeline associated with the facility.
3. The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Chapter 8 of the EIA Report includes an assessment and recommends mitigation measures for all identified issues associated with the proposed project and relevant listed activities. Detailed specialist reports are included in Appendix D to N.
4. The listed activities represented in the EIAr and the application form must be the same and correct.	The activities included in the EIAr are the same as in the application form.
5. If the EIAr contains listed activities and/or other information that differs from the application form, the application form must be amended accordingly and submitted to the Department with the EIAr.	A revised application form has been compiled and submitted with the EIAr to the Department. This includes corrected listed activities (as per comment 1 above) as well as an update of the project description, as detailed in the EIA Report.

Alternatives 6. The "Do-Nothing" alternative must discuss both negative as well as positive impacts of this alternative.	The Do-Nothing alternative is assessed in Chapter 8. The positive and negative impacts of this alternative are considered in this assessment.
7. A preferred alternative must be indicated for Fuel Alternatives, Gas to Power Technology Alternatives and Cooling Technology Alternatives, including a motivation on why it is preferred.	The preferred alternatives and the considerations in arriving at these alternatives are described in Chapter 4.
Environmental Management Programme (EMPr) 8. A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	A construction and operational phase EMPr is included in Appendix K of the EIA Report.
9. The EMPr must be developed in terms of Appendix 4 of the EIA Regulations, 2014 as amended and must include (but not limited to) the following plans and measures:	Refer to Table 4.1 of the EMPr for a summary of where the requirements of Appendix 4 of the 2014 NEMA EIA Regulations (GNR 326) are provided in this EMPr.
a) Re-vegetation and habitat rehabilitation;	Refer to Chapter 7, Objective 14 of the EMPr.
b) Alien invasive Management;	Refer to Chapter 7, Objective 5 of the EMPr.
c) Traffic Management;	Refer to Chapter 7, Objective 11 and Chapter 8, Objective 5 of the EMPr.
d) Noise Management;	No mitigation measures were recommended by the noise specialist within the EIA Report. Therefore no noise mitigation is included in the EMPr.
e) Stormwater Management;	Refer to Chapter 7, Objective 8 of the EMPr.
f) Emergency Response;	Refer to Chapter 8, Objective 3 of the EMPr.
g) Fire Management;	Refer to Chapter 7, Objective 2 and Chapter 8, Objective 3 of the EMPr.
h) Erosion Management	Refer to Chapter 7, Objective 6 and Chapter 8, Objective 1 of the EMPr.
i) Dust Management; and	Refer to Chapter 7, Objective 10 and Chapter 8, Objective 2 of the EMPr.
j) All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted.	All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted have been included within the EMPrs compiled for Planning and Design (Chapter 6), Construction (Chapter 7) and Operation (Chapter 8).
k) An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	Refer to Chapter 7, Objective 13 and Chapter 8, Objective 6 of the EMPr.
10. The EMPr must not contain any ambiguity. Where applicable, statements containing the word "should" or "may" are to be amended to "must".	The EMPr must not contain any ambiguity. Use has been made of the word 'must' where appropriate.

Public Participation 11. You are required to state where the DEIAr was kept/ how it was distributed for public review and comment, as well as the period it was kept for.	As per the approved Public Participation Plan (refer to Appendix C9 of the EIAr), an electronic copy of the EIA Report is available on Savannah Environmental's stakeholder engagement platform and will be sent via file transfer services such as WeTransfer or Dropbox if requested by stakeholders. Where requested by stakeholders, CDs or hard copies will be provided where sanitary conditions can be assured.
12. The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	The Public Participation Process to date has been conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended (GNR 326), as well as in accordance with the approved Public Participation Plan (refer to Appendix C9 of the EIAr). Details of the public participation process undertaken to date is included in detail in Chapter 6 of the EIAr.
13. Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA), the EDTEA: Provincial Air Quality Authority, the King Cetshwayo District Municipality, the Department of Water and Sanitation (DWS), Eskom, the KZN Amafa and Research Institute the Civil Aviation Authority (CAA) and the Richards Bay Airport	Copies of written comments received to date on the project are included in Appendix C6 of the EIAr. Comments received from I&APs, including the stakeholders referenced in the DEFF's letter dated 18 February 2021, during the 30-day review and comment period of the EIAr will be captured in the C&RR (included in Appendix C8 of the final EIAr) and included in Appendix C6 of the final EIAr.
14. It is noted that Appendix C8: Comments and Response Report, makes reference to comments from organs of state, and the copies of these comments are not included in Appendix C6: Comments Received. All copies of original comments received from I&APs and organs of state, which have jurisdiction in respect of the proposed activity must be submitted to the Department with the EIAr.	Appendix C6 of the Final Scoping Report submitted to the DEFF included copies of all comments received on the project. All written comments received since the commencement of the environmental authorization process until the closure of the 30-day review and comment of the EIAr will be included in Appendix C6 of the Final EIAr.
15. Comments must be obtained from this Department's Biodiversity and Conservation Section. Further to that, these comments must be addressed and incorporated in the final EIAr. The contact details are as follows: Biodiversity and Conservation • Attention: Mr Seoka Lekota • Tel: 012 399 9573 • E-mail: SLekota@environment.gov.za	Proof of notification and request for written comments to the DEFF's Department of Biodiversity Conservation is included in Appendix C4 of the EIAr. It is noted that the Biodiversity Conservation Department has requested that all correspondence regarding environmental applications be submitted to their Departmental e-mail address: BCadmin@environment.gov.za. However notices will also be forwarded to Mr Seoka Lekota via a-mail address: SLekota@environment.gov.za
16. All issues raised and comments received during the circulation of the draft EIAr from I&APs and organs of state which have jurisdiction in respect of the proposed activity must be adequately addressed in the final EIAr, including comments from this Department, and must be incorporated into	All comments received during the circulation of the draft EIAr from I&APs and relevant organs of state will be included in the final EIAr, and will be addressed as required.

Appendix C8: Comments and Response Report.	
17. Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Proof of correspondence with the various stakeholders to date is included in Appendices C4 and C5 of the EIAr. Proof of attempts to obtain written comments from stakeholders on the EIAr will be included in Appendices C4 and C5 of the final EIAr.
<u>Layout & Sensitivity Maps</u> 18. The EIAr must provide the following: a) A clear indication of the envisioned area for the proposed gas engine power plant; i.e. the facility and all associated infrastructure should be mapped at an appropriate scale	A layout map providing details of all relevant infrastructure is included in Figure 4.6 of the EIAr.
b) A clear description of all associated infrastructure. This description must include, but is not limited to the following	A description of all infrastructure associated with the project in included in Chapter 4.
• Liquid Petroleum Gas (LPG) storage facility, high voltage yard and other service connection points	
• Internal roads infrastructure	
• All supporting onsite infrastructure such as camp and laydown areas, auxiliary buildings etc	
c) All necessary details regarding all possible locations and sizes of the proposed infrastructure.	A layout map providing details and locations of all relevant infrastructure is included in Figure 4.6 of the EIAr. Details of sizes of proposed infrastructure is included in Table 4.2 of the EIAr.
d) A copy of the final preferred layout map with a clear legend. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following.	Refer to Figures 10.1 and 10.2.
• Permanent laydown area footprint;	
• Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible)	
• Wetlands, drainage lines, rivers, streams and water crossings of roads and cables indicating the type of bridging structures that will be used	
• The location of any sensitive environmental features on site e.g. CBAs, heritage sites, wetlands,	

drainage lines etc. that will be affected by the facility and its associated infrastructure • Substation(s) and/or transformer(s) sites, including their entire footprint; • Location of access and service roads; • All existing infrastructure on the site, especially railway lines and roads • Buffer areas; • Buildings, including accommodation if any; and • All "no-go" areas.	
e) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process	Refer to Figure 10.1.
f) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map	Refer to Figure 10.1.
<u>Specialist Assessments</u> 19. In addition to the preliminary specialist studies contained in the final SR, it is noted that a Climate Change Impact Assessment, Traffic Impact Assessment and Quantitative Risk Assessment will be included in the EIAr, as per Chapter 10 of the final SR	• A Climate Change Impact Assessment is included in Appendix I of the EIAr. • A Traffic Impact Assessment is included in Appendix L of the EIAr. • Quantitative Risk Assessment is included in Appendix N of the EIAr
20. The Archaeological and Palaeontological Study dated September 2020 and prepared by Umlando: Archaeological Surveys and Heritage Management, must be submitted to the KZN Amafa and Research Institute for comments	The Archaeological and Palaeontological Study will be submitted to KZN Amafa and Research Institute for comments.
21. Specialist Studies and sensitivity maps referring to Critical Biodiversity Areas (CBAs) must differentiate between CBA 1 and CBA 2	The Terrestrial Biodiversity Impact Assessment (Appendix D) includes a differentiation between CBA 1 and CBA 2.
22. The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisation	All specialist studies contained in Appendix D to N of the EIAr include details of the methodology followed, and include the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorization.
b) Provide a detailed description of all limitations to the studies.	All specialist studies contained in Appendix D to N of the EIAr include details of assumptions and limitations of the study.
c) All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed	All specialist studies have been conducted in the correct season, where this is of relevance.

d) Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the `no-go' areas	No go areas identified in the EIAr are areas where no development of any infrastructure is allowed. This includes the wetland to the east of the site and the associated 29m buffer. No other no go areas have been defined.
e) Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable	The specialist's definition does not differ from the Department's.
f) All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA	All specialist studies are final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations. No additional studies are recommended.
g) Should the specialist studies provide more detail regarding any of the project activity thresholds, please ensure that the project activity descriptions are amended accordingly in the application form and EIAr.	No detail regarding any of the project activity thresholds have been provided by the specialists.
h) Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Mitigation measures recommended by the specialists are included in Chapter 8 of the EIAr and within the EMPr. In addition, all detailed specialist reports are included in Appendix D to N.
i) Regarding cumulative impacts: • The specialist studies conducted must be specific to a gas to power plant facility and must assess cumulative impacts of other existing and proposed gas to power developments within a 30km radius of the proposed development site.	Specialist studies conducted are specific to a gas to power facility. The area considered for cumulative impacts is a 10km radius from the development site. This was defined taking into consideration the nature of the project and the expected impacts as well as the nature of the area within which the project is proposed (i.e. industrial).
• Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e. cumulative air quality impacts	Cumulative impacts are defined in Chapter 9 of the EIAr. Where possible the size of the identified impact has been quantified and indicated.
• Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process	Identified cumulative impacts associated with the proposed development have been rated with the significance rating methodology used in the process, as defined in Chapter 6 of the EIAr.
• The significance rating must also inform the need and desirability of the proposed development.	The significance ratings provided in Chapter 9 of EIAr inform the conclusions and recommendations that inform the need and desirability of the project.
• A cumulative impact environmental statement on whether the proposed development must proceed	A cumulative impact environmental statement on whether the proposed development must proceed is included in Chapter 9 of the EIAr.

23. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice	No contradicting recommendations were made by any of the specialists.
24. Please ensure that the Specialist declarations of interest are completed in full and that they are signed.	Specialist declarations of interest are included in Appendix Q of the EIAr.
Air Quality Management 25. The Minister is the Licensing Authority and must perform the functions of the Licensing authority. Due to the fact that, the listed activity either relates to the activities listed in terms of section 24(2) of the National Environmental Management Act, 1998 (NEMA)	It is noted that the Minister is the Licensing Authority and must perform the functions of the Licensing authority. This was also confirmed with the Air Quality Directorate of the DEFF during the pre-application consultation meeting for the Air Emissions License (AEL).
Atmospheric Impact Assessment 26. A detailed Specialist Atmospheric Impact Assessment for the project must be conducted as part of the EIAr and the report must be compiled in accordance with the Regulations Prescribing the Format of the Atmospheric Impact Report (AIR) — Regulations No 747 of 11 October 2013.	A detailed Atmospheric Impact Assessment has been undertaken for the project and an Atmospheric Impact Report (AIR) compiled in accordance with the relevant Regulations (refer to Appendix H of the EIAr).
Air Quality Dispersion Modelling 27. Air dispersion modelling exercise must be done in accordance with the Regulations Regarding Air Dispersion Modelling-Regulations No.533 of 11 July 2014, issued in terms of the National Environmental Management: Air Quality Act, 2004 (NEM: AQA).	The Regulations Regarding Air Dispersion Modelling (Gazette No 37801 published 11 July 2014) was referenced for the dispersion model selection. A Level 3 assessment was determined to be suitable for the project since these assessments require more sophisticated dispersion models. The models recommended for Level 3 assessments are CALPUFF or SCIPUFF. In this study, CALPUFF was selected for the following reasons: • Since the dispersion model formulation in CALPUFF is based on a Lagrangian Gaussian Puff model, it is well-suited for complex modelling terrain when used in conjunction with CALMET. The latter code includes a diagnostic wind field model which contains treatment of slope flows, valley flows, terrain blocking effects and kinematic effects. This Lagrangian Gaussian Puff model is well suited to simulate low or calm wind speed conditions. Alternative regulatory models such as the US EPA AERMOD model treat all plumes as straight-line trajectories, which under calm wind conditions grossly over-estimate the plume travel distance. • The dispersion of pollutants in CALPUFF is simulated as discrete "puffs" of pollutants emitted from the modelled sources. These puffs are tracked until they have left the modelling domain while calculating dispersion, transformation and removal along the way. An important effect of non-steady-state dispersion is that the puff can change direction with changing winds, allowing a curved trajectory. The winds can therefore vary spatially as well as

	with time; with the former typically as the result of topographical features. • CALPUFF is able to perform chemical transformations, such as the conversion of nitrogen oxide (NO) to NO_2 and the secondary formation of particulate matter from SO_2 and NO_2 emissions. • As well as sea- and land-breeze circulation systems, the significant differences between the boundary layers of marine and overland can result in distinct changes occur to a dispersing plume moving from land to sea. The CALPUFF modelling system is well suited to handling these complex phenomena. The effects of land/sea breeze circulations on transport of the plume are addressed through use of the mesoscale prognostic meteorological data. • Stagnation conditions, i.e. when the wind is zero or near to zero.
28. The dispersion modelling must consider baseline for all current emitters in the surrounding environment, excluding the proposed development, must consider the proposed development in isolation of the current emitters and must combine the baseline and proposed development (Cumulative)	A recent air quality dispersion modelling study assessing the cumulative impact of operations within the Richards Bay domain was consulted with permission of the authors (WSP Environment and Energy) and the RBCAA (under request for confidentiality of its members). The report is considered by the RBCAA to be the most comprehensive assessment of normal operations of the industries in the Richards Bay airshed, although limitations of the assessment are detailed in the report. These include omission of some industrial sources (where information was not available); exclusion of vehicular traffic emissions; and intermittent sources such as sugarcane burning due to the inherently intermittent nature of the source. Simulated annual average concentrations of PM_{10}, NO_2, and SO_2 were provided for cumulative assessment of the baseline conditions. The data is used as an indication of impact due to the current activities in the area and will be used together with measured baseline data to estimate the combined impact of the proposed 320 MW RMPP and current activities on ambient air quality.
29. Any challenges and limitations encountered, assumptions and justifications made in relation to dealing with cumulative impact assessment for multiple, proposed and approved gas-to-power facilities in the affected areas, must be provided in detail, taking into account the requirements of the Regulations Regarding Air Dispersion Modelling, 2014 (Notice No. R 533 of 11 July 2014).	The approach to undertaking the cumulative impact assessment for the air quality impact assessment are included in Section 5.1.8 of the AIR contained in Appendix H of the EIAr.
30. The Regulations (Notice R533) provide for the use of the Code of Practice for Air Dispersion Modelling in Air Quality Management, which amongst others, recommends a suite of dispersion models to be applied for regulatory practices and provides guidance on modelling input requirements, protocols and procedures to be followed.	The Regulations (Notice R533) was referenced for the dispersion model selection.

31. However, it is impossible for the Code of Practice to provide detailed procedures for every situation due to the diversity of the recommended models and their applications to different sources, topography and meteorological combinations. Therefore, allowance is made for professional judgment to be used of technical experts conducting the modelling exercise, in dealing with specific assessment challenges pertaining to a particular case	A Level 3 assessment was determined to be suitable for the project since these assessments require more sophisticated dispersion models. The models recommended for Level 3 assessments are CALPUFF or SCIPUFF. In this study, CALPUFF was selected for the following reasons: • Since the dispersion model formulation in CALPUFF is based on a Lagrangian Gaussian Puff model, it is well-suited for complex modelling terrain when used in conjunction with CALMET. The latter code includes a diagnostic wind field model which contains treatment of slope flows, valley flows, terrain blocking effects and kinematic effects. This Lagrangian Gaussian Puff model is well suited to simulate low or calm wind speed conditions. Alternative regulatory models such as the US EPA AERMOD model treat all plumes as straight-line trajectories, which under calm wind conditions grossly over-estimate the plume travel distance. • The dispersion of pollutants in CALPUFF is simulated as discrete "puffs" of pollutants emitted from the modelled sources. These puffs are tracked until they have left the modelling domain while calculating dispersion, transformation and removal along the way. An important effect of non-steady-state dispersion is that the puff can change direction with changing winds, allowing a curved trajectory. The winds can therefore vary spatially as well as with time; with the former typically as the result of topographical features. • CALPUFF is able to perform chemical transformations, such as the conversion of nitrogen oxide (NO) to NO_2 and the secondary formation of particulate matter from SO_2 and NO_2 emissions. • As well as sea- and land-breeze circulation systems, the significant differences between the boundary layers of marine and overland can result in distinct changes occur to a dispersing plume moving from land to sea. The CALPUFF modelling system is well suited to handling these complex phenomena. The effects of land/sea breeze circulations on transport of the plume are addressed through use of the mesoscale prognostic meteorological data. • Stagnation conditions, i.e. when the wind is zero or near to zero.
Emission Control Technology 32. Detailed information on pollution abatement measures or equipment to be used in order to comply with the Minimum Emission Standards, including its performance, efficiency, availability, types of pollutants to be abated and the expected emission concentration in mg/Nm3 (under normal condition of 273 K, 101.3kPa, for applicable pollutants in terms of Section 21 of NEM: AQA (Act 39 of 2004) listed activities, must also be assessed	Water injection is proposed for NO_x abatement. No other pollution abatement measures are required. Refer to Chapter 4 of the EIAr.

Health Impact Assessment 33. The source-pathway-receptor (exposure pathways), which entail the route by which the receptor can be exposed, should be assessed. This exercise is significant as it will identify the relevant receptors, which are the valuable features of the environment that are at risk or are likely to be impacted such as plants, water bodies, buildings etc. This help to set the boundaries of the risk assessment by providing the scope of the problem and clarifying the environmental components at risk.	The Atmospheric Impact Assessment (Appendix H of the EIAr) includes a human health risk and nuisance impact screening assessment based on dispersion simulation results. Methodology, analysis and assessment of impacts in this regard is detailed in Section 5 of the AIR contained in Appendix H of the EIAr.
34. Control measures must be put in place to mitigate dustfall generation from open surfaces, stockpiles, unpaved roads, construction areas, and from any other dust generation sources. Such measures must, as a minimum, include covering the affected sources or suppression of dust generation via watering	Mitigation measures to mitigate dustfall during construction are included in the AIR (Appendix H of the EIAr) and the EMPr (Appendix K of the EMPr).
<u>General</u> 35. If the site and/or linear activities have numerous bend points, coordinates must be provided at each bend point	Co-ordinates of the site are included in Chapter 4 of the EIAr xx.
36. Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies must be indicated	Potential future use for the site after decommissioning is included in Chapter 4 of the EIAr.
37. Should a Water Use License be required, proof of application for a license needs to be submitted.	Proof of application for a Water Use License (confirmation that a General Authorisation is applicable) is included in Appendix Bof the EIAr.
38. Please ensure that electronic copies of the draft and final EIAr submitted to the Department, are copy/paste enabled, for internal administration purposes.	The electronic copy of the EIAr submitted to the Department, is copy/paste enabled, for internal administration purposes.
39. The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr	Relevant responses have been provided to all comments raised.
The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amendment, with regard to the time period allowed for complying with the requirements of the Regulations	The EAP acknowledges the comment from DEFF.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department	The EAP acknowledges the comment from DEFF. The applicant has been advised that no activities may commence prior to receipt of an Environmental Authorisation.

6.4. Overview of the EIA Phase

As per the EIA Regulations (GNR 326) the objectives of the EIA Phase are to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context.
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report.
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
- Determine the:
    - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - Degree to which these impacts:
        - Can be reversed
        - May cause irreplaceable loss of resources
        - Can be avoided, managed or mitigated
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment.
- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping Report through the life of the activity.
- Identify suitable measures to avoid, manage or mitigate identified impacts.
- Identify residual risks that need to be managed and monitored.

This EIA Report assesses potential positive and negative, direct, indirect, and cumulative impacts associated with all phases of the project life cycle including pre-construction, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

The following subsections outline the activities within the EIA process that have been undertaken to date.

6.4.1. Authority Consultation

Consultation with authorities has been undertaken during the Scoping Phase and will continue throughout the EIA process. The following steps are to be undertaken as part of this EIA phase of the process:

- Make the EIA Report, inclusive of the Atmospheric Impact Report (AIR) in support of the AEL Application, available for a 30-day public and authority review period.
- Notification and consultation with stakeholders, I&APs and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
- Incorporating comments received during the 30-day public review period to prepare a Final EIA Report.
- Submission of the Final EIA Report to DEFF for decision making.

» Provide an opportunity for DEFF and DEDT&EA representatives to visit and inspect the proposed site and project area.

A record of all authority correspondence undertaken prior to and within the EIA Phase is included in **Appendix C4** and **Appendix C5**.

6.4.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations under NEMA, specifically the EIA Regulations. The sharing of information forms the basis of the public participation process and offers the opportunity to Interested and Affected Parties (I&APs) to become actively involved in the EIA Process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

During the Scoping Phase
- » identify issues of concern and suggestions for enhanced benefits;
- » verify that their issues have been recorded;
- » assist in identifying reasonable alternatives; and
- » contribute relevant local information and knowledge to the environmental assessment.

During the EIA Phase
- » contribute relevant local information and knowledge to the environmental assessment;
- » verify that their issues have been 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.

The public participation process therefore aims to ensure that:
- » Information that contains all the 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 the 320MW RMPP project.
- » Adequate review periods are provided for I&APs to comment on the findings of the Scoping and EIA Reports.

The restrictions enforced in terms of Government Gazette 43096 which placed the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus has placed some limitations on the commencement and continuation of the public consultation as part of the EIA process. Considering these limitations, a public participation plan **(Appendix C9**) and consultation process has been designed by Savannah Environmental and approved by DEFF to cater for the undertaking of the public participation process which includes I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, Municipalities, ward councillors and other key stakeholders.

The traditional means and opportunities available for the undertaking of public participation will be covered and implemented as part of the public participation plan considering the current limitations. In addition, alternative means of undertaking consultation have been designed and will be implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to raise comments on the project through an interactive web-based platform readily available and accessible to any person with interest in the project, and facilitates the undertaking of the public participation process in line with Regulations 41 to 44 of the EIA Regulations, 2014, as amended.

This online stakeholder engagement platform allows the EAP to visually present details regarding the project and relevant consultation documentation, including project maps and plans, presentations, and posters regarding the project, and reports available for review. The use of online tools enables stakeholders and I&APs to explore the project- specific content in their own time and allow them to participate in a meaningful way in the consultation process. The online platform allows for instant feedback and comments to be submitted, in so doing saving time for the stakeholder and also giving the assurance that their comments have been submitted for inclusion in the project reporting. The approved public participation plan considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces not open for operation or which have restricted access.

The schematic illustration overleaf provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

Key tasks undertaken in the EIA Phase to ensure effective participation includes the following:

- Notice of commencement of the EIA phase circulated to registered I&APs
- Placement of advertisements in a local newspaper.
- Radio live reads.
- Updating of I&AP database throughout the EIA process.
- On-going consultation with all registered I&APs regarding the progress in the EIA process through stakeholder consultation via notification letters, telephone calls, sms's, whatsapp, 'please call me' and consultation meetings or virtual focus group meetings.
- Release of the EIA report, inclusive of the Atmospheric Impact Report (AIR) in support of the AEL Application, for a 30-day review period.

The following sections detail the tasks which were undertaken as part of the public participation process within the EIA Phase to date.

i. Adverts and Notifications

The EIA process, commencing in February 2021, and the availability of the EIA Report for comment was announced as follows:

» A letter advising registered parties of the Acceptance of Scoping received from DEFF and the commencement of the EIA process distributed on 18 February 2021.
» Notification letter distributed to all registered parties advising them of the availability of the EIA Report, inclusive of the AIR in support of the AEL Application, for review and comment on 18 February 2021
» An advertisement announcing the availability of and inviting comment on the EIA Report in the Zululand Observer newspaper on 18 February 2021. The tear sheets of the newspaper advert will be contained in **Appendix C2** of the Final EIA Report.
» Radio adverts (live reads) on a local community radio station will be undertaken announcing the project and the availability of the scoping report and where I&APs can register their details should they require any further information.
» I&APs have been encouraged to view the EIA Report and submit written comment. The EIA Report has been circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. The evidence of distribution of the EIA Report has been included in this EIA Report (refer to **Appendix C**).

ii. Public Involvement and Consultation

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 are being provided in the EIA phase of the process to note issues and comments. I&APs are being consulted through the following means:

» Opportunity for review of the EIA report, inclusive of the AIR in support of the AEL Application, for a 30-day period from **19 February 2021 – 23 March 2021**. Comments received during this review period will be captured within a Comments and Responses Report, which will be included within the Final EIA Report.
» **Focus group meetings**: Focus group meetings will be held with key government departments, stakeholders and landowners during the EIA phase of the process. The purpose of these focus group meetings is to provide an overview of the findings of the EIA studies to facilitate comments on the EIA process and EIA Report, as well as to record any issues or concerns raised by stakeholders regarding the project. As per the approved public participation plan, these meetings will be held via virtual platform. The minutes of these meetings will be included in the final EIA Report for review and acceptance by the DEFF. A preliminary list of meetings planned is included in Table 6.4.
» **One-on-one consultation meetings** for example with directly affected or surrounding landowners as per the approved public participation plan, these meetings will be held via virtual platform.
» **Telephonic** consultation sessions.
» Written, faxed or e-mail correspondence.

All comments received during the 30-day review period will be included in **Appendix C6** and minutes of all meetings held during the review period will be included in **Appendix C7** within the Final EIA report.

Table 6.4: Summary of Public Participation Process

Activity	Date
Notice of Acceptance of Scoping and Commencement of the EIA phase circulated to registered I&APs	18 February 2021
The availability of the EIA report (including the AIR) was advertised in: » The Zululand Observer	18 February 2021
Distribution of notification letters for the availability of the EIA report to organs of state departments, ward councillors, landowners within the study area, neighbouring landowners and stakeholder groups.	18 February 2021
Distribution of EIA Report	19 February 2021
Review period for the EIA Report for public comment.	19 February 2021 – 23 March 2021
Preliminary list of Focus Group Meetings to be held: » City of Mhlathuze Local Municipality » KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs » Richards Bay Clean Air Association » RB IDZ » Adjacent Landowners – Mondi and Transnet	Meeting dates to be confirmed and included within the final EIA report.

iii. Identification and Recording of Issues and Concerns

A Comments and Responses Report has been compiled to include all comments received. Comments received during the EIA phase 30-day review period, will be included in the Comments and Responses Report within the Final EIA Report. The Comments and Responses Report including all comments received to date is included as **Appendix C8**.

6.5. Review of the EIA Report

The EIA Report has been made available for review from **19 February 2021 to 23 March 2021**. In accordance with the accepted Public Participation Plan, the report is available for download from the Savannah Environmental website, www.savannahSA.com and can also be sent via other electronic means such as WeTransfer, Dropbox or CD at the request of stakeholders. Hard copy reports can be made available where sanitary conditions can be assured.

6.6. Identification and Assessment of Issues

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations.

The requirement for the submission of a Screening Report (**Appendix S** for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended). **Table 6.5** provides a summary of the specialist assessment requirements identified for the project site in terms of the screening tool and responses to each assessment requirement based on the nature and extent of the project.

Table 6.5: Sensitivity ratings from the DEFF's web-based online Screening Tool associated with the development of 320MW RMPP and associated infrastructure

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Landscape/Visual Assessment	Not specified within screening tool	A Visual Impact Assessment has been undertaken for the proposed project.
Archaeological and Cultural Heritage Impact Assessment	Not specified within screening tool	A Heritage Impact Assessment has been undertaken for the proposed project.
Palaeontology Impact Assessment	Not specified within screening tool	A Heritage Impact Assessment encompassing a Palaeontology assessment has been undertaken for the proposed project.
Terrestrial Biodiversity Impact Assessment	Very High Sensitivity	A Terrestrial Biodiversity Impact Assessment has been undertaken for the proposed project.
Aquatic Biodiversity Impact Assessment	Very High Sensitivity	An Aquatic Biodiversity Impact Assessment has been undertaken for the proposed project.
Hydrology Assessment	Not specified within screening tool	A surface and ground water assessment has been undertaken for the proposed project.
Socio- Economic Assessment	Not specified within screening tool	A Socio- Economic Impact Assessment has been undertaken for the proposed project.
Plant Species Assessment	Medium Sensitivity	A plant species assessment has been included within the Terrestrial Biodiversity Assessment.
Animal Species Assessment	High Sensitivity	An animal species assessment has been included within the Terrestrial Biodiversity Assessment.
Soil and Agricultural Assessment	Very High Sensitivity	A Soil and Agricultural Potential Assessment was undertaken for the proposed project in the Scoping phase. No detailed assessment was required as per the recommendations of this report.

These issues were evaluated in the Scoping Phase. Based on the findings of the Scoping assessment, the following issues were identified as not requiring further investigation within the EIA, and no further or detailed assessment was required:

- ***Impacts on soils and agricultural potential*** – Of the 6 soil profiles that were examined, all consisted of non-arable land (LCCVI and LCCVIII) / DEA Agricultural Sensitivity Theme 1 to 5, probably 1 to 2. As the land parcel proposed for the development is made up of vacant, unused non-arable land in the heart of a fully transformed major industrial hub, impacts to soil and agricultural potential were determined to be of low significance. Therefore, the findings of the Soils and Agricultural Assessment are considered to be sufficient and no further impact assessment is required for the EIA Phase.
- ***Impacts on heritage, archaeological and palaeontological resources***: The desktop study indicated that several human settlements occurred in the general study area; however, none occurred within the project study areas. The study area consists of old agricultural fields. Isolated stone tools will occur in the study area, however these are of low significance and do not require any mitigation. The general area is of low palaeontological sensitivity. As such, it is very unlikely that the proposed development will negatively impact on significant palaeontological heritage and as such, it is recommended that no further palaeontological studies are required. The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No

further heritage field work on the site is recommended for the proposed development. Whilst no further studies are required, a Heritage Impact Assessment report has been compiled for inclusion in the EIA.

» ***Impacts of ground and surface water resources*** – The Geohydrological and Surface Water Scoping Impact Assessments determined that the risks of impact from the development of the 4320MW RMPP from chemical pollutants are considered low provided that the mitigation measures proposed are strictly implemented, therefore no further studies are required. SIt was however, recommended that an impact assessment report be included in the EIA Phase of the project, together with a ground and surface water monitoring programmes for inclusion within the EMPr.

Based on the outcomes of the Scoping Phase,evaluation of the project, and the requirements of an EIA, the following issues were identified as requiring detailed assessment.

Table 6.6: Specialist consultants appointed to evaluate the potential impacts associated with the 320MW RMPP

Issue	Specialist	Refer Appendix
Terrestrial Biodiversity	Jacolette Adam and Charlene Smuts of Exigent Engineering Consultants	Appendix D
Wetland and Aquatic Ecology	Jacolette Adam and Charlene Smuts of Exigent Engineering Consultants	Appendix E
Geo-Hydrology & Surface Water	Andrew Greet of Davies Lynn & Partners	Appendix F
Archaeology & Palaeontology	Gavin Anderson of Umlando: Archaeological Surveys and Heritage Management	Appendix G
Air Quality	Terri Bird of AirShed Planning Professionals	Appendix H
Climate Change	Karien Erasmus of Promethium Carbon	Appendix I
Noise	Morne de Jager of Enviro Acoustic Research cc	Appendix J
Visual	Lourens de Plessis of LOGIS	Appendix K
Traffic	Adrian Johnson of JG Afrika	Appendix L
Socio-Economic	Eugene de Beer of Urban Econ Development Economists	Appendix M
Quantitative Risk Assessment	Mike Obezerholzer of Riscom	Appendix N

Specialist studies considered direct, indirect, and cumulative environmental impacts associated with the development of the Thermal Plant. Issues were assessed in terms of 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;
  * 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);
    - 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);
    - 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 either 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).

Specialist studies also considered cumulative impacts associated with similar developments within a 10km radius of the proposed project. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

A conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the specialist reports.

As the Applicant has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) is included as **Appendix O**.

6.7. Finalisation of the EIA Report

The final stage in the EIA process will entail the capturing of responses from stakeholders and I&APs on the EIA Report to finalise and submit the final EIA Report for consideration. It is the final EIA Report upon which the decision-making environmental authorities will issue a decision.

6.8 Assumptions and Limitations of the EIA Process

In conducting the EIA studies, the following general assumptions have been made:

- 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 project site identified represents a technically suitable site for the establishment of the 320MW RMPP and associated infrastructure (i.e., based on the surrounding land use, access to the site, access to infrastructure etc.)
- Conclusions of specialist studies undertaken, and this overall Impact Assessment assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
- This EIA Report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer also to the specialist studies contained in **Appendices D – N**.

6.9 Legislation and Guidelines that have informed the preparation of this EIA Report

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

- National Environmental Management Act (Act No. 107 of 1998)
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended in GNR R326 in Government Gazette No 40772 of April 2017)
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines.

A listing of relevant legislation applicable to the 320MW is provided in **Table 6.6**.

Table 6.6: Review of the relevant environmental policies, legislation, guidelines and standards applicable to the 320MW RMPP EIA

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right implies a long term responsibility to ensure sustainable development and environmental protection for future generations. The Environmental right clause provides that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(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. A Scoping and EIA Process is required to be undertaken for the proposed project.	DEA – Competent Authority KwaZulu-Natal EDTEA – Commenting Authority	The listed activities requiring authorisation triggered by the proposed project have been identified and are being assessed as part of the EIA process for the 320MW RMPP. The EIA process will culminate in the submission of a final EIA Report to the Competent Authority in support of the Application for Environmental Authorisation.
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause	DEA KwaZulu-Natal EDTEA	While no permitting or licensing requirements arise directly by virtue of the 320MW RMPP in terms of this section, this general duty of care

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.		finds application through the consideration of potential cumulative, direct and indirect impacts.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DEFF KwaZulu-Natal EDTEA uMhlatuze Local Municipality	Noise impacts are expected to be associated with the construction and operational phase of the project. Considering the location of the 320MW RMPP in relation to residential areas and provided that appropriate mitigation measures are implemented, construction and operational noise is unlikely to present a significant intrusion to the local community (refer to specialist noise impact assessment in Appendix J).
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence.	Regional Department of Water and Sanitation	The 320MW RMPP facility is located within 500m of a wetland. A water use authorisation in terms of Section 21(c) and (i) read with section (f) of the National Water Act (Act No. 36 of 1998) will therefore be required. The project proponent has consulted with the DWS which has confirmed

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)), and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)), and disposal of waste water (section 21 e-h).		that a General Authorisation should be applied for (confirmation attached in Appendix B)
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit. Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA.	Department of Mineral Resources	No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA is not required to be obtained in this regard.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner unless on any land which lies within an approved town planning scheme which has applied for an obtained approval.		In terms of Section 53 of the MPRDA, approval may be required from the Minister of Mineral Resources to ensure that the proposed project does not sterilise a mineral resource that might occur on the site.
National Environmental Management: Air	The List of Activities Which Result in Atmospheric Emissions Which Have or May Have A Significant Detrimental Effect on The Environment, Including Health, Social Conditions,	DEFF	The project is a new facility and does not yet have an AEL. As a gas-fired power station with capacity greater than 50 MW, the project will

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Quality Act (No. 39 of 2004) (NEM:AQA)	Economic Conditions, Ecological Conditions or Cultural Heritage (GN 893) published under Section 21(1)b of the NEM: AQA prescribe the emissions standards for a number of listed activities deemed detrimental to the environment. In accordance with the Regulations (GN 893) any person who conducts any activity in such a way as to give rise to emissions in quantities and concentrations that may exceed the minimum emissions standards set out must, apply for an Air Emissions License (AEL).	KwaZulu-Natal EDTEA / King Cetshwayo District Municipality	require an AEL to operate. Emissions from the power station will be required to comply with the new plant Minimum Emission Standards (MES). The applicable listed activities categories will include: Subcategory 1.4 (Gas Combustion Installations) and 2.4 (Storage and Handling of Petroleum Products). Listed activities defined in Section 21 of the NEM:AQA (as amended) require Environmental Authorisation – therefore triggering the Environmental Impact Assessment process - prior to the issuance of an AEL granting license to operate a facility that may impact ambient air quality.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from	South African Heritage Resources Agency AMAFA	A Heritage Impact Assessment has been undertaken as part of the EIA process (refer to **Appendix G** of this EIA Report). Potential for graves within the area has been identified. Relevant procedures, as detailed in the EMPr, are required to be implemented should any graves be encountered during construction. The study area is in an area of very low palaeontological sensitivity. It thus has no or very low, palaeontological value. Should fossil finds be made within the Cretaceous deposits 4m+ below the surface, the Fossil Finds Procedure as included in the EMPr must be implemented.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	SAHRA for the presentation of archaeological sites as part of tourism attraction.		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).	DEFF KwaZulu-Natal EDTEA	Under NEM:BA, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. No protected species were found within the project site (refer to terrestrial biodiversity assessment included in **Appendix D**). Due to the potential for protected plants to occur in the broader area, a further walk through will be undertaken prior to construction.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.	DEFF KwaZulu-Natal EDTEA	Alien plant species listed in terms of Chapter 5 of NEM: BA were identified within the project as per the findings of the Terrestrial Assessment (**Appendix D** of the EIA report). These must be managed in accordance with the relevant legislative requirements.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864). Restricted activities and the respective requirements applicable to persons in control of different categories of listed invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA, together with the requirements of the Risk Assessment to be undertaken.		
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GNR 1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Forestry and Fisheries (DAFF)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of DAFF will be required if the project requires the draining of vleis, marshes or water sponges on land outside urban areas. However, this is not applicable to the project. In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation (4). » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	DAFF	A licence is required for the removal of protected trees listed under the National Forests Act of 1998 (No 84 of 1998). No species protected in terms of the NFA were observed on the proposed development site (refer to **Appendix D**).
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is	DAFF	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the 320MW RMPP, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		
Hazardous Substances Act (No. 15 of 1973) (HAS)	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 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.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health (DoH). Hazardous substances (e,g, LPG) will be stored within the project site

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	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 NEM:WA (GNR 912), a BA or EIA 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.	DEFF – hazardous waste KwaZulu-Natal EDTEA – general waste	No waste listed activities are triggered by the project and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard, if more than 100m^3 of general waste or 80m^3 for hazardous waste is to be generated by the project and stored on site at any one time. Third party registered waste contractors will be responsible for the handling and disposal of the waste.
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on	South African National Roads	An abnormal vehicle permit may be required by transporters to transport various components of the transmission infrastructure to site for

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.	Agency (SANRAL) – national roads KwaZulu-Natal Department of Transport (DoT)	construction. These may include road clearances for vehicles carrying abnormally dimensioned loads (transport vehicles exceeding the dimensional limitations (length) of 22m). Hazardous waste transporters will have to comply with the National Road Traffic Act requirements.
Provincial Policies / Legislation			
KwaZulu-Natal Systematic Conservation Plan (KZNSCP, 2012)	The process of conservation planning involves extensive mapping of vegetation types, transformation, species data, ecological processes and threats.	KwaZulu-Natal EDTEA EKZN Wildlife	Sensitivity mapping and ground truthing has been undertaken for the project site to determine the vegetation types and species data. Plant species of special concern observed within the study area, but not necessarily within the development footprint include *Crinum stuhlmannii* in the *Helichrysum – Chrysanthemoides* coastal grasslands and *Ficus trichopoda* and *Barringtonia racemosa* individuals in the swamp forest. Based on EKZNW GIS data, the following CBA was identified within the project site: » CBA: Irreplaceable

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
KwaZulu -Natal Nature Conservation Ordinance (No. 15 of 1974)	This Oridinance provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Oridinance; provides for the appointment of nature conservators to implement the provisions of the Ordinance; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Ordinance provides lists of protected species for the Province.	KwaZulu Natal EDTEA	A collection/destruction permit must be obtained from KZN EDTEA for the removal of any protected plant or animal species found on site. Plant species of special concern observed within the study area, but not necessarily within the development footprint include *Crinum stuhlmannii* in the *Helichrysum – Chrysanthemoides* coastal grasslands and *Ficus trichopoda* and *Barringtonia racemosa* individuals in the swamp forest.

6.9.1 International Guidelines

i) <u>The Equator Principles III (June, 2013)</u>

The Equator Principles (EPs) III constitute a financial industry benchmark used for determining, assessing, and managing projects environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects and apply globally to all industry sectors.

The EPs comprise the following principles:

Principle 1: Review and Categorisation
Principle 2: Environmental and Social Assessment.
Principle 3: Applicable Environmental and Social Standards.
Principle 4: Environmental and Social Management System and Equator Principles Action Plan
Principle 5: Stakeholder Engagement
Principle 6: Grievance Mechanism
Principle 7: Independent Review
Principle 8: Covenants
Principle 9: Independent Monitoring and Reporting
Principle 10: Reporting and Transparency.

When a project is proposed for financing, the Equator Principle Financial Institution (EPFI) will categorise it based on the magnitude of its potential environmental and social risks and impacts.

Projects can be categorized as follows:

Category A: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented.
Category B: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures.
Category C: Projects with minimal or no adverse environmental and social risks and/or impacts.

.

Category A and Category B projects require that an assessment process be conducted to address the relevant environmental and social impacts and risks associated with the project.

The 320MW RMPP is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GNR 326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed. The National EIA process aligns and fulfils the requirements of the Equator Principles.

ii) International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (January 2012)

The International Finance Corporation (IFC), a division of the World Bank Group that lends to private investors.

The IFC Performance Standards (PS) on Environmental and Social Sustainability were developed by the IFC,to provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations..

The PS comprise of the following:

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
Performance Standard 2: Labour and Working Conditions.
Performance Standard 3: Resource Efficiency and Pollution Prevention.
Performance Standard 4: Community Health, Safety and Security.
Performance Standard 5: Land Acquisition and Involuntary Resettlement.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.
Performance Standard 7: Indigenous Peoples.
Performance Standard 8: Cultural Heritage.

Performance Standard 1 establishes the importance of:

i). Integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects.
ii). Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them.
iii). The management of social and environmental performance throughout the life of a project through an effective Environmental and Social Management System (ESMS).

PS 1 requires that a process of environmental and social assessment be conducted, and an ESMS appropriate to the nature and scale of the project and commensurate with the level of its environmental and social risks and impacts be established and maintained. PS 1 is the overarching standard to which all the other standards relate. PS 2 through 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, PS 2 through 8 describe potential social and environmental impacts that require particular attention in emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its Environmental and Social Management System (ESMS) consistent with PS 1.

This EIA has taken into consideration the requirements and guidelines set out in the IFC PS's and incorporated specific assessments where relevant.

CHAPTER 7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section of the EIA Report provides a description of the environment that may be affected by the 320MW RMPP. This information is provided 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 existing information available for the area (refer to Chapter 11 for list of references) as well as from specialist field surveys and aims to provide the context within which this EIA process is being conducted.

7.1. Legal Requirements as per the EIA Regulations for the undertaking of an EIA Report, 2014 (as amended)

This chapter of the EIA report includes the following information required in terms of Appendix 3: Content of the EIA 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 320MW RMPP is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:
	» The regional location of the project site is described in Section 7.2.
	» The climatic conditions of the Richards Bay area are described in Section 7.3.
	» Biophysical characteristics of the project site and the surrounding areas are described in Section 7.4. This includes the topography, hydrology, geology, soils, agricultural potential, geo-hydrology and ecology of the project site.
	» Visual considerations are described in Section 7.5
	» The air quality of the area is considered in Section 7.6
	» Ambient noise levels of the area are described in Section 7.7.
	» Heritage resources, including the palaeontology and archaeology of the project site are described in Section 7.8.
	» Social and economic characteristics of the Richards Bay area are described in Section 7.9

7.2. Regional Setting: Location of the Project Site

The KwaZulu-Natal Province is situated in the north-eastern portion of South Africa. The province shares boundaries with the Mpumalanga, Free State and Eastern Cape Provinces. The proposed development falls under the jurisdiction of the City of uMhlathuze Local Municipality and within the greater King Cetshwayo District Municipality in the KwaZulu-Natal Province. The City of uMhlathuze Local Municipality is situated on the coast of the Indian Ocean in KwaZulu-Natal, South Africa. It is one of five local municipalities that form part of the King Cetshwayo District Municipality. In 2002 Richards Bay and Empangeni, as well as the surrounding rural and tribal areas merged to form the "City of uMhlathuze" covering an area of approximately 800 km² and supporting approximately 334 4459 people.

The proposed development site falls within the Alton Industrial area which is located just outside the Richards Bay IDZ Phase 1F Estate. The 320MW RMPP site is currently vacant and is being periodically used for communal cattle grazing. Mondi Richards Bay is located directly west of the project site.

The project site has been reserved for the development of the gas to power plant by Phinda Power Producers (Pty) Ltd who is an affiliated group company to Moondream Trading (Pty) Ltd the current owner of the affected property. The zoning of the proposed 320MW RMPP site is 'general industrial' and is currently in the process of being rezoned to 'noxious industrial'. The broader area is characterised by intense past land-use modifications from agriculture, mining, tourism, residential, recreational, and industrial development activities. The study site is located within the Alton Industrial area and is bordered by mixed-use industrial developments, open areas and Zone 1F of the Richards Bay IDZ. Railway lines are located along the north western, northern and south eastern boundaries of the site adding to the industrial nature of the area and project site. Natural features occurring within the surrounding areas include Lake Nsezi, located approximately 3km north-west of the project site, and a channel valley bottom to the south of the site. Agricultural activities, mainly relating to plantations are located ~2km west of the project site.

The site for the proposed 320MW RMPP is situated north west of the of the regional road (R34), which is also known as the John Ross Highway. Access to the 320MW RMPP site is available along Kabelring Road.

7.3. Climatic Conditions

The Richards Bay area is characterised by a subtropical climate. Summers are warm and wet, and winters are mild, moist to dry and do not experience frost conditions. The average annual rainfall of the area is 1128mm. Temperatures for the area ranged between 10°C and 42°C. The highest temperatures occurred in September and the lowest in July. During the day, temperatures increase to reach maximum at around 14:00, and decrease to reach a minimum at around 06:00 (i.e., just before sunrise). **Figure 7.1** indicates the diurnal temperature variability for the project area.

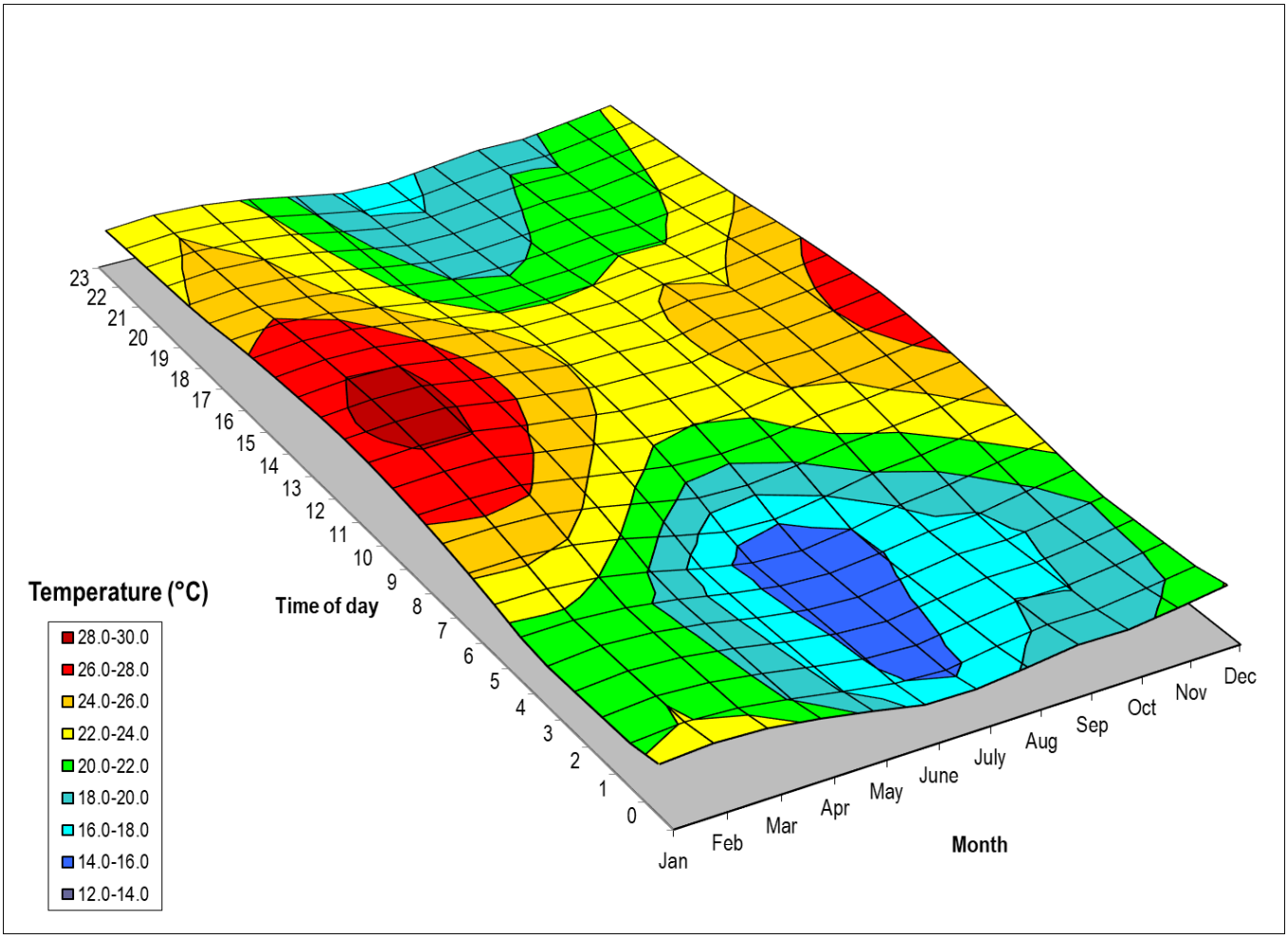

Figure 7.1: Diurnal temperature profile (source: Airshed (2021))

Wind roses for the project site (refer to **Figure 7.2**) indicate a predominant south-south-westerly and north-easterly wind direction, with an average wind speed of 4.5m/s. The seasonal variation in the wind field shows a slight northerly dominance in winter while north-northeasterlies are more dominant in summer and spring. Highest wind speeds are likely in spring.

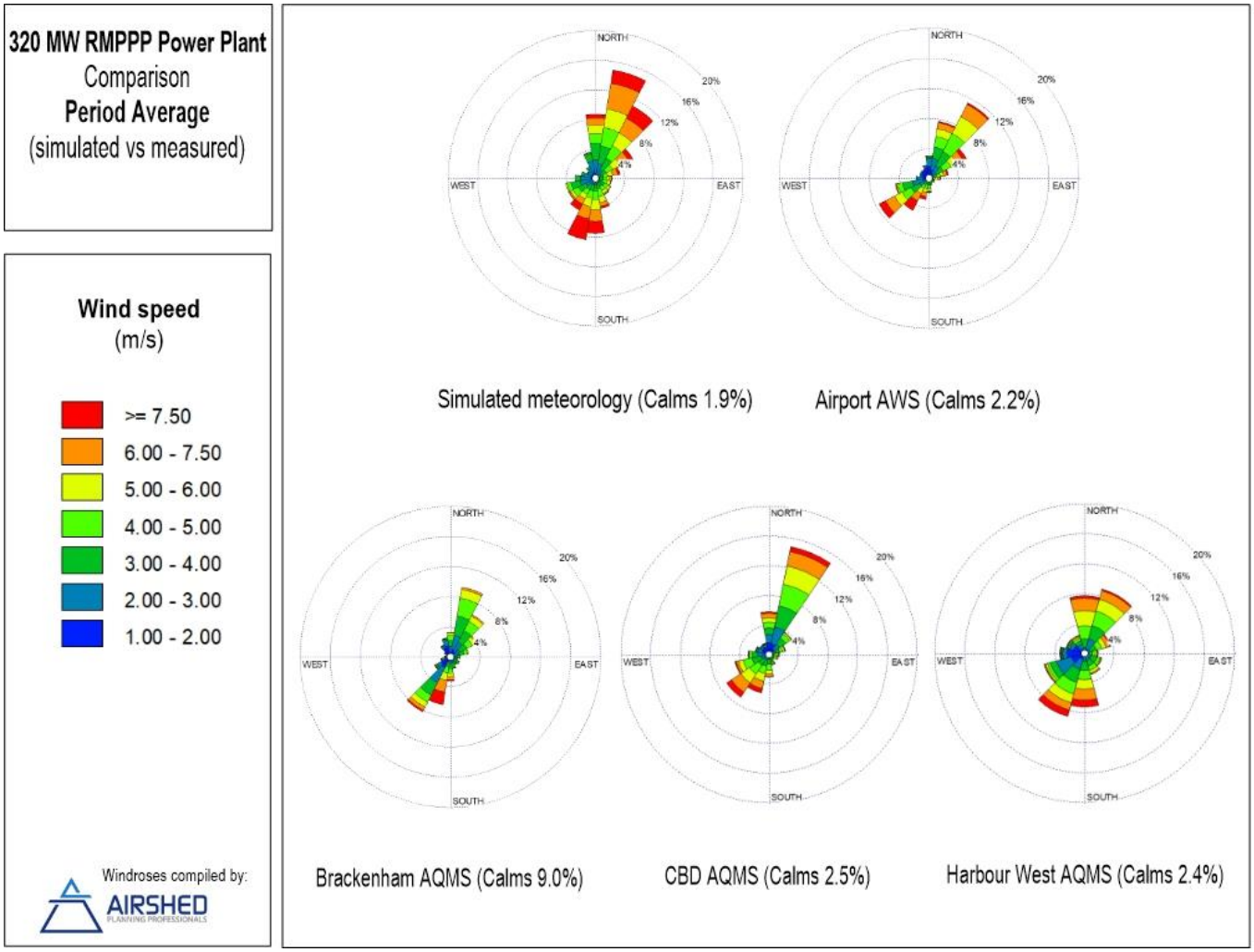

Figure 7.2: Average wind-field simulated for the project area (source: Airshed (2021))

7.4. Biophysical Characteristics of the Study Area

7.4.1 Topography

The topography of the study area is described as plains of the eastern coastal foreland. The region has an even slope with elevation ranging from sea level at the Indian Ocean to approximately 130m above sea level to the north-west. The flat topography is dominated by wetlands and water bodies (e.g. the Nsezi and Mzingazi lakes, the harbour bay and its numerous channels) while the Mhlatuze River meanders to the south of the study area. The project site is considered to be relatively flat with maximum and minimum elevations of between 32 and 46m above sea level across the north western portions of the site.

7.4.2 Geology, Soils and Agricultural Potential

The larger study area is underlain by unconsolidated, Quaternary-age sediments. These redistributed cover sands are underlain by recent clays and sands of the upper Port Durnford Formation of the Maputaland Group. The Port Durnford Formation rests unconformably on either Cretaceous sediments or partially calcified / lithified sediments of the Uloa or Umkwelane Formations. It comprises a succession of carbonaceous muds and sands, with basal sandstones, black muds and lignite in evidence. Nearer the

surface however, white and orange mottled clayey sands are overlain by younger dune sands, which cover much of the coastal plain.

Lot 1854 in Alton and the surrounding areas of Richards Bay are underlain by a cover of unconsolidated and partly consolidated sediments of aeolian and alluvial origin. These sediments are in turn underlain by weathered calcarenite and coquina of the Uloa Formation of Miocene age, which is then typically underlain by siltstones of the St Lucia Formation of Cretaceous age.

Soil parent materials have been identified by reference to the Council for GeoScience geological survey map no. 2732, St Lucia. Although these maps are on a scale of 1: 250 000 they do provide useful indicators of the quality of soils that are likely to be encountered within the study site. The soil parent material is described as "Yellowish redistributed sand" code Qs.

Fernwood is fine unstructured sand that was deposited along the South African coastline as sediment from the Great Flood which took place some 10 000 years ago and is named after the farm Fernwood between Mtubatuba and Hluhluwe. It is first found as a narrow strip in the southern KZN and then gradually widens as it moves northwards, reaching a width of 30-40 km on the Maputaland coast. This soil does little more than hold the plant upright. Although the climate has a good rating, the Fernwood Soils that cover the site will only support eucalyptus species and casuarina equisetifolia.

The empirical evidence taken at site demonstrates that the target site comprises of non-arable land within a fully transformed industrial development zone.

In terms of Government Notice 320, being non-arable land within a fully transformed industrial development zone, the project site is considered to be a low sensitivity area with a Land Capability Value of 1-5 on a scale of 1-15.

7.4.3 Hydrology

The site is typically gently sloping and displays typical gentle inland hummocky type dune topography, while there are portions across the central and northern plateau areas of the site that are level. Along the eastern boundary of the site lies an approximately north-east to south-west trending surface water drainage feature, with ±6m difference in elevation between the base of the channel and the central flat lying plateau area.

The streams/ drainage courses are artificially channelled through upstream industrial sites and into this surface water drainage feature. It is expected that surface runoff and subsurface seepage of contaminants from these upstream industrial sites will potentially impact the site of the proposed 320MW RMPPP development, particularly after periods of heavy rainfall or major storm events.

A shallow water table is typically associated with surface drainage features such as rivers, streams, wetlands, pans and dams, together with the flood plains and low-lying areas associated with them, and in this case is represented by the north-east to south-west trending natural surface water drainage feature along the eastern boundary of the site in which surface water is very gently flowing.

Baseline water quality for surface water resources on the project site are presented in **Table 7.1** below.

Table 7.1: Baseline surface water quality on project site (source: Davies Lynn & Partners (2021))

Determinant	Unit	TWQR	Critical Effect Value	Accute Effect Value	Upstream sample	Downstream sample
Aluminium	µg/l	5	10	100	**520**	**73**
Ammonia	mg/l	0.007	0.015	0.100	**6.10**	**0.46**
Cadmium	µg/l	0.15	0.3	3	**11.1**	**0.96**
Copper	µg/l	0.3	0.53	1.6	**135**	**5.48**
Cyanide	µg/l	1	4	110	**5**	**3**
Fluoride	mg/l	0.75	1.50	2.54	**0.45**	**0.82**
Lead	µg/l	0.2	0.5	4	**0.49**	**0.08**
Manganese	µg/l	2	3.60	36	**313**	**386**
Mercury	µg/l	0.04	0.08	1.7	**0.16**	**0.14**
Zinc	µg/l	2	3.60	36	**4782**	**92**

7.4.3 Geo-hydrology

Richards Bay's groundwater occurs within the inter-granular primary aquifer in the semi consolidated and unconsolidated materials deposited during the Tertiary and Quaternary periods. Boreholes drilled into the unconsolidated sediments typically intercept groundwater of good quality, with pH values generally varying between 6.0 – 9.0 and electrical conductivity (EC) values below 100 mS/m. Boreholes drilled into the unconsolidated sediments typically intercept groundwater of good quality, with pH values generally varying between 6.0 – 9.0 and electrical conductivity (EC) values below 100 mS/m.

Within the upper layers of the Port Durnford Formation, calcium (Ca) concentrations reportedly vary between 1.02 mg/ℓ – 15.24 mg/ℓ, magnesium (Mg) between 2.23 mg/ℓ – 4.33 mg/ℓ and sodium (Na) between 15.51 mg/ℓ – 26.21 mg/ℓ. Recharge to the underlying inter-granular aquifer has been reportedly estimated at 5% to 18% of mean annual precipitation (MAP), which is described as holding 'huge and renewable' groundwater reserves.

Surface drainage features such as those represented by the north-east to south-west trending natural surface water drainage feature along the eastern boundary of the site indicate a shallow water table.

Baseline groundwater quality results obtained from 3 onsite boreholes are presented in **Table 7.2** below.

Table 7.2: Baseline groundwater quality for project site (source: Davies Lynn & Partners (2021)).

Determinant	Risk	Unit	Standard Limit	BH1	BH 2	BH 3
Physical – Water Quality						
Colour	Aesthetic	mg Pt-Co/ℓ	≤15	**120**	**75**	**23**
Turbidity	Operational	NTU	4	**39**	**21**	**18**
Macro Chemical - Determinants						
Chloride	Chronic Health	mg Cl/ℓ	≤300	**433**	**355**	**82**
Nitrate	Chronic Health	mg N/ℓ	≤11	**2.33**	**14.1**	**19.5**

Determinant	Risk	Unit	Standard Limit	BH1	BH 2	BH 3
Combined Nitrate & Nitrite	Chronic Health	-	≤1	**0.23**	**1.3**	**1.8**
Sodium	Chronic Health	mg Na/ℓ	≤200	**429**	**256**	**59**
Total Organic Carbon	Chronic Health	mg C/ℓ	≤10	**18**	**29**	**7.1**
Micro Chemical – Determinants						
Aluminium	Chronic Health	µg Al/ℓ	≤300 µg/ℓ	**490**	**558**	**83**
Iron	Chronic Health	µg Fe/ℓ	Chronic: ≤2000 µg/ℓ Aesthetic: ≤300 µg/ℓ	**3356**	**2032**	**2053**
Manganese	Chronic Health	µg Mn/ℓ	Chronic: ≤400 µg/ℓ Aesthetic: ≤100 µg/ℓ	**494**	**414**	**96**
Microbiological - Determinants						
Total Coliforms	Operational	colonies / 100mℓ	≤10	**132000**	**129000**	**380**
E. Coli	Acute	colonies / 100mℓ	0	**3**	**4**	**0**
Standard Plate Count	Operational	colonies / mℓ	≤1000	**>10000**	**>10000**	**>10000**

7.4.4 Ecological Profile

The larger part of the study area falls within the Indian Ocean Coastal Belt bioregion comprising of Maputaland Wooded Grassland, interspersed with Subtropical Alluvial Vegetation, Swamp Forests, Subtropical Freshwater Wetlands and Freshwater Lakes. Large parts of the study area, especially to the north, have been transformed by forestry (exotic plantations) and sugar cane cultivation, and industrial development. The dominant land cover types, where intact, are described as Thicket and Dense Bushland and Grassland.

i) Protected and other conservation areas

Protected areas considered include National Parks, Provincial Nature Reserves, Local Authority Nature reserves, Wildlife Management Areas, Private Nature Reserves, Important Bird Areas (IBA) Areas, Game Farms, Game Reserves, Nationally Protected Forest Patches and NPAES focus areas. The following protected areas are located within a 30 km radius of the project site (refer to **Figure 7.3**):

» Richards Bay Nature Reserve and IBA located 4 km to the south
» Enseleni Nature Reserve located 6 km to the north
» Ngoye Nature Reserve and IBA located 23.3 km to the south west
» Thukela NPAES focus area located 22.9 km to the west

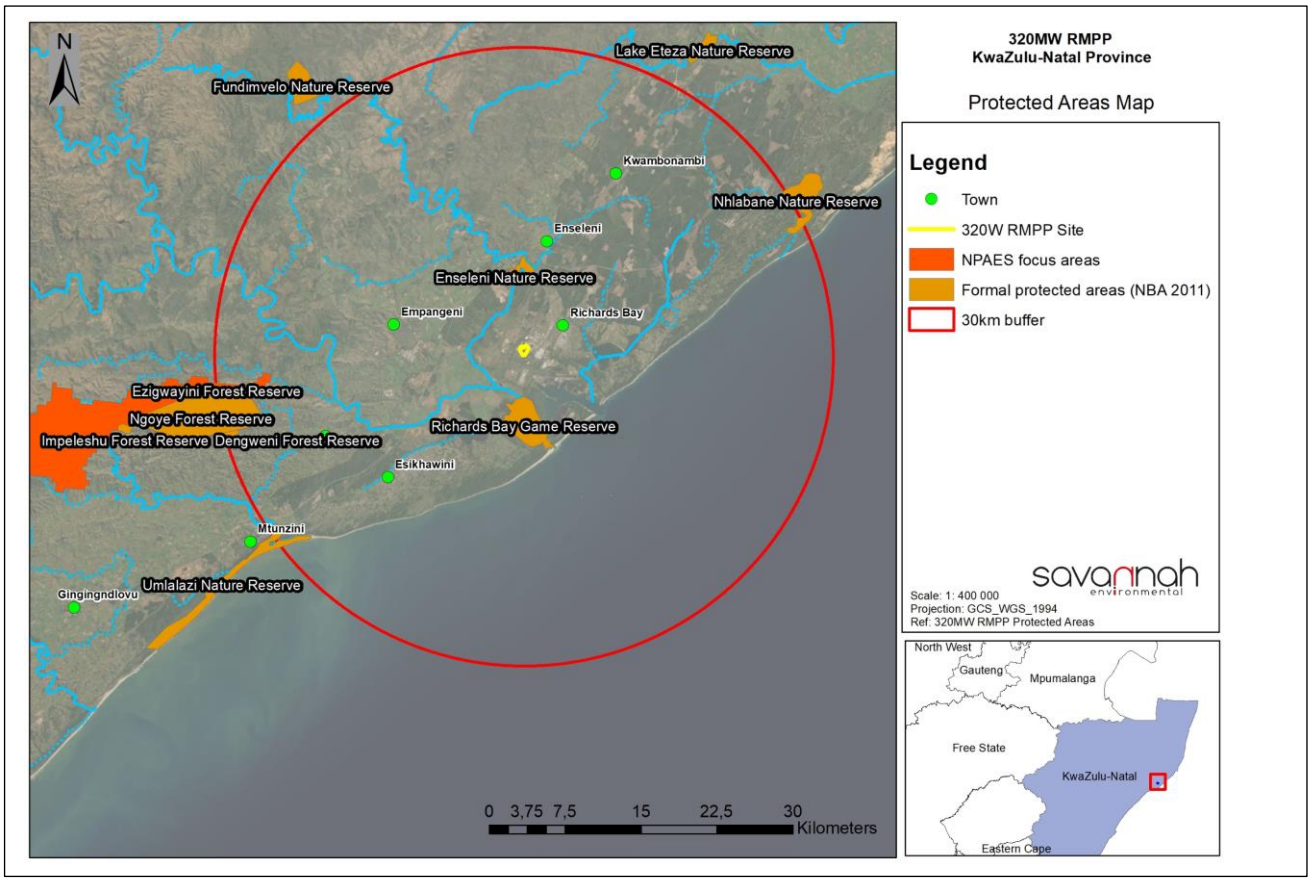

Figure 7.3: Protected and other conservation areas in relation to the project site

ii) Threatened/Endangered Ecosystems

According to the Ecosystem Threat Status of the National Biodiversity Assessment (NBA, SANBI 2018) and EKZNW (2011) the Maputaland Wooded Grassland is classified as Endangered. Following ground truthing, the vegetation confirmed on the development site resembles that of Maputaland Wooded Grassland albeit the natural woody layer has been greatly reduced.

Plant species within the region include *Crinum stuhlmannii* in the *Helichrysum – Chrysanthemoides* coastal grasslands and *Alsophila dregei, Boophone disticha, Ficus trichopoda and Barringtonia racemosa* individuals in the *Phragmites – Typha* channelled valley bottom wetlands (as detailed below). No protected species were observed on the development site during the site visits.

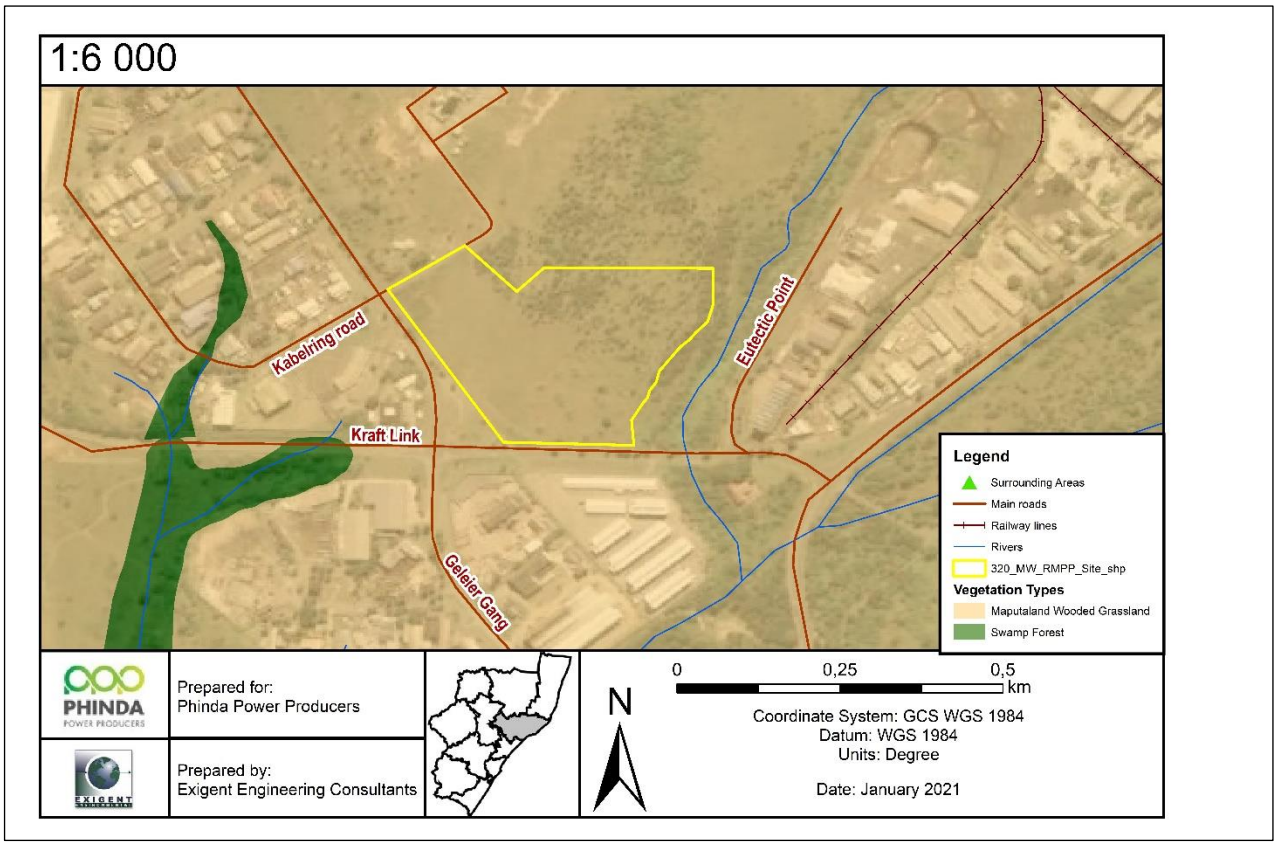

Figure 7.4: Endangered Ecosystems (Maputaland Wooded Grassland)

iii) Critical Biodiversity Areas

Based on the EKZNW CBA data, the 320MW RMPP is proposed within an irreplaceable area (Figure 7.5). Irreplaceable areas would be considered critical for meeting biodiversity targets and thresholds and are required to ensure the persistence of viable populations of species and the functionality of ecosystems. The Land use management objectives are to maintain these areas in a natural state with limited to no biodiversity loss (EKZNW, 2016).

According to EKZNW (2016), the planning units (PU) identified in these critical biodiversity areas (CBAs) represent the localities for one or more biodiversity features for which conservation targets can be achieved. The distribution of the biodiversity features is not always applicable to the entire extent of the PU but is more often confined to a specific niche habitat e.g. a forest or wetland reflected as a portion of the PU. Generally, CBAs are terrestrial (land) and aquatic (water) features (e.g. vleis, rivers and estuaries) in the landscape and/or indicates the potential for the occurrence of protected species that are critical for conserving biodiversity and maintaining ecosystem functioning in the long term. As seen by the pixelated blocks and inclusion of transformed industrial areas in Figure 7.5, these CBA areas are provincially mapped at a large scale. The site may have been incorrectly classified as CBA due to an error in the land cover map, or alternatively a disturbance to the site has occurred subsequent to the development of the CBA Map. The site must be assessed for its potential to be rehabilitated and/or its role as part of a landscape corridor and the potential presence of protected species. Further, the proposed activity at the site should be investigated in terms of its potential impact on adjacent correctly classified CBA and Ecological Support Areas (ESAs). No protected species were observed during the site visits. No PU's or biodiversity features for which conservation targets need to be achieved were found on site. The relevance of the PU in the context of the CBA and as a Critical Habitat has been assessed in the Chapter 8 of this EIA report.

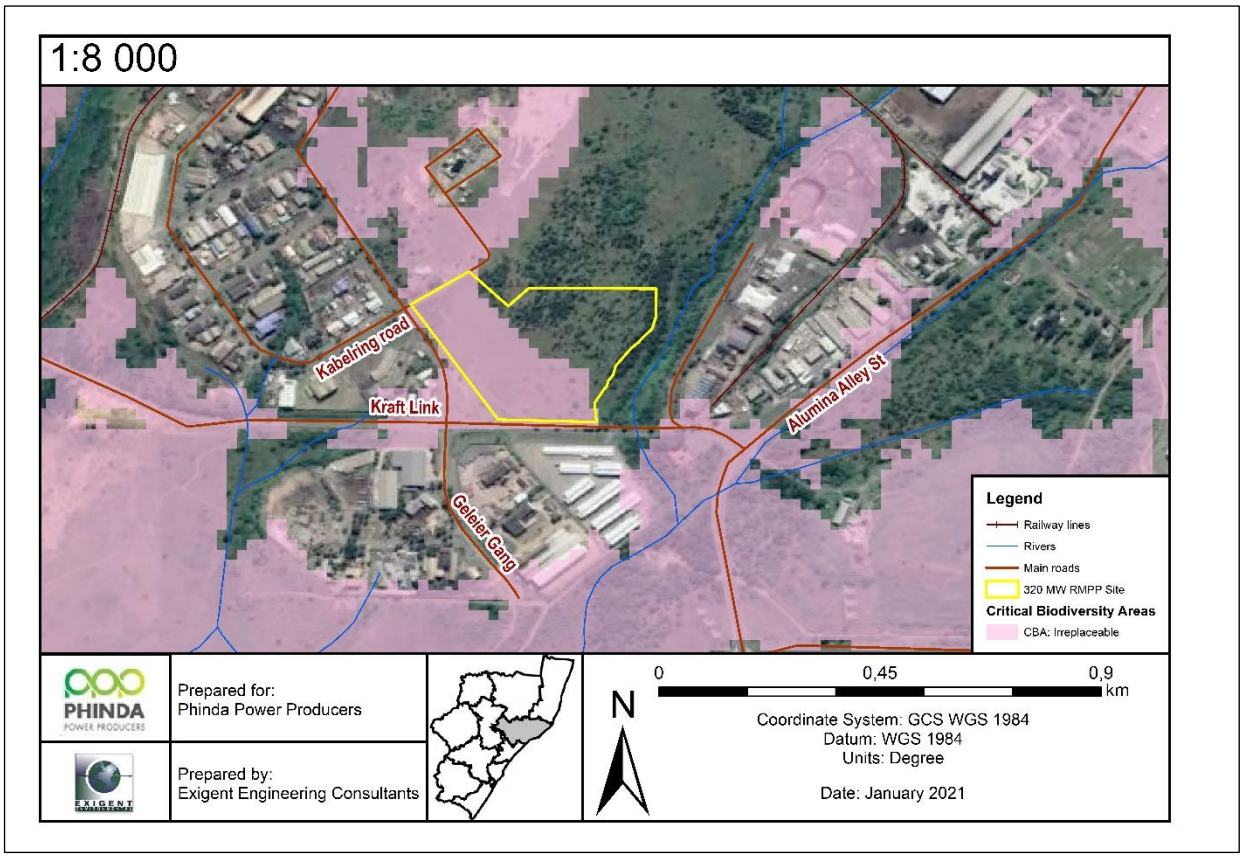

Figure 7.5: Critical Biodiversity Areas present in the study area

iv) Vegetation of the Project Site

The proposed development site has a long history of transformation, from being surveyed in 1909 as Reserve No. 6 surrounded by Crown Land, 1937 used for agriculture with the presence of human settlement and confirmation of these settlements on maps from 1964. The topographic map of 1984 shows the area as an industrial zone (HIA, Anderson, 2019) with plantations. Aerial imagery from 2004 indicates that this area has been transformed from Eucalyptus plantations to the coastal grassland present on site today. Cattle was observed grazing the site daily during the field surveys undertaken. The vegetation on the site is currently degraded as a result of historical activities.

The vegetation within the project site was broadly classified into two vegetation communities, namely *Helichrysum - Chrysanthemoides* coastal grasslands (Figure 7.6), and a small portion of the site consisted of Eucalyptyus plantations. A *Phragmites - Typha* channelled valley bottom wetland community was observed on the eastern border of the site but does not impede into the site as it is currently fully developed. Approximately 3.27 hectares of the development site consists of *Helichrysum - Chrysanthemoides* coastal grasslands. It is dominated by shrubs such as *Helichrysum krausii* and *Chrysanthemoides monolifera* subspecies *rotundata*. Invaders such as *Psidium guajava*, *Cuscuta campestris, Chromolaena odorata* and *Lantana camara* were only recorded in close proximity to and along tracks and road edges. Several *Crinum stuhlmannii* individuals, protected in terms of the KZN Nature Conservation Ordinance, were located in this vegetation community but not within the development footprint.

A Closed coastal woodland vegetation community was identified south of the project site. This community's natural vegetation is mostly replaced by alien, invasive and ruderal species undergrowth. Species such as *Brachylaena discolour, Bridelia micrantha, Salacia kraussii, Phoenix reclinata, Rhus natalensis, Trema orientalis and Ziziphus mucronate* were recorded. The edges of this community comprise of dense thickets of *Chromolaena odorata and Lantana camara*. Other dominant aliens include *Melia azedarach, Solanum mauritianum and Ricinus communis*. Footpaths traverse this area and numerous informal structures where observed. A servitude with a gravel track bisects this vegetation. Eucalyptus plantations occupy approximately 191m^2 of the development site. It is remnants of a historical plantation. No flora species protected in terms of the KZN Ordinance were confirmed on the proposed development site.

Figure 7.6 provides a map of the associated vegetation types located within the project site.

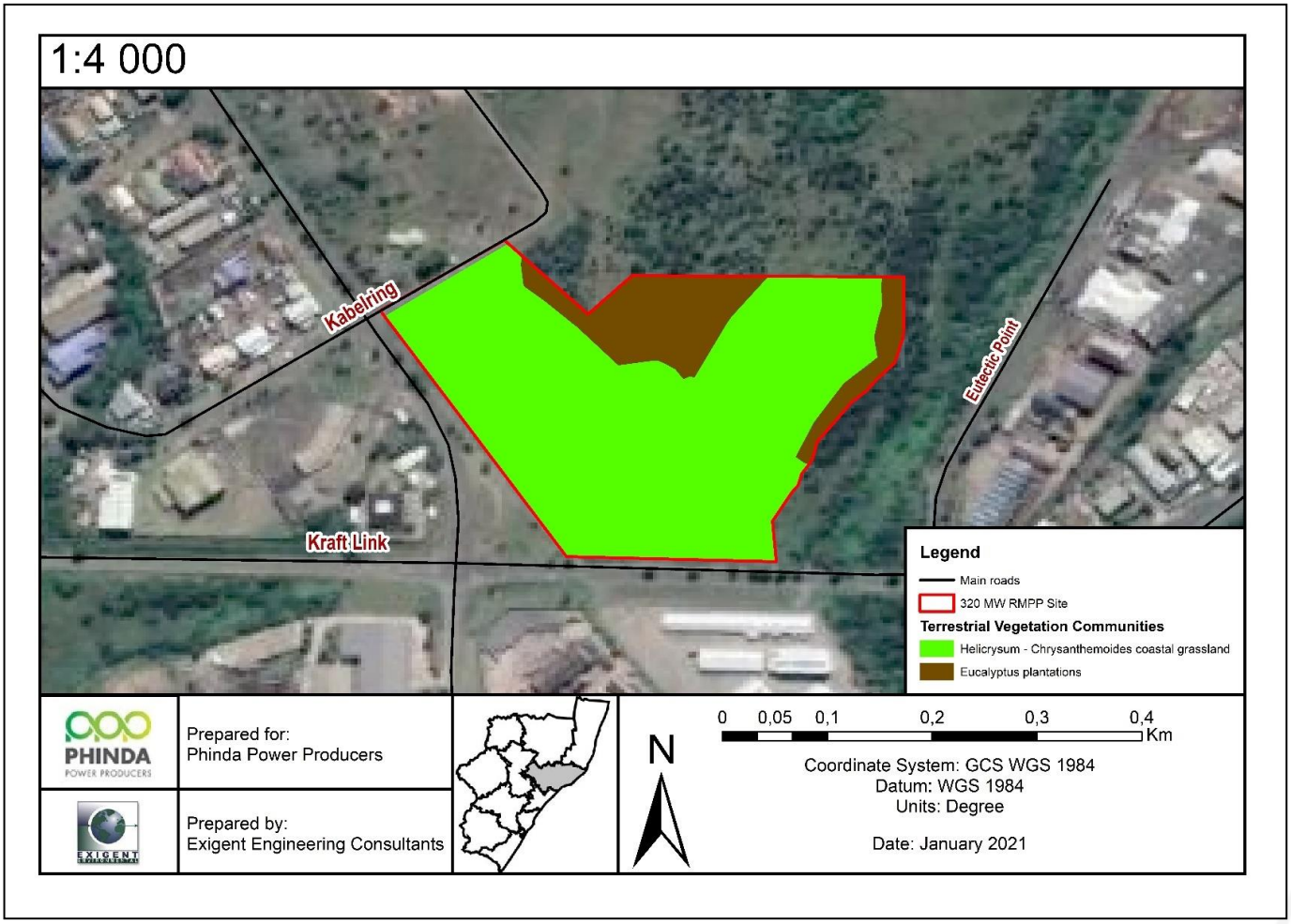

Figure 6.6: Vegetation map of the project site indicating the extent of the present vegetation types

Flora species of Conservation Concern

Although the project site is in poor ecological condition, some natural vegetation is still present and the presence of Red Listed/Protected flora species is still possible. Potential plant species of special concern include *Crinum stuhlmannii* in the Helichrysum – *Chrysanthemoides* coastal grasslands and *Alsophila dregei, Boophone disticha, Ficus trichopoda* and *Barringtonia racemosa* individuals in the Phragmites – Typha channelled valley bottom wetland. However, as the proposed project site is located outside these wetlands, no impacts to those species in this habitat are expected. Species such as *Crinum stuhlmannii* in the *Helichrysum – Chrysanthemoides* coastal grasslands is listed on the DEFF Screening tool with a high potential to occur on the proposed development site. No protected species were observed during the site visits.

Invasive Plant Species

Invasive alien plants (IAPs) are widely considered as a major threat to biodiversity, human livelihoods and economic development. The Closed coastal woodland vegetation at the site is mostly replaced by an alien, invasive and ruderal species undergrowth. Eucalyptus plantations, remnants of a historical plantations occupy approximately 191m^2 of the 320MW RMPP development site. Species such as *Catharanthus roseus, Chromolaena odorata, Cuscuta campestris, Lantana camara, Parthenium hysterophorus, Pennisetum clandestinum, Schinus terebinthifolius, Solanum mauritianum, Verbena bonariensis,* and *Psidium guajavas* were recorded.

v) Sensitive Aquatic Ecosystems

No watercourses are present within the project footprint. No wetlands were identified within the boundaries of the proposed 320MW RMPP site. Due to the waterlogged nature of the lower laying areas of the coastal plain in the Richards Bay area, three major stormwater drainage channels were historically constructed to mitigate flooding and enable development in the Alton industrial area. One of these drainage channels lies adjacent to the eastern boundary of the proposed 320MW RMPP site, following the low points to the south of the site (Figure 7.7). Although it has historically been artificially channelled, the channel bed is earthen and therefore functions as a natural river channel with its associated channelled valley bottom wetland. Identification of this wetland system was based on its position in the landscape, soil form, wetness, as well as indicator vegetation.

This system has been defined as a *Phragmites - Typha* channelled valley bottoms. The project development area does not infringe on this wetland, as a 29m buffer area has been set around the wetland. This wetland has experienced a moderate change in ecosystem processes and a loss of natural habitats has taken place, however the basic ecosystem functions are still predominantly unchanged. This wetland is ecologically important and sensitive at a local scale. Species of special concern were recorded in the wetland and include *Alsophila dregei, Boophone disticha, Ficus trichopoda* and *Barringtonia racemosa* individuals. Although *Phragmites australis* and *Typha capensis* are the dominant plant species, several pockets of swampy *Barringtonia racemosa and Ficus trichopoda* are imbedded in the channel with *Cyperus fastigiatus* also present in very dense stands.

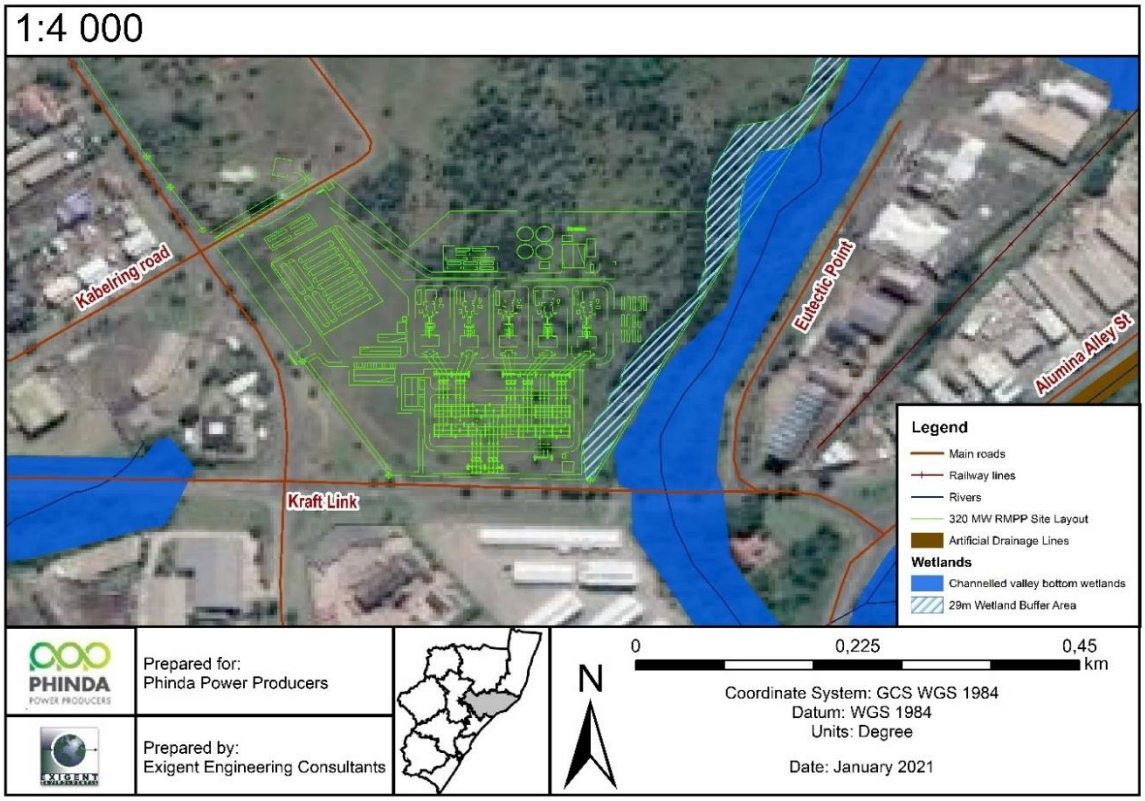

Figure 7.7 The extent of the wetland areas and buffers in relation to the project site

vi) uMhlatuze Environmental Services Management Plan (ESMP)

The uMhlathuze Environmental Services Management Plan (ESMP) provides the municipality with a clear understanding of activities that need to be undertaken to protect and enhance the supply of environmental services in the area. Based on the final 2016/2017 uMhlathuze Spatial Development Framework (SDF), the two critical goals of the ESMP are:

- 'To define cohesive and functional spatial management units within the municipal area that need to be managed in order to optimise the delivery of environment services.'
- 'To develop management plans for each management unit that identify the management activities required to secure environmental services supply**.'**

The areas that provide environmental services to the City are spatially defined, and the following "Levels" of protection were determined:

- **Nature Reserves (Level 1):** These are areas of high biodiversity and environmental significance that require a high level of legal protection. Included are unique habitats or areas that are considered important at International, National or Provincial level; estuaries, lakes, major wetlands, natural forests, coastal buffers and critically endangered habitats that are protected in terms of international or national legislation and/or treaties. It is recommended that these areas be proclaimed as nature reserves in terms of relevant legislation such as the National Environmental Management Protected Areas Act.

» **Conservation Zone (Level 2):** Areas of biodiversity / environmental significance, which are not viable for proclamation as nature reserves, but that require some form of legal protection. Included are unique or regionally important natural habitats; wetland and forest areas that are protected in terms of national legislation; and all areas that fall within the 1:100-year flood line. No transformation of the natural assets or the development of land for purposes other than conservation should be permitted in this zone. Sustainable use of renewable resources is permitted.

» **Open Space Linkage Zone (Level 3):** Included in the open space linkage zone are areas that provide a natural buffer for Level 1 and 2 Zones, areas that provide a natural link between Level 1 and 2 Zones and areas that supply, or ensure the supply of, significant environmental services. Transformation of natural assets and the development of land in these zones should only be permitted under controlled conditions.

» **Development Zone (Level 4):** Includes all areas that are not included in Level 1, 2 and 3 zones. Areas in this zone are either already developed or transformed and contain land and natural assets that are not critical for environmental service supply. However, it is recognised that the development of these zones can impact on environmental services supply. As such, they should be developed in a manner that supports, or at least does not adversely impact on, the sustainability of environmental service supply in Level 1, 2 and 3 zones.

Areas earmarked as Municipal conservation zones and its associated open space linkage zones lie east of the proposed 320MW RMPP. The development footprint falls within a defined development zone.

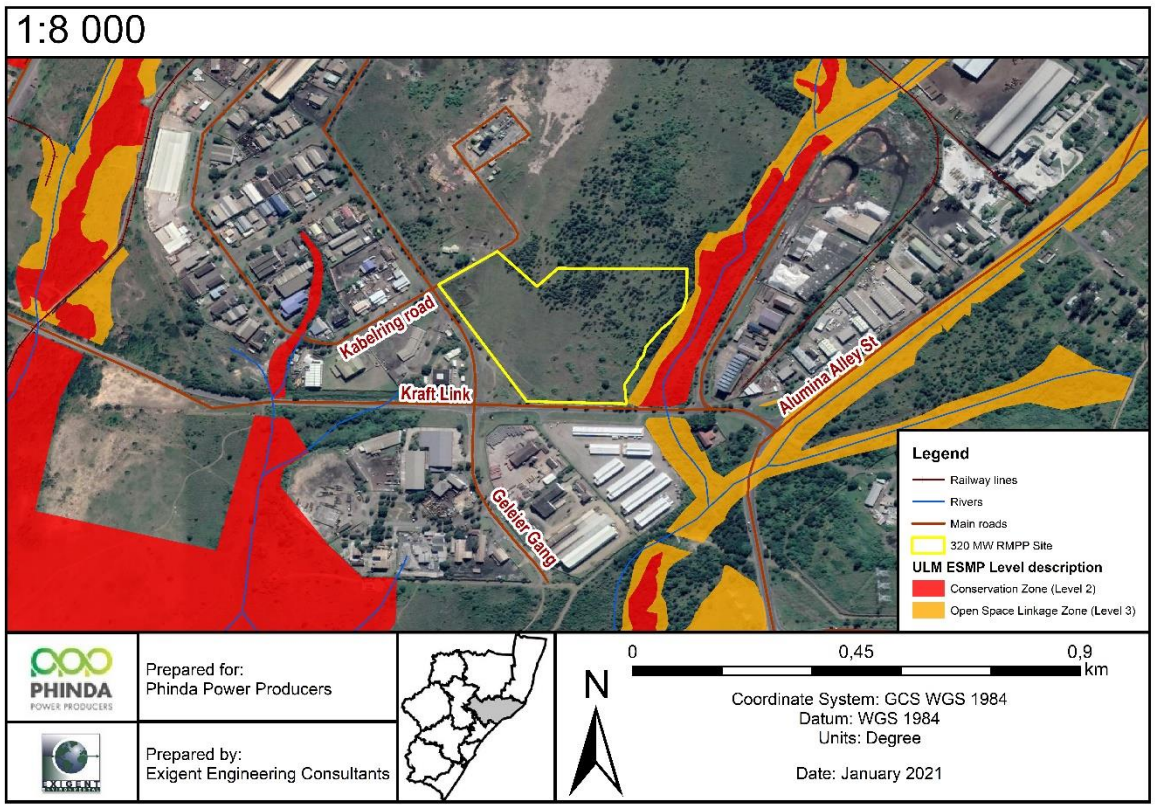

Figure 7.9. ESMP conservation zones and open space linkages associated located outside the project footprint.

vii) Faunal Communities

Mammals

The project site offers three major mammal habitats, i.e. terrestrial, arboreal and wetland/aquatic. The terrestrial habitat is the most abundant and provides habitat to a vast variety of small mammals such as rodents, shrews, mongooses etc. At present, large mammals are only expected in protected and privately owned reserves and are therefore generally excluded in mammal assessments for urban developments. Arboreal habitat is represented by trees, often used by bats while shrews occasionally find refuge in vegetation associated with water bodies of aquatic habitats. Approximately 48 species have the potential to use the development site and its surrounding areas.

The majority of the species of the resident diversity are common and widespread, all with wide habitat tolerances. The reason for their survival success lies predominantly in their remarkable reproductive success and wide habitat tolerance.

Table 6.2 lists fourteen (14) species previously observed in the Degree Grid 2832CC and recorded on the MammalMap. Surveys for small mammals will be conducted from 07:00 – 11:00 and 16:00 – 19:00 daily for 3 days as part of the detailed EIA investigation.

Table 6.2: Mammal species previously recorded in Degree Grid 2832CC (MammalMAP)

Group name	Group Species	Species Name	Observation
Monkey	*Vervet Monkey*	*Chlorocebus pygerythrus*	*MammalMap (2012, 2013, 2015, 2016, 2018, 2019)*
Leopard	*Leopard*	*Panthera pardus*	*MammalMap (2016)*
Hippopotamus	*Common Hippopotamus*	*Hippopotamus amphibius*	*MammalMap (2016)*
Otter	*African Clawless Otter*	*Aonyx capensis*	*MammalMap (2016)*
Mongoose	*Marsh Mongoose*	*Atilax paludinosus*	*MammalMap (2015, 2018)*
Mongoose	*Slender Mongoose*	*Herpestes sanguineus*	*MammalMap (2017)*
Mongoose	*Banded Mongoose*	*Mungos mungo*	*MammalMap (2015, 2016, 2017, 2018, 2019)*
Mouse	*Natal Multimammate mouse*	*Mastomys natalensis*	*MammalMap (2016) Helichrysum coastal grasslands*
Mouse	*South African pygmy mouse*	*Mus (Nannomys) minutoides*	*MammalMap (2003) Phragmites – Typha channelled valley bottom wetland*
Mouse	*South Africa pouched mouse*	*Saccostomus campestris*	*MammalMap (2016)*
Shrew	*Reddish-grey musk shrew*	*Crocidura cyanea*	*MammalMap (2016)*
Rat	*Greater cane rat*	*Thryonomys swinderianus*	*MammalMap (2011)*
Genet	*Cape large spotted genet*	*Genetta tigrina*	*MammalMap (2016)*
Bat	*Epauletted fruit bats*	*Epomophorus sp.*	*MammalMap (2015)*
Bat	*Egyptian free-tailed bat*	*Tadarida aegyptiaca*	*Phragmites – Typha channelled valley bottom wetland*

Herpetofauna

The project site offers three major reptile habitats, i.e. terrestrial, arboreal and fossorial. Several herpetofauna species have a distribution range in the area. 23 reptile species and 53 frog species were previously observed in the grid cell 2832CC and recorded on the South African Reptile Conservation Assessment (SARCA) and South African Frog Atlas databases respectively.

Approximately 23 reptile species and 53 frog species have the potential to use the development site and its surrounding areas. Majority of the reptile and frog species diversity is common and widespread. No reptiles or frogs were observed during the screening site visits. No Red Listed/Protected reptile species are expected to be present within the project site.

Avifauna

Approximately 358 bird species have been recorded in pentads 2840_3200 and 2845_3200 of which 12 were observed during this study's site investigation (Table 6.3). The diversity is expected to be high due to the Richards Bay Game Reserve Important Bird Area (IBA) located approximately 3,4 km south of the development site. The proposed development is however unlikely to impact on any individuals of the area.

Table 6.3: Bird species observed within the project site

Group name	*Group Species*	*Species Name*	*Observation*
Barbet	Black-collared	Lybius torquatus	Phragmites – Typha channelled valley bottom wetland
Barbet	White-eared	Stactolaema leucotis	Phragmites – Typha channelled valley bottom wetland
Bishop	Southern Red	Euplectes orix	Phragmites – Typha channelled valley bottom wetland
Bulbul	Dark-capped	Pycnonotus tricolor	All habitats
Buzzard	Steppe	Buteo vulpinus	Helichrysum - Chrysanthemoides coastal grasslands
Crow	Pied	Corvus albus	Helichrysum - Chrysanthemoides coastal grasslands
Ibis	Hadeda	Bostrychia hagedash	Helichrysum - Chrysanthemoides coastal grasslands
Lark	Rufous-naped	Mirafra africana	Helichrysum - Chrysanthemoides coastal grasslands
Long-claw	Yellow throated	Macronyx croceus	Helichrysum - Chrysanthemoides coastal grasslands
Mousebird	Speckled	Colius striatus	Phragmites – Typha channelled valley bottom wetland
Nightjar	Fiery-necked	Caprimulgus pectoralis	Phragmites – Typha channelled valley bottom wetland
White-eye	Cape	Zosterops capensis	Phragmites – Typha channelled valley bottom wetland

7.5. Visual Considerations

It is possible that landscape change due to the proposed development could impact the character of the landscape. Landscape character can be derived from specific features relating to the urban or rural setting and may include key natural, historic or culturally significant elements.

7.5.1. Topography, vegetation and hydrology

The proposed project site is located at approximately 30m above sea level. The topography of the study area is described as plains of the eastern coastal foreland. The region has an even slope with elevation ranging from sea level at the Indian Ocean to approximately 130m above sea level to the north-west.

The flat topography is dominated by wetlands and water bodies (e.g. the Nsezi and Mzingazi lakes, the harbour bay and its numerous channels) while the Mhlatuze River meanders to the south of the study area. The project site falls within the Mhlatuze River quaternary catchment and the Nseleni River floodplain (a tributary of the Mhlatuze) is prominent to the west of the study area.

The larger part of the study area falls within the Indian Ocean Coastal Belt bioregion comprising of Maputaland Wooded Grassland, interspersed with Subtropical Alluvial Vegetation, Swamp Forests, Subtropical Freshwater Wetlands and Freshwater Lakes. It must be noted though, that large parts of the

study area, especially to the north, have been transformed by forestry (exotic plantations) and sugar cane cultivation, and industrial development. The dominant land cover types, where intact, are described as Thicket and Dense Bushland and Grassland.

7.5.2. Land use and settlement patterns

The industrial activities, the Richards Bay IDZ and the transportation infrastructure related to the port, as mentioned earlier, are the primary land use activities within the study area. This and the intensive forestry and sugar cane production to the north (and south) account for the largest economical drivers within the region. There is a well-established railway network and a large number of electricity distribution and transmission power lines traversing the study area.

The N2 national road, the R34 arterial road (John Ross Parkway) and the R619 main road provide motorised access to the region. The John Ross Parkway traverses south of the proposed development site, and is expected to be the quickest access road (via Alugang and Kraft Link Roads) to the site.

The majority of residential areas within Richards Bay are located north of the city and east of the R619 main road. Residential neighbourhoods include Arboretum, Birdswood, Veld-en-Vlei and Wilde-en-Weide. None of these residential areas are located in close proximity to the proposed development site.

There are only two proclaimed terrestrial protected areas within the region, namely; the Enseleni Nature Reserve to the north-west and the Richards Bay Nature Reserve south of the study area. Other than these protected areas, and potentially along the Indian seaboard, there are no identified tourist attractions or destinations in closer proximity to the development site.

7.6 Air Quality

Meteorological mechanisms direct the dispersion, transformation and eventual removal of pollutants from the atmosphere. The extent to which pollution will accumulate or disperse in the atmosphere is dependent on the degree of thermal and mechanical turbulence within the earth's boundary layer. This dispersion comprises vertical and horizontal components of motion. The stability of the atmosphere and the depth of the surface-mixing layer define the vertical component. The horizontal dispersion of pollution in the boundary layer is primarily a function of the wind field. The wind speed determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of wind speed, in combination with surface roughness. The wind direction, and variability in wind direction, determines the general path pollutants will follow, and the extent of crosswind spreading. The pollution concentration levels therefore fluctuate in response to changes in atmospheric stability, to concurrent variations in the mixing depth, and to shifts in the wind field.

7.6.1. Sources of air pollution in the region

The identification of existing sources of emission in the region and the characterisation of existing ambient pollutant concentrations is fundamental to understand the current air quality of the area. Source types present in the area and the pollutants associated with such source types are noted with the aim of identifying pollutants, which may be of importance in terms of cumulative impact potentials. The source types include:

- Stack, vent and fugitive emissions from industrial operations;
- Fugitive emissions from industrial, mining, commercial and miscellaneous operations;
- Vehicle tailpipe emissions;
- Biomass burning (veld fires, forest fires and sugar cane burning);
- Waste treatment facilities (i.e. water treatment plants, landfills, incinerators etc.); and
- Various miscellaneous fugitive dust sources (agricultural activities, wind erosion of open areas, vehicle-entrainment of dust along paved and unpaved roads).

Figure 7.10 provides the location of the main industries and mines within the Local Municipality.

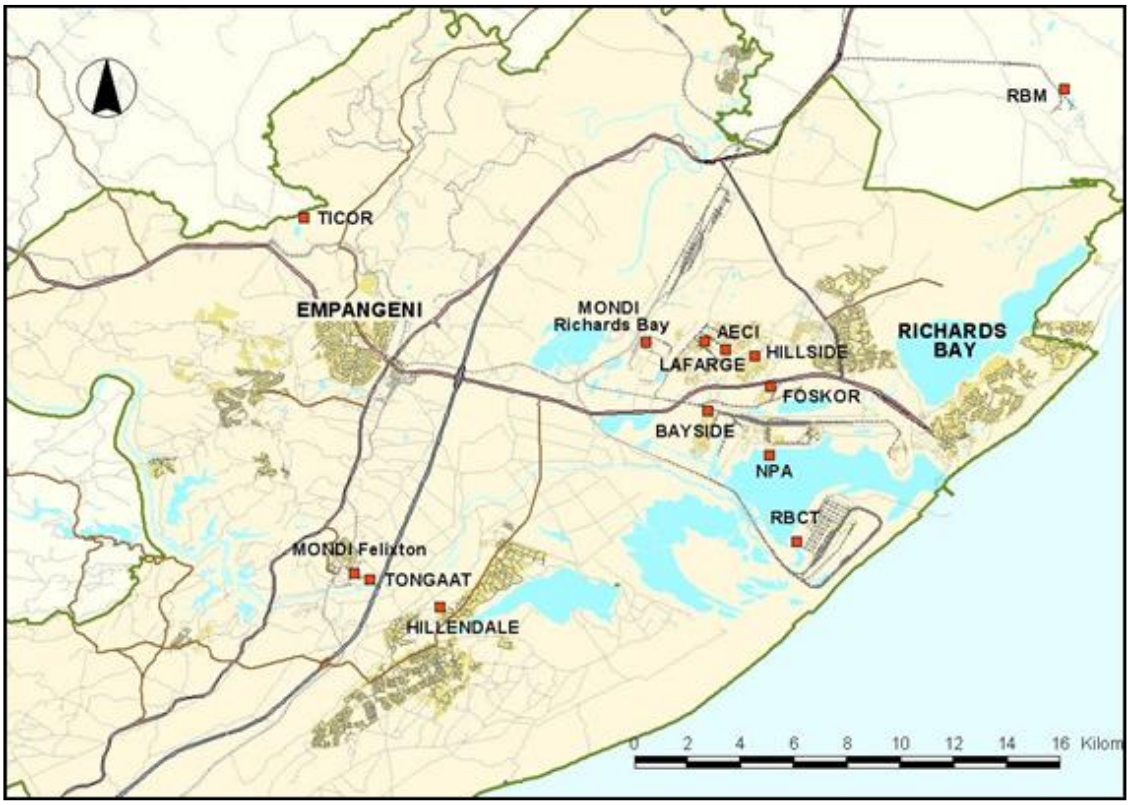

Figure 7.10: Location of all the main industries and mines within the City of uMhlathuze Local Municipality

i) Industrial Sources

Most of industrial sources within the region are located within Richards Bay. These industrial operations have a substantial influence on ambient concentrations in Richards Bay.

ii) Mining sources

Mining operations within the Richards Bay area almost exclusively include mineral sand mining activities. Only two mines are operational within the municipal boundaries namely Tronox Hillendale, and Hlanganani Sandwork Operations. There might be other smaller sandwork operations within the municipality. The Tronox Hillendale Mine is nearing the end of its life, and the Fairbreeze Mine to the south of Hillendale, will provide the mineral concentrate for the smelter once the Hillendale operations have ceased. The Zulti South Mining Lease Area is a proposed mineral sand mine to be located northeast of Mtunzini, covering an area of 20 km in length by a maximum of 2 km in width. The operations will include opencast dry mining of dune sand and processing to produce heavy mineral concentrate (HMC).

Mining operations represent potentially significant sources of fugitive dust emissions, where the particulate emissions are the main pollutant of concern. Fugitive dust sources associated with sand mining activities include materials handling activities, vehicle-entrainment by haul trucks and wind-blown dust from tailings impoundments and stockpiles.

iii) Transport related emissions

Vehicles, railroad, shipping and the airport are included in this category. The main source of concern in the area is vehicle tailpipe emissions. The main national and provincial highways and roads include the N2 from Durban in the south to north of Empangeni. Various main and secondary roads link the rural and urban areas within the municipality.

iv) Biomass burning

Crop-residue burning and general wildfires (veld fires) represent significant sources of combustion-related emissions associated with agricultural areas and forestry. Major pollutants from veld fires are particulates, CO and VOCs. The extent of NO_X emissions depends on combustion temperatures, with minor quantities of sulfur oxides released. Emissions are greater from sugar cane burning than for savannas due to sugar cane areas being associated with a greater availability of existing material to be burned.

v) Miscellaneous sources

Various miscellaneous fugitive dust sources, including agricultural activities, wind erosion of open areas, vehicle-entrainment of dust along paved and unpaved roads are found in the area.

7.6.2. Measured Baseline Ambient Air Quality

The Richards Bay Clean Air Association (RBCAA) operates 12 ambient monitoring stations, measuring meteorological parameters and ambient SO_2, TRS and PM_{10} concentrations. Hourly data from all stations was provided by the RBCAA for the period January 2016 to December 2019. The uMhlathuze Municipality operates 2 ambient monitoring stations measuring meteorological parameters, ambient SO_2, ambient NO_2, and PM_{10} concentrations

i) PM_{10} Ambient Concentrations

The daily PM_{10} concentrations – for the data period provided (January 2016 to December 2019) – indicate non-compliance with the daily PM_{10} NAAQS at Brackenham station during 2018, where daily average concentrations measured exceeded 75 µg/m³ on more than four occasions during the year. Annual average PM_{10} concentrations were compliant with the NAAQS at all stations and similarity between years at each station is noted.

ii) SO_2 Ambient Concentrations

Hourly SO_2 concentrations recorded at seven RBCAA stations complied with the hourly NAAQS for all years in the data set. Harbour West AQMS had the largest number of hourly exceedances, 22 hours in 2018 and 1 hour in 2016. The NAAQS allows for 88 hours exceeding the limit concentration per year (350 µg/m³). The

Scorpio AQMS recorded 12 hours in 2018 and 2 hours in 2016. The CBD AQMS recorded 1 hour (in 2016) exceeding the hourly limit concentration. No hourly exceedances were measured at the other stations during the January 2016 to December 2019 period. The Harbour West AQMS recorded non-compliance with the daily SO_2 NAAQS (125 µg/m³) in 2018 due to 5 days recording averages in excess of the limit concentration (4 days are allowed). Although the daily average SO_2 concentrations exceeded the limit concentration at Scorpio for one day during 2018 no further daily exceedances at the Scorpio (or other AQMS) have been recorded. Annual average SO_2 at all stations was compliant with the NAAQS with a slight trend towards improvement at all stations.

iii) NO_2 Ambient Concentrations

There were no exceedances of the short-term or long-term NAAQS NO_2 at any of the monitoring stations. Higher concentrations of NO_2 occur in the mornings around 07H00 and the evenings around 18H00 which may be indicative of traffic as the main contributing source.

7.7. Noise

Potential noise sensitive receptors which could be affected by the development of the 320MW RMPP and associated infrastructure have been identified from aerial images. Two potential noise-sensitive developments were identified during the site screening process and the status of these locations was confirmed during the site visit. The site visit identified a number of dwellings that are used for residential purposes within 2 000m from the proposed activity (**Figure 7.12**).

The current environmental sound character was determined through a methodology used to measure ambient sound levels as defined by the South African National Standard SANS 10103:2008. A number of single measurements were collected to gauge the ambient sound character and levels around the project site while being able to hear and possibly identify noise sources.

Short-term (10-minutes) measurements were collected over a period of two (2) nights close to residential dwellings within the industrial area as per the requirements of GG 43110 of 20 March 2020. There are approximately 60 structures used by contractors in the area as residential dwellings. Ambient sound levels close to the residential dwellings are elevated and higher than the World Health Organization recommended noise limits for residential use. Ambient noise levels in the Alton Industrial area were elevated and typical of a busy urban (with roads, business and workshops) to central business noise district. It should be noted that SANS 10103 highlights that ambient sound levels in an industrial noise district (appropriately zoned) up to 70 dBA is expected and typical.

Monitoring location	GPS Co-ordinate	Night-time sound level ($L_{Aeq,i}$) - dBA	Night-time sound level ($L_{Aeq,f}$) - dBA	Night-time statistical sound level ($L_{A90,f}$) - dBA	Night-time rating level i.t.o SANS 10103
RBNSTSL11 (Night 1, 10 PM)	-28.764698°, 32.020459°	54.3	53.4	49.6	Central Business District
RBNSTSL11 (Night 1, 04 AM)	-28.764698°, 32.020459°	55.5	53.8	50.2	Central Business District
RBNSTSL11 (Night 2, 10 PM)	-28.764698°, 32.020459°	52.1	51	46.8	Urban (with main roads, workshops, etc.)
RBNSTSL11 (Night 2, 04 AM)	-28.764698°, 32.020459°	55.3	54.3	48.1	Central Business District

Figure 7.11: Summary of average sound levels measured

Figure 7.12: Potential noise-sensitive receptors close to the proposed project focus area

7.8. Heritage features of the region

7.8.1. Heritage and archaeology

The proposed site was first surveyed in 1909 as Reserve No. 6 surrounded by Crown Land. It indicated that some of the land was subdivided for lease purposes and may be linked to the Native Delimitation Act of 1904. This leased area is not present on later maps. A 1937 map indicates that the study area was mostly used as agricultural fields surrounding wetlands (Figure 7.12). Settlements and one cattle byre are visible on this map. Human graves could be associated with these settlements.

Only agricultural fields occur in the study area, while settlements occur outside it.

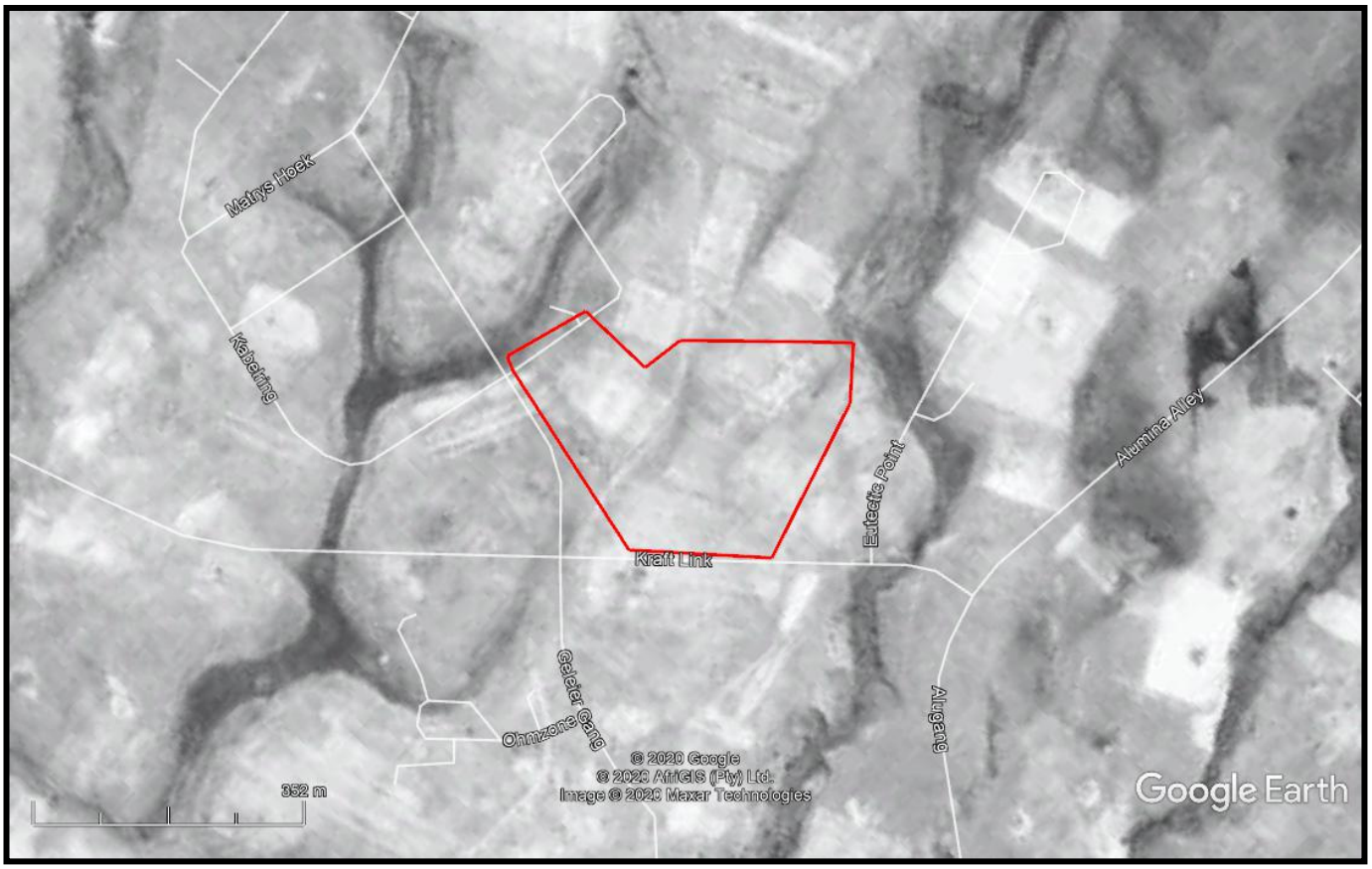

Figure 7.13: Topographical map of the proposed development (1937)

A 1964 topographical map indicated that there were two settlements within the study area that human graves could generally be associated with. The project area had also been one of the many areas regarding forced removals of the Mandlazini people (Griffiths 1996; Ntuil 2019). No land claims on the proposed project site are recorded as at 21 September 2020.

The 1984 topographical map indicates the area as an industrial zone. These maps concur that there was a wetland formed by the Hlangabenzani River. However, by 1983 furrows/canals had drained much of the water. The historical maps thus indicate that human settlements did exist in the general area and thus there is a possibility for human graves in the general area. No human settlements were identified in the specific study site. The presence of human remains is highly unlikely. The high water tables in the area, before canalization, would have resulted in the rapid decay of human remains.

Individual stone tools will probably occur as a lag deposit on the hard clay horizons as noticed in the previous surveys. These are not significant and do not constitute an archaeological site.

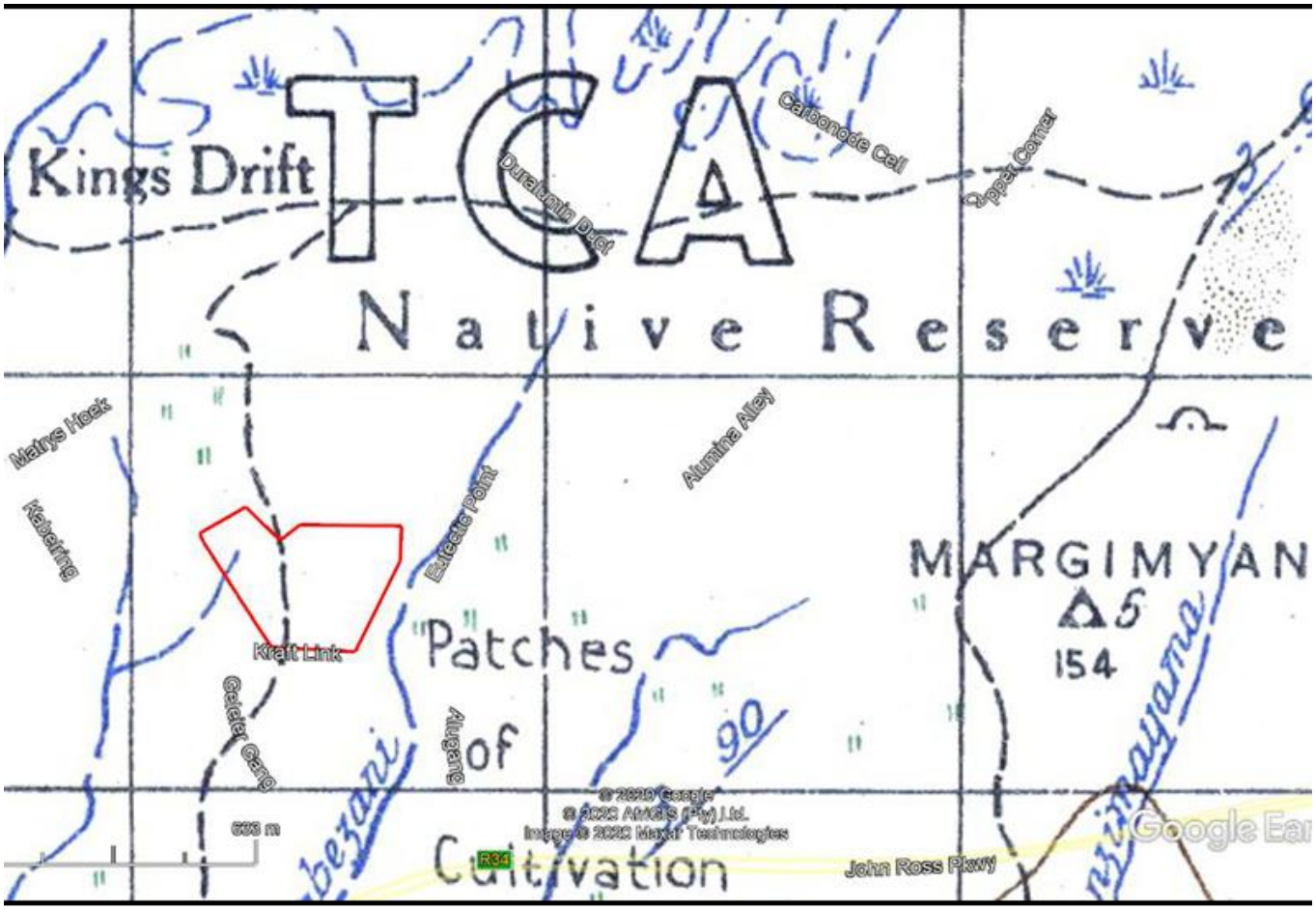

Figure 7.14: Topographical map of the proposed development (1943***)***

7.8.2. Palaeontology (Fossils)

The study area is coded blue according to the SAHRIS palaeosensitivity map, indicating no or very low palaeontological value. However, this is slightly misleading as there are Cretaceous deposits 4m+ below the surface. These deposits are noticeable for their megalodon teeth, large ammonites, and other shell species. The general area is of low palaeontological sensitivity. However Cretaceous deposits could occur at 4m+ below the surface. It is unlikely that excavations will extend to these depths. Any excavations reaching these layers would need to inform KZNARI and have a qualified palaeontologist assess the samples. This would include an assessment of the deposits and possible sampling. The sampling of these deposits will not affect the project as it is only the recovery of exposed fossils.

Figure 7.15: Palaeontological sensitivity map (The study area is coded blue according to the SAHRIS palaeosensitivity map indicating no or very low, palaeontological value.)

7.9. Current Social and Economic Characteristics of the Project Site and Surrounding Areas

Between 2001 and 2011 the City of uMhlathuze Local Municipality (LM) experienced an annual population increase of 1.5%, with the population in 2011 reported to be 362 778 people. According to the 2016, Community Survey 2016 population within the uMhlathuze LM reported to be 410 465 persons, indicating a growth rate of 2.81% annually between 2011 and 2016, significantly higher than previously experienced.

For the period 1996 to 2016, the percentage of the total population within the City of uMhlathuze Local Municipality classified as 'potentially economically active' (ages of 15 and 64) has been consistently higher than the percentage of the population within this age group in the District Municipality and KZN province. Access to education within uMhlathuze Local Municipality improved between 2001 and 2011, with the percentage of the population over the age of 20 reported to have never received formal education dropping from 18% to 8%. While the same trend was experienced within the DM (a drop of 32% to 16% reporting no access) and province (a drop of 22% to 11% reporting no access), access was better within the LM.

Despite improvements between 2001 and 2016, unemployment within the uMhlathuze Local Municipality remains high at 30% however, this is below the level of unemployment reported for the King Cetshwayo DM 34% and KwaZulu-Natal 33.

The Gross Value Added (GVA) of City of uMhlathuze LM was valued to be R36 122 million in 2019 current prices as shown in the table below. This is equal to a GDP per capita of R102 152 which is significantly higher than the national and provincial economies with a GDP-R per capita of R75 205 and R61 174 respectively.

Access to electricity for lighting (the most basic level of access) within the uMhlathuze LM is better than access on a district and provincial level. Access to piped water improved significantly within the

uMhlathuze LM between 2001 and 2016, with 94% of all households reported to have access to piped water either within their household or within their yard.

From a social perspective, there are 8 zones considered to be affected by the proposed development and should be assessed i.e. Zone 1: Industry; Zone 2: Harbour; Zone 3: Business; Zone 4: Tourism; Zone 5: Agriculture; Zone 6: Natural; Zone 7: Forestry and Zone 8: Residential

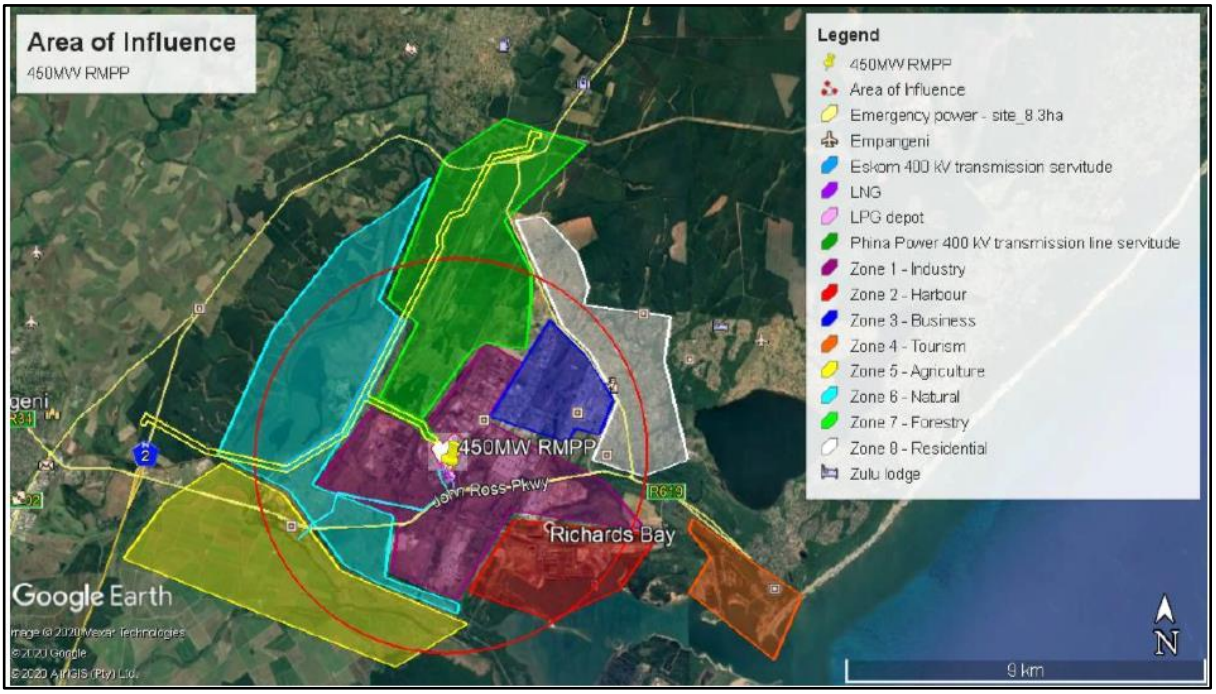

Figure 7.16. Area of Impact and the Zones of Influence

ZONES OF IMPACT	SHORT DESCRIPTION OF THE AREA OF IMPACT
# 1 INDUSTRY	Consists mainly of industrial land uses, these include general industry as well as noxious industries. The R34 provides access to Richards Bay, the Harbour and divide the industrial area, harbour and the agricultural zones. Some of the industries include Mondi, Steelplate Solutions, South32 Aluminium, Lafarge, Grindrod Simunye, Macsteel, Bell Equipment and Foskor.
# 2 HARBOUR	This zone consists mainly of the harbour precinct and lies towards the south east of the site for the power plant. Some of the businesses and institutions residing within the harbour precinct include Transnet National Port Authority, Richards Bay Harbour, Fermentech, Vanguard, SGS South Africa, Kingston Park, Bayview and the Richards Bay Seafarers Club.
# 3 BUSINESS	Consists of the central business district (CBD) of Richards Bay and includes mainly retail, commercial and business uses. The zone includes the University of Zululand, City of uMhlathuze Municipality, Boardwalk Inkwazi Shopping Centre, Netcare The Bay Hospital, Lakeside Mall as well as numerous retail and commercial facilities.
# 4 TOURISM	Although this zone falls outside of the 5km area of immediate impact, it was decided that due to the strong strategic importance of establishing this zone as a tourism destination in Richards Bay it should not be excluded

	from this assessment. The area includes high-end residential housing, numerous restaurants, and the main beach area for Richards Bay. Some of the tourism facilities include Bon Hotel Waterfront, Richards Bay Small Crafts Harbour, Pelican Island, Meerensee Boat Club, Richards Bay Ski Boat Club, Richards Bay Skate Park, Alkantstrand as well as numerous restaurants and tourism accommodation and lodging facilities.
# 5 AGRICULTURE	Zone 5 consists mainly of sugarcane farming and lies to the south and south west of the project site. The sugarcane industry is a well-established industry that provides numerous jobs to the local communities and forms an integral part of the local economy.
# 6 NATURAL	Zone 6 consists of natural land and green conservation areas that act as a buffer zone between the industrial areas and the agriculture land. This zone lies between zone 1 and zone 5 to the south as well as to the west of zone 1. To the south it is mostly wetlands and to the western portion of the zone there is the Nseleni River and the Nsezi dam. The water treatment works are located within this zone as well as the Richards Bay Radio Flyers Club and the Bay Saddle Club.
# 7 FORESTRY	Zone 7 is the forestry areas to the north of the proposed power plant and zone 1. This zone also includes the Life Occupational Health Transnet Insezi Wagon Clinic and the Nsezi Transnet Engineering Depot.
# 8 RESIDENTIAL	Zone 8 consists mainly of the residential neighbourhoods to the north and north east of Richards Bay, these include Wild en Weide, Arboretum, Veld en Vlei and Brackenham.

CHAPTER 8. ASSESSMENT OF 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 320MW RMPP. This assessment has considered the construction of a gas power facility with a contracted capacity of up to 320MW within a development footprint of approximately 9.4ha in extent on a site in Alton Industrial area, Richards Bay. The project will comprise the following key infrastructure and components:

- Main Power Island consisting of aeroderivative gas turbines operated in open cycle comprising of air intake, air filter structures and exhaust stack for the generation of electricity using LPG.
- Battery storage system and emergency generator for start-up power to the first gas engine / turbine.
- Auxiliary transformers.
- Balance of Plant systems.
- Dry Cooling systems.
- Auxiliaries.
- Four LPG truck unloading gantries connected onsite by pipeline to the LPG storage.
- LPG storage comprising of up to 10 000m^3 of storage in total, comprising of 13 bullets.
- LPG vaporisation and onsite piping to deliver gas to the turbines.
- Demineralisation water treatment plant.
- Clarified water storage tanks and demineralised water storage tanks.
- Three effluent reticulation systems - 1) sanitary wastewater system; 2) zero liquid discharge system for treatment of demineralisation plant effluent and 3) oily water separator and storm water drainage system including attenuation basin.
- 132kV interconnecting substation and power lines connecting to the grid transmission infrastructure (The power lines to the grid transmission structure have been applied for under a separate environmental approval process).

The full extent of the project site was considered through the EIA process by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desktop evaluations and field surveys. A development footprint for the 320MW RMPP within the project site was proposed by the developer through consideration of the sensitive environmental features and areas identified through the EIA process.

A layout for the 320MW RMPP was designed within this development footprint and avoids no-go, very high and high sensitivity areas identified in the scoping phase (refer to **Figure 8.1**). Therefore, the layout/development footprint of 320MW RMPP is considered as *least intrusive* on the environment at the proposed location, and most suitable for the EIA investigation.

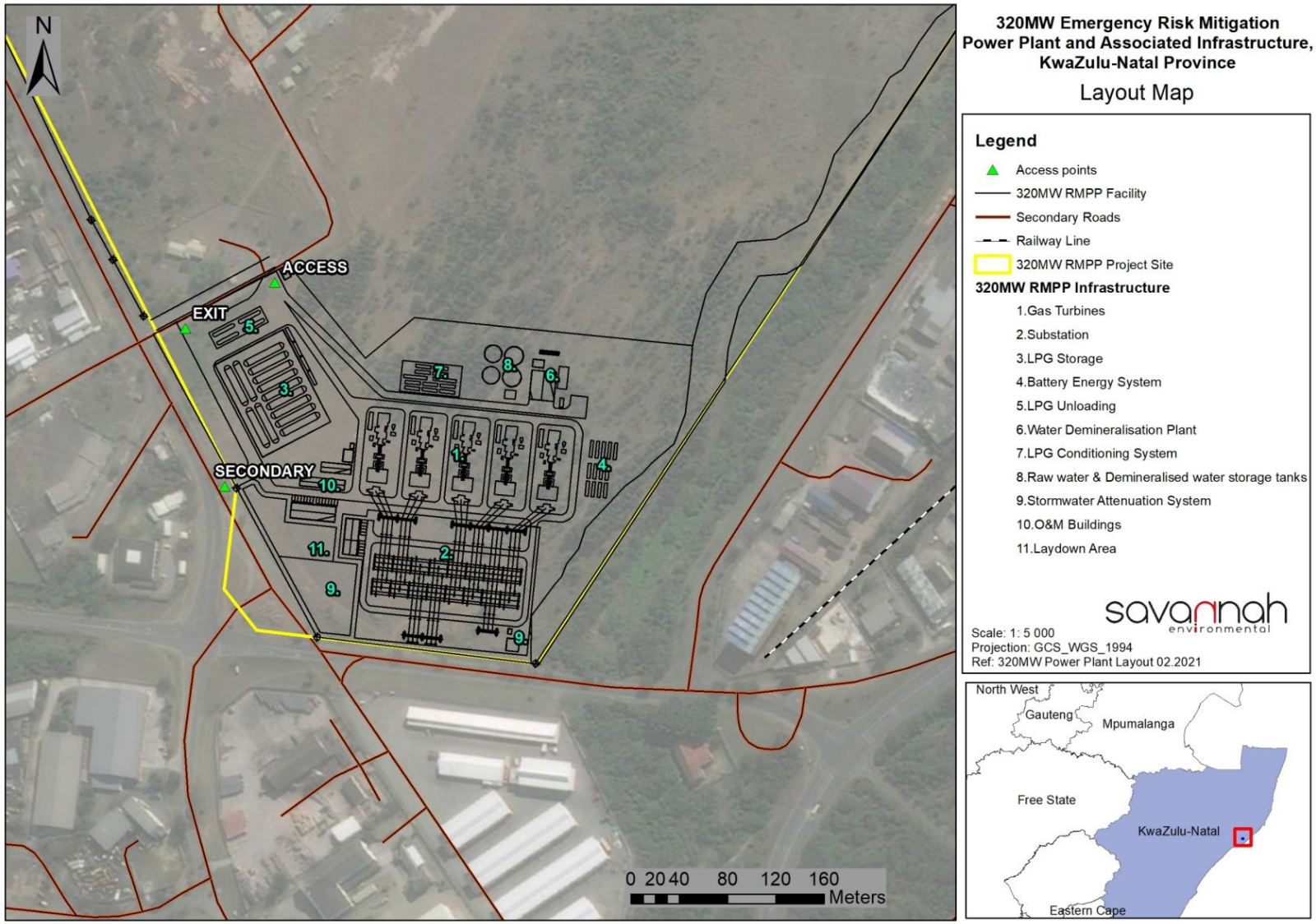

Figure 8.1: Map illustrating the project layout considered for the 320MW RMPP

The development of 320MW RMPP will comprise the following phases:

- *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, laydown areas, and facility infrastructure; construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the 320MW RMPP is estimated at 18 months.
- *Operation* – will include the operation of the 320MW RMPP facility and the generation of electricity. This will be fed into the national grid via an on-site substation and underground power lines to a switching station, the underground powerlines and switching station being subject to a separate basic assessment process. The operation phase of 320MW RMPP is expected to be approximately 20 years (with maintenance).
- *Decommissioning* – depending on the economic viability of the 320MW RMPP facility, the length of the operation phase may be extended beyond a 20-year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the thermal energy facility, clearance of the relevant infrastructure at the site and appropriate disposal thereof, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities. Therefore, these impacts are not considered separately within this chapter.

8.1. Potential impacts identified during the Scoping Study

Impacts/ issues identified through the Scoping process requiring assessment in the EIA Phase include the following:

- Impacts on Terrestrial Biodiversity
- Impacts on Wetland and Aquatic Ecology
- Impacts on Geo-Hydrology & Surface Water
- Impacts on Archaeology & Palaeontology
- Impacts on Air Quality
- Impacts on Climate Change
- Impacts on ambient Noise Levels
- Visual impacts
- Traffic impacts
- Socio-Economic impacts
- Quantitative Risk Assessment (Impact due to unplanned events)

These issues have been assessed during the EIA Phase, and where applicable potential sensitivities have been mapped accordingly based on the detailed specialist studies and site investigations undertaken.

8.2. Quantification of Areas of Disturbance on the Site

The project footprint being assessed for the 320MW RMPP requires an area of approximately 9.4ha (equivalent to 19% of the broader site), of which gas turbines will occupy an area of approximately 1.2ha in extent, the LPG storage will occupy an area of approximately 0.5ha, and the onsite substation will occupy an area of approximately 1.6ha. Supporting infrastructure such as internal roads, on-site buildings and structures, demineralised water treatment plant, and energy storage will occupy most of the remaining extent, with the balance remaining undeveloped. During construction, a temporary laydown area approximately 0.4ha in extent will be required within the footprint of the site.

8.3. Impacts on Terrestrial Biodiversity(Ecology, Flora and Fauna)

The majority of the ecological impacts associated with the development would occur during the construction phase as a result of the disturbance associated with site clearance, excavations, the operation of heavy machinery at the site and the presence of construction personnel. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

8.3.1. Results of Terrestrial Biodiversity Impact Assessment

Following ground truthing, the vegetation on the development site was broadly classified into two vegetation communities, namely *Helichrysum - Chrysanthemoides* coastal grasslands, and a small portion of the site consisted of *Eucalyptus* plantations. A *Phragmites - Typha* channelled valley bottom wetland community was observed on the eastern border of the site, and the Closed coastal woodland vegetation community was identified to the south of the 320MW RMPP site.

Although classified as a CBA in terms of the EKZNW CBA data, there were no CBA biodiversity features or planning units found on site It is considered that this classification is erroneous. The land cover map also includes the surrounding transformed industrial areas in the pixelated blocks (refer to **Figure 8.2**), A disturbance to the site may have occurred subsequent to the development of the CBA Map. Overall, the proposed development site has a long history of transformation, and no planning units or biodiversity features requiring CBA protection were encountered onsite.

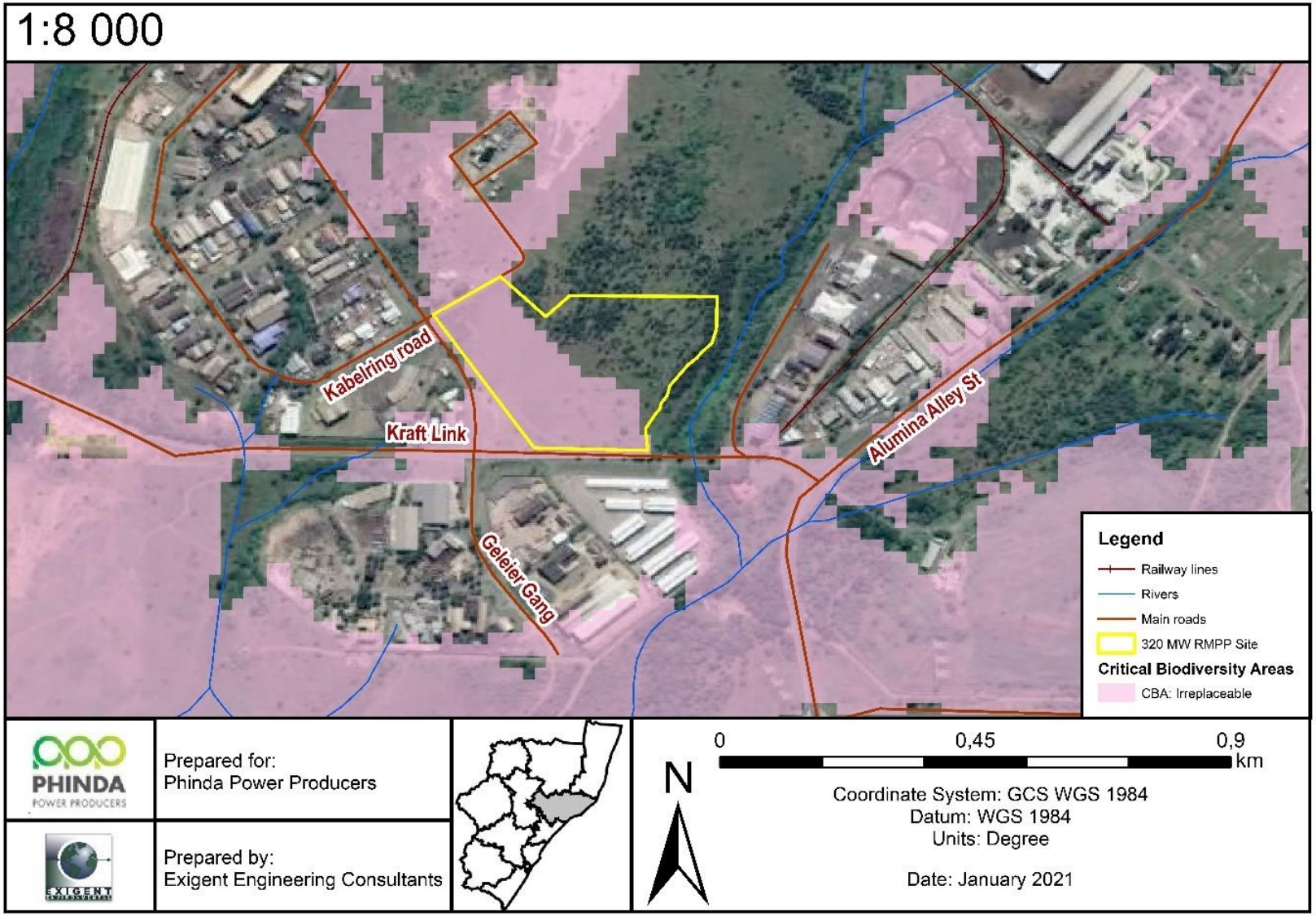

Figure 8.2: Critical Biodiversity Areas present in the study area.

An ecological sensitivity map (refer to **Figure 8.3**) was produced based on the conservation status, species diversity, Red List Species status and extent of transformation/degradation of habitats within the development site as defined during the impact assessment for this project. A summary of the ecological classification of the development site is provided below:

» Areas of medium sensitivity:
Helichrysum - Chrysanthemoides coastal grasslands and Broadleaved Mixed woodland, has a medium sensitivity due the habitat it provides for the protected species *Crinum stuhlmannii*, although none were observed within the development footprint.

» Areas of low sensitivity:
Eucalyptus plantation, artificial drainage channels and bare soil in *Helichrysum – Chrysanthemoides* coastal grasslands are of low sensitivity. The ecology of this vegetation type is limited due to transformation, and no species of importance are observed in these areas.

The tables below provide a motivation for the extent of the sensitivity classes defined on the site

Table 8.1: Motivation of extent of Low Sensitivity areas in the development site.

Vegetation type:	***Eucalyptus* plantation, artificial drainage channels and bare soil in *Helichrysum - Chrysanthemoides* coastal grasslands.**
Vegetation:	*Cynodon dactylon, Aristida diffusa, Triticum aestivum* and *Eucalyptus* species.
Connectivity:	Ecology of this vegetation type limited due to transformation.
Red List Plants:	No Red Data plant species were observed and are unlikely to be present.
Wetlands:	None present
Rivers:	None present

Table 8.2: Motivation of extent of Medium Sensitivity areas in the development site.

Vegetation type:	***Helichrysum - Chrysanthemoides* coastal grasslands and Broadleaved Mixed woodland**
Vegetation:	Dominated by shrubs such as *Helichrysum krausii* and *Chrysanthemoides monolifera subspecies rotundata.*
Connectivity:	The land uses have impacted on the ecology of the study area but diverse species remain present. Some invasion by alien invasive species observed within the vegetation type.
Red List Plants:	Several *Crinum stuhlmannii* individuals, protected in terms of the KZN Nature Conservation Ordinance, were located in this vegetation community, but not within the development footprint.
Wetlands:	None present
Rivers:	None present

An evaluation was also undertaken to the determine the relevance of the development site as a Critical Habitat in terms of the IFC Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources. The Critical Habitat criteria 1-4, considered in **Table 8.3** below, were based on the criteria and thresholds established in the IUCN Key Biodiversity Area (KBA) Standard while critical habitat Criteria 5 has no numerical thresholds available to guide decision-making and is mainly based on best available scientific information and expert opinion (refer to **Table 8.4**).

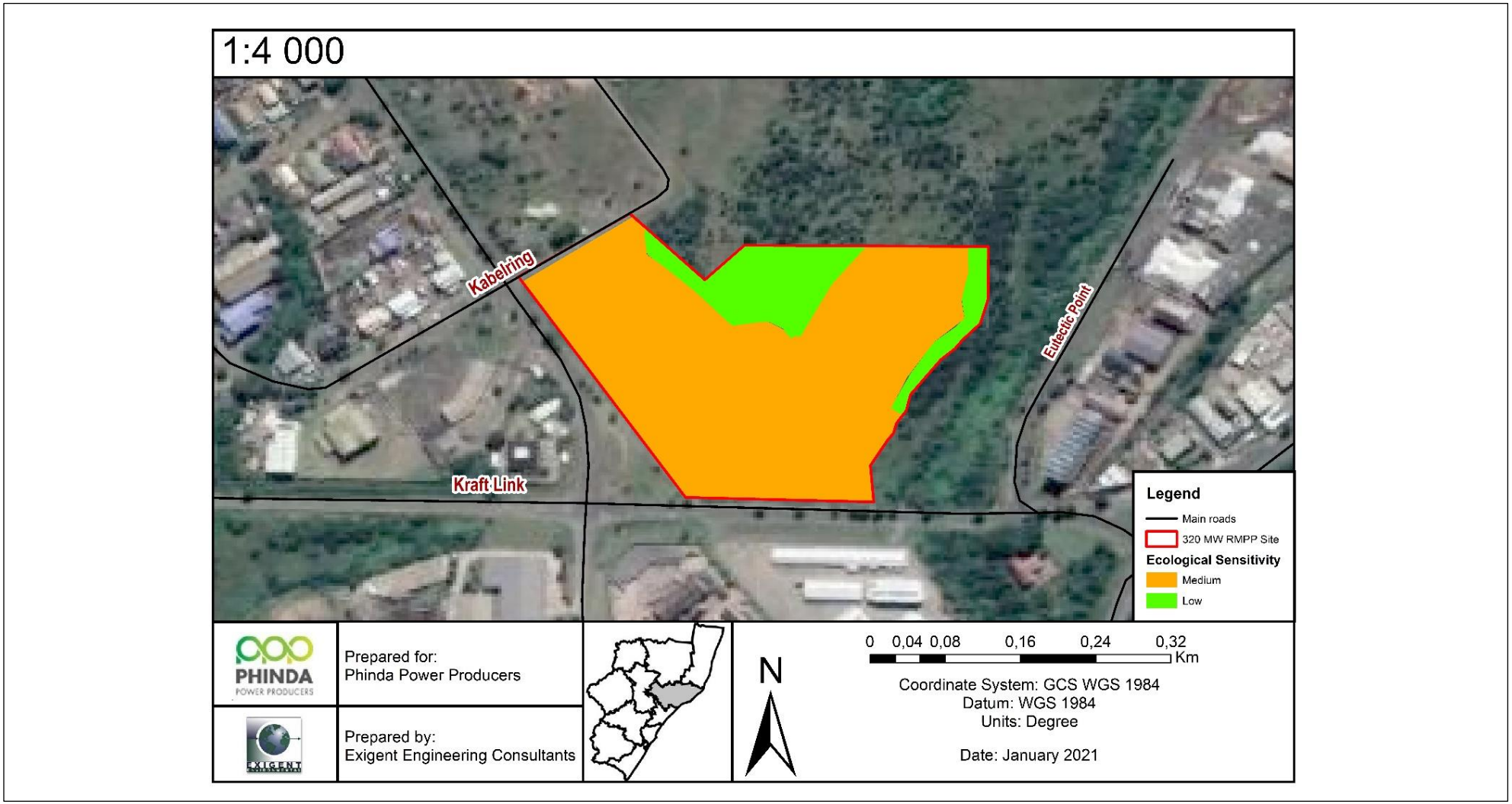

Figure 8.3: Map illustrating the ecological sensitivity within the 320MW RMPP project site within the project boundary.

Table 8.3: The thresholds established for critical habitat Criteria 1-4 as described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2019).

Criteria	Thresholds	Relevance to development site
Criterion 1: Critically Endangered and Endangered Species	GN72. Thresholds for Criterion 1 are the following: *(a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive unitsGN16 of a CR or EN species).* *(b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).* (c) *(c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.*	The development site is located within an industrial area of Richards Bay, where the large majority of the surrounding natural vegetation has been cleared and replaced with hard impermeable surfaces. In order to ensure proper drainage of these hard surfaces, a stormwater drainage channel was constructed to mitigate flooding. The majority of the site is located within the medium sensitive *Helichrysum - Chrysanthemoides* coastal grasslands and in the low sensitive *Eucalyptus* plantations, as classified in the ecological sensitivity assessment. Several invaders such as *Psidium guajava, Cuscuta campestris, Chromolaena odorata* and *Lantana camara* were observed on site. The development site is located outside of the highly sensitive features (Wetlands) and it's 29 m buffer as classified in the ecological sensitive assessment. The surrounding land uses have also impacted on the terrestrial and aquatic systems of the area. During one of the field investigations in September 2019, a veld fire raged through a large portion of the development site, burning a lot of the natural vegetation of the area. No protected fauna or flora species or those listed as critically endangered or endangered species were observed on the proposed development site during the field investigations, which included follow up visits post the veld fire.
Criterion 2: Endemic and Restricted-range Species	GN75. The threshold for Criterion 2 is the following: *a) Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.* *GN74. The term endemic is defined as restricted-range. Restricted range refers to a limited extent of occurrence (EOO).* • *For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometers (km2).*	The species found on site were those typical of the *Helichrysum - Chrysanthemoides* coastal grasslands and Eucalyptus plantations. The site is not large in extent and has been subject to veld fires and impacts from the surrounding industrial activities. The site does not support ≥10% of the global population size AND ≥10 reproductive units of a species and therefore does not support the threshold for Criteria 2.

Criteria	Thresholds	Relevance to development site
	• *For marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km2.* • *For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).*	
Criterion 3: Migratory and Congregatory Species	GN78. Thresholds for Criterion 3 are the following: *(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.* *(b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.* *GN76. Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem).*	The site is located in the industrial area of Alton. During one of the field investigations in September 2019, a veld fire raged through a large portion of the development site, burning a lot of the natural vegetation of the area. The development site is also subject to impacts from the surrounding industrial activities. From the findings of this study, it is not found that the site supports the thresholds as listed for Criteria 3.
Criterion 4: Highly Threatened or Unique Ecosystems	GN80. The thresholds for Criterion 4 are the following: (a) Areas representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN. (b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.	The development site is located within an industrial area of Richards Bay, where the large majority of the surrounding natural vegetation has been cleared and replaced with hard impermeable surfaces. No protected fauna or flora species or those listed as critically endangered or endangered species were observed on the proposed development site during the field investigations. Based on the EKZNW CBA data, a portion of the proposed 320MW RMPPP Power Plant site is located within an area classified as irreplaceable. After consideration of the findings of the specialist studies, it is unclear why a portion of the site may have been classified as a CBA, as there are no biodiversity features on the site to validate the CBA status on site. It could be due to an error in the land cover map as the surrounding transformed industrial areas have also been included in the pixelated blocks (Figure 6 6), or alternatively, it could be that a disturbance to the site has occurred

Criteria	Thresholds	Relevance to development site
		subsequent to the development of the CBA Map.

Table 8.4: The critical habitat Criteria 5 as described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2019) and its relevance to the development site.

Criterion 5: Key Evolutionary Processes	Relevance to development site
As per GN81. described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources, the structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties.	Considering the structural attributes of the site and the findings of this study, it is not foreseen that the development site supports the description listed for Criteria 5.

According to the definition as per paragraph 16 of the Performance Standard, critical habitats are "areas of high biodiversity value that comprise of "at least one or more of the five values specified in paragraph 16 of Performance Standard 6 and/or other recognized high biodiversity values". Therefore, as assessed above, the findings of the site do not align with any of the 5 criteria for critical habitat, and for this reason, it is the specialist's opinion that the site does not fall within any IFC critical habitat as described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2019).

IIn terms of the IFC standard, is however still important that all mitigation measures as described within the Biodiversity Impact Assessment report are complied with in order to ensure that the impact on the receiving environment is limited. It is also recommended that a search and rescue operation is undertaken during a follow-up site visit, prior to construction, to ensure that none of the potential species prevalent in the area, and with the potential to be found on the site, is harmed. Should any protected species be identified on-site during the follow-up site visit prior to construction, permits must be obtained for all required species in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) and the KwaZulu-Natal Nature Conservation Ordinance (15 of 1974).

According to this finer scale local environmental plan database (the uMhlathuze Environmental Services Management Plan (ESMP)), the proposed development site lies within a development zone (Level 4). Areas earmarked as Municipal conservation zones (Level 2) and its associated open space linkage zones (Level 3) lie east of the proposed 320MW RMPP site. Even though portions of these zones were historically channelled to drain the Alton area, they are linked to the swamp forest and other aquatic habitats identified in the Aquatic Biodiversity Impact Assessment report (Exigent, 2020). As shown in Figure 8.4, the proposed development site is located within development zones and outside the Municipal ESMP Conservation (approximately 20 m away) and Open Space Linkage zones (approximately 5 m away).

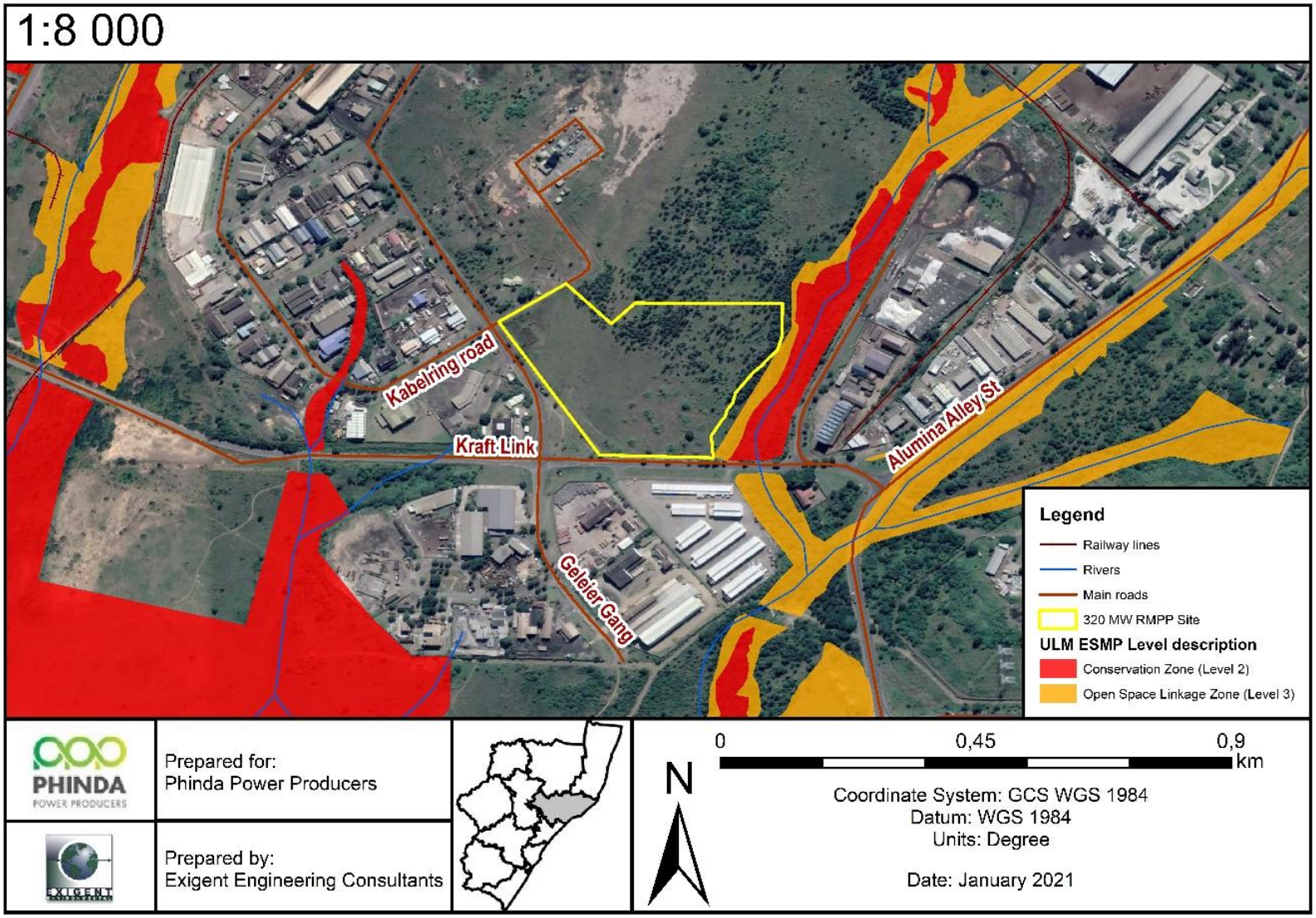

Figure 8.4: Municipal ESMP of the development site (SDF 2016/2017)

8.3.2. Description of Terrestrial Biodiversity Impacts

The project will include clearing of the existing vegetation on the site and levelling the site during the construction phase.. Clearance of the vegetation leading to habitat fragmentation will occur due to the large extent of the open space area, however it should be noted that the proposed development site is surrounded by industrial development and the contribution of the site towards the larger extent of habitat corridors is limited. The wetland and recommended 29m buffer zone will remain functional as a migration corridor.

The following potential key issues arising have been identified and assessed in this terrestrial impact assessment:

Construction Phase:

- Loss of vegetation and terrestrial habitat;
- Potential loss of faunal species;
- Potential loss of species of special concern;
- Habitat fragmentation (loss of corridors);
- Infestation of alien invasive species; and
-

Operational phase:

- Infestation of alien species;

8.3.3. Impact tables summarising the significance of impacts on terrestrial biodiversity during construction and operation (with and without mitigation)

Nature: Loss of vegetation and terrestrial habitat within the development site

Vegetation plays an important part in the functioning of ecosystems, as well as maintaining biological processes in the soil, reducing the loss of topsoil and nutrients, and recycling of nutrients. The removal of natural vegetation results in a loss of habitat for fauna and flora species. The proposed development site is however surrounded by industrial development and is an isolated patch of terrestrial habitat. Strict measures should be enforced to limit the construction impact to the project footprint and not to impede into the wetland buffer (as defined in the aquatic impact assessment in Section 8.3 and **Appendix E**).

	Without mitigation	**With mitigation**
Extent	Local (2)	Local site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	**Medium (65)**	**Medium (50)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	

Mitigation:

- A search and rescue operation will be required prior to the start of construction for *Crinum stuhlmannii* and any other protected species that have a high probability of occurrence. This operation must be undertaken by a

qualified ecologist or botanist based on a rescue relocation plan approved by the relevant competent authority as part of the permit application, where applicable.
» A minimum impact approach must be adopted. Only vegetation in the project footprint, outside the recommended 29m buffer, must be removed, leaving adjacent buffer vegetation intact.
» No indigenous vegetation may be collected or used for firewood.
» Where construction occurs close to any plants of high conservation value off site that have a probability of occurring on-site, they must be suitably and visibly demarcated and cordoned off by the Environmental Officer (EO) prior to, and during the construction phase.
» Where clearing is required outside of permanent infrastructure areas, vegetation should be brush-cut rather than cleared to speed re-establishment following site closure.
» All areas affected during the construction phase must be rehabilitated as soon as possible.

Residual Impacts:
» Impact on fauna migration corridors due to change in land use; and
» Loss of habitat for terrestrial fauna and flora species.

Nature: <u>Loss of faunal species</u>

The removal of natural vegetation results in a loss of habitat for faunal species. Species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types. It is therefore unlikely that the proposed development will have a lasting adverse impact on the faunal species of the area.

Terrestrial habitat is the most abundant and provides habitat to a variety of faunal species. Approximately 48 mammal species, 23 reptile species and 53 frog species have the potential to use the development site and its surrounding areas and approximately 358 bird species have been recorded in the area. The proposed development is however unlikely to impact on any avifauna individuals of the area

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:
» A minimum impact approach must be adopted. Only vegetation in the project footprint, outside the recommended 29m buffer, must be removed, leaving adjacent buffer vegetation intact as faunal habitat.
» Intentional killing of any faunal species (including snakes) should be avoided by means of awareness programs and toolbox talks presented to construction labourers. Any person found deliberately harassing any animal in any way must face disciplinary measures.
» If any faunal species is recovered during the construction phase, this species must be relocated to the nearest natural open space with suitable habitat for the particular species to survive.
» All construction activities must be limited to daylight hours as far as possible.
» All areas affected during the construction phase must be rehabilitated as soon as possible.

Residual Impacts:
» Impact on fauna migration corridors due to change in land use; and
» Loss of habitat for terrestrial fauna and flora species.

Nature: <u>Potential loss of species of special concern</u>

Species of special concern could potentially occur on the proposed plant site, such as *Crinum stuhlmannii* in the *Helichrysum – Chrysanthemoides* coastal grasslands. *Zoothera guttata* (spotted ground thrush) is listed on the DEA Screening tool with a high potential to occur on the proposed development site. No protected species were observed during the site visit.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (15)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, if species of special concern are found on site	

Mitigation:

- A search and rescue operation will be required for all protected species confirmed on the broader *Helichrysum – Chrysanthemoides* coastal grassland as well as those species that have a high probability of occurrence which will be impacted by the proposed development. This operation must be undertaken by a qualified ecologist or botanist prior to the start of construction to confirm the absence of any protected species.
- The necessary permits must be obtained prior to removal of any species of concern if identified.

Residual Impacts:

None

Nature: <u>Habitat fragmentation (loss of corridors)</u>

Although the surrounding land use is industrial, a portion of the proposed site is currently undeveloped and is connected to the adjacent *Pragmites – Typha* artificially channelled valley bottom wetland and does provide habitat for different species. The change of land use of the undeveloped portion of the site will impact on migration corridors of small mammals and reptiles. No development will take place within the wetland or recommended 29m wetland buffer area, the migration corridor of the wetland area has no potential to be lost and migration of aquatic and semi-aquatic fauna and dispersal of flora seeds will remain possible during construction and the operational phases of the project.

	Without mitigation	**With mitigation**
Extent	Local region (3)	Local region(3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Improbable (3)
Significance	**Medium (42)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Installation of environmentally friendly barrier fencing such as Clear Vu between the development site and the buffer zone, to limit uncontrolled access into the wetland area;
- The wetland and associated buffer zone areas must be managed as natural open space, retaining the connectivity with adjacent natural open spaces. The management must facilitate natural processes, provide habitat for pollinators and reduce edge effects.

» A minimum impact approach must be adopted. Only vegetation in the project footprint must be removed, leaving adjacent buffer vegetation intact;
Residual Impacts: Edge effects resulting in loss of habitat for terrestrial species.

Nature: *Infestation of alien invasive species*

The disturbance of the natural vegetation and soil by the proposed construction activities and lack of competition from established species may accelerate exotic species growth. Utmost care should be taken to manage dispersion and colonisation of these species.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Medium (3)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (44)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» Natural open spaces outside the development footprint should be left in their undeveloped state.
» Any existing or new exotic vegetation within the proposed development site must be eradicated.
» A monitoring program should be put in place to remove exotic vegetation and maintain areas free from exotic invasions during the construction and operational phase.
» Within, and in proximity to the Phragmites – Typha channelled valley bottom wetland, successful re-vegetation is crucial to stabilise soils and limit infestation by invasive alien plant species. Rehabilitation should be undertaken on a progressive basis in these areas.

Residual Impacts:
Invasion and replacement of natural vegetation by ruderal weed species, hence a loss of habitat for terrestrial species.

8.3.4. Implications for Project Implementation

Potential impacts on the terrestrial biodiversity are related to the loss of vegetation and terrestrial habitat. This could result in a loss of fauna and flora species, migration corridors and the potential loss of protected species and species of special concern. Disturbance of the natural vegetation by the proposed activities may furthermore accelerate the growth of exotic species. However, the proposed development site has a long history of transformation and therefore the impacts on the terrestrial environment are likely to be limited as the species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types. Protected species such as *Crinum stuhlmannii* and *Zoothera guttata* have potential to occur on the proposed development site.

No protected species were observed during the site visit. A search and rescue operation will however be required during a follow-up site visit, prior to construction, to ensure that none of the potential species prevalent in the area, and with the potential to be found on the site, are harmed. With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts associated with 320MW RMPP can be reduced to medium and low. It is the opinion of the specialists

that should the recommendations be implemented, the proposed project poses no fatal flaws and the project may be approved.

8.4. Potential Impacts on Aquatic Biodiversity

The majority of the impacts on aquatic ecology associated with the development would occur during the construction phase as a result of the disturbance associated with site clearance, excavations, the operation of heavy machinery at the site and the presence of construction personnel. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

8.4.1. Results of Aquatic Biodiversity Impact Assessment

The proposed project site is located adjacent to a channelled valley-bottom wetland. As part of the mitigation hierarchy principles, the location of the development site has been reviewed and has been located outside a defined wetland buffer. An ecological sensitivity map of aquatic biodiversity (refer to **Figure 8.4**) was produced based on the conservation status, species diversity, Red List Species status and extent of transformation/degradation of habitats within the 500m study area boundary from the development site.

The habitats within the study area were assessed based on their conservation status, species diversity, Red List species status and extent of transformation/degradation.

The conservation importance categories are:

» High: This category contains areas classified as natural wetlands (riverine, drainage lines, etc.), indigenous bush clumps and grassland areas. These communities have a limited alien species invasion and must be conserved and not impacted.

Phragmites – Typha channelled valley bottom wetland and *Imperata – Cylindrica* depressions, have a high sensitivity due to the presence of protected species *Barringtonia racemosa* and *Ficus trichopoda* although none were observed with the development site (refer to **Figure 8.5**). These areas also exhibit wetland functions and ecological connectivity to similar surrounding environments. No development must take place within the wetland or recommended 29m buffer area.

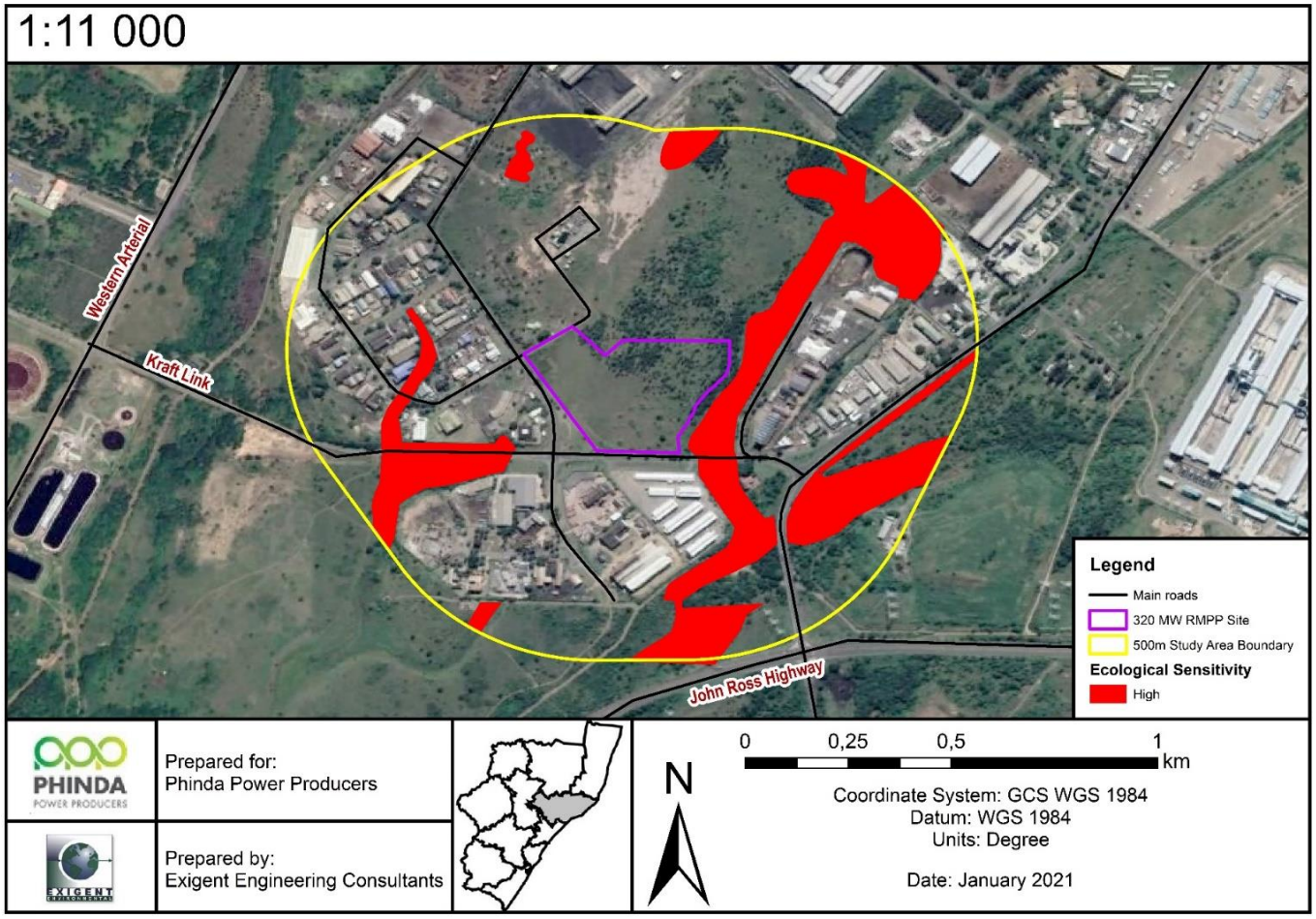

Figure 8.5: Map illustrating the aquatic sensitivity areas surrounding the 320MW study area site in relation to the proposed development boundary.

8.4.2. Description of Aquatic Biodiversity Impacts

Even though the proposed development site is located outside the watercourse and buffer, there remain potential impacts during the construction and operational phases of the project. The following key issues have been identified and assessed during this aquatic impact assessment:

Construction phase:
- Destruction of natural habitat –wetland habitat;
- Potential loss of Species of Special Concern;
- Habitat fragmentation (loss of corridors);
- Infestation of alien species;
- Sedimentation;
- Hydrological impacts; and
- Pollution of surface and groundwater due to chemical, oil and fuel spills.

Operational phase:
- Infestation of alien species;
- Sedimentation;
- Hydrological impacts; and
- Pollution of surface and groundwater due to chemical, oil and fuel spills.

8.4.3. Impact tables summarising the significance of impacts on aquatic biodiversity during construction and operation (with and without mitigation)

Nature: *Impact on natural habitat –wetland habitat (Construction only)*

No wetlands were identified within the boundaries of the proposed 320MW RMPP site, and a 29 m buffer has been set for the wetland along the eastern border of the site to limit potential impacts on the channelled valley-bottom wetland. Potential impacts such as erosion and alien invasive species growth impacting on the wetland has thus been mitigated. The project layout on the proposed development site has taken cognisance of the buffer zone, excluding all activities from this buffer. A risk assessment was also undertaken according to the DWS Risk Assessment Guidelines and the results produced were of 'low' risks for all aspects assessed.

	Without mitigation	**With mitigation**
Extent	Local (1)	Site only (1)
Duration	Permanent (5)	Medium-term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (14)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:
- Installation of environmentally friendly barrier fencing such as Clear Vu between the development site and the buffer zone, to limit uncontrolled access into the wetland area;
- A minimum impact approach must be adopted. Only vegetation in the project footprint, outside the buffer must be removed, leaving buffer vegetation intact;

- » Demarcation of the wetland buffer is required prior to the commencement of construction activities. No construction activities, or movement of construction vehicles must be allowed within the buffer zone.
- » No indigenous vegetation may be collected or used for firewood from the buffer zone;
- » Excavated soils must be placed on the upslope side of the proposed development site, minimizing the risk of erosion and excess sediment entering the buffer;
- » No chemical toilets or hazardous substances/chemical storage areas must be located within the buffer zone or 100 m from the channelled valley bottom wetland;
- » No rubble may be temporarily stockpiled or dumped within the buffer zone.

Residual Impacts:
Minimal residual impact if mitigation measures are implemented.

Nature: *Infestation of alien invasive species (construction and operation)*

The disturbance of the natural vegetation by the proposed construction activities and lack of competition from established species may aid alien invasive species to invade. Utmost care should be taken not to disperse and increase the colonisation of these species, especially from other sites by seeds transported by construction equipment.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (5)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (44)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Natural open spaces outside the development footprint should be left in their undeveloped state.
- » Any existing or new alien invasive vegetation within the proposed development site must be eradicated.
- » A monitoring program should be put in place to remove exotic vegetation and maintain areas free from alien invasions during construction and operational phases.
- » In proximity to the *Phragmites – Typha* channelled valley bottom wetland and buffer, successful re-vegetation is crucial to stabilise soils and limit infestation by invasive alien plant species. Rehabilitation should be undertaken on a progressive basis in these areas.

Residual Impacts:
Invasion and replacement of natural vegetation by ruderal weed species, hence a loss of habitat for aquatic to semi-aquatic species.

Nature: Hydrological Impacts (construction and operation)

Hydrological impacts relate to any alterations in the quantity, timing and distribution of water inputs and through flows within the wetlands. Construction activities associated with bulk earthworks (such as excavations, stockpiling, reshaping, back-filling and compaction) in the catchment area feeding downstream watercourses can alter natural patterns of surface runoff reaching water resources downslope/downstream. Excavations may impound and redirect water, thus starving downstream water resources. Infilling, compaction and rutting of soils caused by construction vehicles working outside the wetlands also alter the patterns of diffuse surface and sub-surface flows by altering micro-topography and the permeability of soil profiles.

Changes in flow patterns reaching aquatic ecosystems does not only affect hydrological functionality and thus ecosystem integrity but may lead to erosion and sedimentation though increased runoff velocities linked to concentrated flow paths created during the construction and operational phase.

Vegetation clearance may result in sheet erosion and will further reduce the capacity of the land surface to retard the flow of surface water, thus, decreasing infiltration, and increasing both the quantity and velocity of surface water runoff and erosion.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (4)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Probable (3)
Significance	**High (75)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» Silt traps must be installed on the development site boundary during construction;
» As the slopes are draining towards the freshwater ecosystems, small-scale diversion berms should be constructed, to reduce the risk of the earthworks becoming a preferred surface flow path leading to erosion;
» "Trench-breakers", which are in-trench barriers, should be installed within any trench excavations to intercept and minimise the accumulation of surface runoff water from upslope areas running down the trenches;
» Erosion control structures must be put in place where soil may be prone to erosion;
» Multiple discharge points that are reasonably spread out across the working areas adjoining the wetland habitat to allow a diffuse spread of surface runoff, maximising the amount of infiltration;
» Engineering structures (such as gabions or reno mattresses) for large discharge points must be used to dissipate and control energy of stormwater runoff before entering the watercourses;
» Bare areas where vegetation has been removed pose a risk of becoming a sediment load into the adjacent watercourses during heavy rainfall, this must be managed by placing it on the upslope side of the development site;
» Temporary stormwater management structures must be used during construction. Any areas damaged as a result of stormwater runoff from the construction site must be rehabilitated immediately; and
» During rehabilitation, prompt and progressive reinstatement of bare areas is required. During reinstatement, the topsoil layer is to be replaced last, to simulate the pre-construction soil conditions.

Residual Impacts:

Minimal residual impact if mitigation measures are implemented.

Nature: **Pollution of surface and groundwater due to chemical, oil and fuel spills (construction and operation)**

During the construction and operational phase of the proposed project, the potential for spills and leakages may occur. Contaminants will include mainly oil/ grease and petrol/ diesel. These pollutants may result from leakages from operating equipment, vehicles, oil changes during the servicing of equipment and vehicles, or from spills as a result of incorrect handling of substances or equipment.

These contaminants have the capacity to negatively affect aquatic ecosystems including sensitive or intolerant species of flora and fauna. Where significant changes in water quality occur, this will ultimately result in a shift in aquatic species composition, favouring more tolerant species, and potentially resulting in the localised exclusion of sensitive species.

	Without mitigation	**With mitigation**

Extent	Local (2)	Local/Site (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (30)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: » Extra care must be taken to prevent any potentially hazardous substances from entering the watercourse during heavy rainfall events by implementing mitigation plans, such as the Stormwater Management Plan; » The use and handling of all chemicals and potentially hazardous substances must take place on an impermeable surface and bunded areas to prevent chemicals and potentially hazardous substances from infiltrating the soil; » All rubble and other types of waste must be appropriately stored and disposed of at a licensed waste disposal site to prevent it from entering the watercourse; » Contingency plans must be compiled for possible spillages of dangerous goods and include details for decontamination and process to be followed; » Spill kits must be available in the event of a hydrocarbon or chemical spill; » No chemical toilets or hazardous substances/chemical storage areas must be located within the buffer zone or 100 m from the channelled valley bottom wetlands.		
Residual Impacts: » Potential spillage from overflowing of bunded areas during high rainfall events » Groundwater pollution through hazardous substance leakages of construction vehicles		

8.4.4. Implications for Project Implementation

Potential impacts on the aquatic biodiversity are expected to be medium to low due to the proposed project development being located outside the *Phragmites - Typha* channelled valley bottom wetland and the 29m buffer which has been set for the wetland. The sensitivities presented were based on the findings of the site investigations and includes final recommendations and mitigation measures.

It is the opinion of the specialists that should the recommendations be implemented; the proposed project poses no fatal flaws and the project may be approved.

8.5. Assessment of Impacts on Surface and Groundwater Resources

The impacts on surface and groundwater resources associated with the development area have been assessed, and potential impacts on surface and groundwater resources and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details).

8.5.1. Results of Surface and Groundwater Impact Assessment

The following can be deduced from the baseline groundwater and surface water sampling undertaken in the area (refer to **Chapter 7**):

» Non-conformances of borehole water quality to SANS 241:2015 drinking water requirements.

» Groundwater contamination is most likely attributed to industrial activities to the north-west and north-east of the site

Sources of surface water contamination are likely attributed to industrial activities to the north of the project site. Of particular concern, are the elevated Microbiological Determinants (Total Coliforms, E.coli and Standard Plate Count) suggesting recent and/or long-term sewerage contamination.

8.5.2 Description of the Impacts to Surface and Groundwater Resources

The following potential impacts have been identified during both the construction and operational phases for the 320MW RMPP.

Construction phase:

» On-site accidental fuel spills and leaks from construction vehicles/plant, equipment and/or fuel storage areas as well as cleaning fluids, cement power, wet concrete, shutter-oil, etc. These spills can either migrate offsite to surrounding surface bodies by means of rainwater surface runoff or infiltration through the subsoils and into the groundwater by means of rainwater seepage (pathways).
» Leachate from construction waste disposal areas (sources) and infiltration through the soil (pathway) of dirty water/wastewater from supplied ablution facilities (sources).

Operational phase

» Leak of diesel and/or chemicals from storage facilities and/or onsite pipelines and from emergency backup generators leaks (sources). Following rainwater infiltration, hydrocarbon products can migrate through highly permeable unconsolidated sediments and infiltrate into the groundwater or migrate off-site to adjacent surface water bodies by rainwater surface runoff (pathways).
» Rainwater surface runoff from potentially oil contaminated areas such as internal roads, parking areas, and LPG unloading facility.

8.5.3 Impact tables summarising the significance of impacts on surface and groundwater during construction and operation (with and without mitigation)

Nature: ***Impact on localised groundwater and surface water quality (Construction Phase)***

During the Construction Phase, chemical pollutants (hydrocarbons from equipment, vehicles and plant, cleaning fluids, cement powder, wet concrete, shutter-oil, etc) associated with site clearing machinery and construction activities, could migrate downwards through the subsoils and into the groundwater by rainfall infiltration. Appropriate ablution facilities should be provided for the construction workers during the construction phase of the 320MW RMPP development.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local /site (1)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- » Implement appropriate measures to ensure strict use and management of all hazardous materials used on site.
- » Implement appropriate measures to ensure strict management of potential pollutants (e.g., hydrocarbons from vehicles and machinery, cement during construction, etc.)
- » Implement appropriate measures to ensure strict control over the behaviour of construction workers.
- » Ensure appropriate ablutions facilities are available.
- » Surface and stormwater runoff must be diverted through an oil/water separator before leaving the site.
- » Emergency spill kits must always be present on site.
- » Good housekeeping practices must be implemented.
- » Immediate reporting of significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.
- » Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.
- » Implement a surface water and groundwater monitoring programme be implemented during the Construction Phase.

Residual:

Residual risks will be negligible after appropriate mitigation

Nature: <u>Impact on localised groundwater and surface water quality (Operational Phase)</u>

During the Operational Phase, chemical pollutants (hydrocarbons from operational equipment, vehicles and plant, cleaning fluids, emergency backup generators, maintenance equipment, etc), and other chemical storage areas or pipelines associated with the operation of the facility could migrate downwards through the subsoils and into the groundwater by rainfall infiltration. Appropriate ablution facilities should be provided for the workers during the Operational Phase of the 320MW RMPPP Power Plant.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local /site (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- » Implement appropriate measures to ensure strict use and management of all hazardous materials stored and used on site.
- » Implement appropriate measures to ensure strict management of potential pollutants (e.g., hydrocarbons from vehicles and machinery, emergency backup generators, maintenance equipment, etc.)
- » Ensure appropriate ablutions facilities are available.
- » Surface and stormwater runoff must be diverted through an oil/water separator before leaving the site.
- » Emergency spill kits must always be present on site.
- » Good housekeeping practices must be implemented.
- » Immediate reporting of significant spillages and initiate an environmental site risk assessment and remediation if necessary.
- » Implement appropriate measures to ensure strict control over the behaviour of workers during the Operational Phase of the Power Plant.

» Working protocols incorporating pollution control measures (including approved Standard Operating Procedures (SOP)) should be clearly set out in the Environmental Management Plan (EMP).
Residual:
Residual risks will be negligible after appropriate mitigation

8.5.4. Implications for Project Implementation

Although the results of the Surface and Groundwater Impact Assessment indicates that the risks of impact are Low, it is still recommended that a surface water and groundwater monitoring programme be implemented, during the Construction Phase, to fulfil the Environmental Authorizations for this site. The monitoring programme will essentially be implemented to document and establish the long-term and historical baseline and/or ambient groundwater and surface water chemistry of the area prior to, and during development of the 320MW RMPP facility.

8.6. Assessment of Impacts on Air Quality

Impacts on air quality associated with the development are expected to occur during the construction and operational phases. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for more details).

8.6.1. Results of the Air Quality Impact Assessment

The proposed project site is located approximately 4 km south west of the Richards Bay Central Business District (CBD). The nearest residential areas to the project site are Richards Bay CBD (3.3 km); Wild-en-Weide (4.7 km); Arboretum (5.1 km east); Nseleni A (11.0 km north); and Felixton (13.7 km south-west). There are several schools, hospitals and clinics located within 5 km of the proposed location (**Figure 8.6; Table 8.5**). Industrial areas (Alton and the Richards Bay Harbour) are located within 5 km of the proposed project.

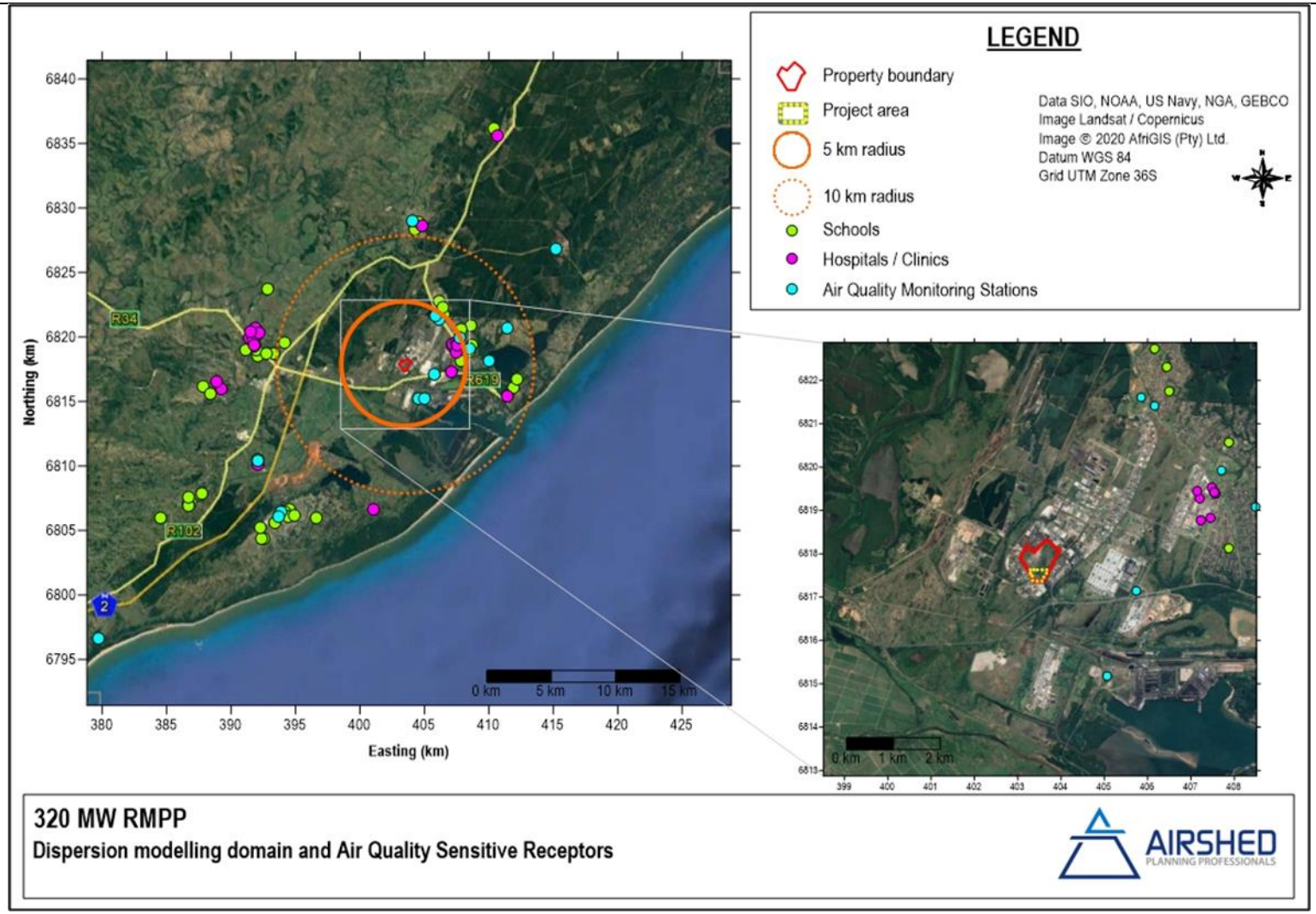

Figure 8.6: Air Quality Sensitive Receptors

Table 8.5: Distance to the air quality monitoring stations and the 20 closest air quality sensitive receptors

Air Quality Monitoring Station Name	**Distance from proposed site (km)**	**Direction from proposed site**
Scorpio (RBCAA)	2.3	ESE
Bayside (RBCAA)	2.8	SSE
Harbour West (RBCAA)	3.1	SSE
Brackenham (RBCAA)	4.4	NE
Brackenham (uMhlathuze)	4.4	NNE
CBD (RBCAA)	4.7	ENE
Arboretum (RBCAA)	5.1	ENE
Arboretum (uMhlathuze)	6.5	E
Airport (RBCAA)	8.4	ENE
eNseleni (RBCAA)	11.1	N
Felixton (RBCAA)	13.7	WSW
RBM (RBCAA)	14.7	NE
Esikhawini (RBCAA)	15.0	SW
eSikhaleni (uMhlathuze)	15.4	SW
Mtunzini (RBCAA)	31.9	SW
St Lucia (RBCAA)	58.6	NE
Receptor name / details	**Distance from proposed site (km)**	**Direction from proposed site**
Richards Bay Municipal Clinic	3.8	SSW
Mens Clinic International - Richards Bay	4.0	WSW
Better2Know Private STD Health Centre Richards Bay	4.0	SW
Umhlathuze Dental	4.1	SW
Richardsbay Medical Institute	4.3	SW
Mandlazini Clinic	4.3	SW
The Bay Hospital	4.3	NNE
John Ross College	4.4	ESE
Richards Bay Secondary School	4.9	ESE
Veldenvlei Primary School	5.1	NNE
Arboretum Primary School	5.1	ESE
Brackenham Primary School	5.3	SE
Richardsbaai Hoerskool	5.4	ESE
Bay Primary School	5.5	ESE
Richards Bay Christian School	5.9	NE
Headache Clinic | Bay Chiropractic | Smile Dent	8.3	WSW
Richards Bay Primary School	8.6	NE
St Francis Pre-Primary School	8.7	E
Old Mill High School	9.5	SE
Empangeni Christian School	10.2	ESE

8.6.2. Description of Potential Air Quality Impacts

The impact of the project on ambient air quality was simulated using the United States Environmental Protection Agency (US EPA) CALPUFF modelling suite. Simulated meteorological data for the Richards Bay area was acquired for the period 2017 to 2019. The wind field showed generally north to north-easterly co-dominance with south and south-westerly component. The assessment of the impact of the project assumed that emissions from the power station would primarily be vented to the atmosphere via the exhaust stacks where the emissions would meet the minimum emission standards (MES) for Subcategory 1.4 – Gas Combustion facilities. Simulated pollutant concentrations were compared against the NAAQS and various environmental screening levels for ecosystem impacts. Simulated nuisance dust-fall rates were compared against the National Dust Control Regulations (NDCR) for non-residential and residential areas

The following key issues have been identified and assessed during the air quality impact assessment:

Construction phase:
» Particulate matter impacts

Operational phase:
» SO_2, NO_2, PM, CO, and VOC impacts

8.6.3. Impact tables summarising the significance of impacts on Air Quality during construction and operation (with and without mitigation)

Nature: *Impacts on air quality during construction and decommissioning*

Construction (and decommissioning) activities are likely to result in emissions of particulate and gaseous pollutants due to civil and building work and from vehicle traffic. The nature of emissions from construction activities is highly variable in terms of temporal and spatial distribution and is also transient. Increased ambient concentrations of fine particulates and gaseous pollutants may result in negative human health impacts. Increased nuisance dustfall is likely as a result of wind-blown dust emissions from the working areas. Increased nuisance dustfall rates will likely result in negative impact on dustfall at nearby residences and potentially on plants.

Unmitigated particulate emissions were conservatively found to exceed assessment criteria for up to 400 m but not at any residential areas, schools, and/or medical facilities. Areas to the south of the project site are more likely to be affected, especially in the short-term, due to the predominant winds. The impact of gaseous pollutants is likely to minor.

	Without mitigation	**With mitigation**
Extent	Local (3)	Site (1)
Duration	Short duration (2)	Short duration (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Highly likely	Likely
Can impacts be mitigated?	Yes, with minimum control efficiency of 50%.	

Mitigation:
» Wet suppression, or other appropriate dust suppressant, at key handling points or cleared areas, and on unpaved roads.

» Haul trucks to be restricted to specified haul roads and using the most direct route. » Reduce unnecessary traffic. » Strict on-site speed control (i.e. 40km/hr for haul trucks). » Reduction of extent of open areas to minimise the time between clearing and infrastructure construction, and/or use of wind breaks and water suppression (other appropriate dust suppressant) to reduce emissions from open areas. » Restriction of disturbance to periods of low wind speeds, as far as practically possible (less than 5 m/s). » Stabilisation of disturbed soil (for example, chemical, rock cladding, or vegetation). » Re-vegetation of cleared areas as soon as practically feasible.
Residual: Expected to be low if mitigation measures are properly implemented.

Nature: *Impacts on air quality during operation (SO_2, NO_2, PM, CO, and VOC impacts)*

The normal operation of the proposed open cycle power station will result in emission of gaseous and particulate pollutants including: SO_2, NO_2, PM, CO, and VOCs. Increased ambient concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall.

Unmitigated emissions of these pollutants were found to comply with the assessment criteria and off-site impacts are unlikely. Residential receptors, schools, and medical facilities are unlikely to be affected. Areas to the north east of the project site are more likely to be affected in the long-term, due to the predominant winds.

	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	
Can impacts be mitigated?	To some extent.	

Mitigation:

» Regular inspection and maintenance of turbines, boilers, and associated equipment in accordance with manufacturer recommendations.
» Optimise start-up times to minimise elevated emissions from turbines and boilers.
» Access roads are to be paved and particulate content minimised through sweeping or watering (or other appropriate suppressants).
» Vehicle idling periods should be minimised when stationary for extended periods of time.
» Strict on-site speed control (i.e. 15km/hr for large vehicles).
» Euro V or better emission limits from LPG delivery vehicle engines.

Residual:
Expected to be low if mitigation measures are properly implemented.

8.6.4. Implications for Project Implementation

The main findings of the simulated incremental assessment were:

1. The construction phase of the project could result in off-site exceedances of the PM_{10} daily and annual NAAQS over the 15 to 18-month construction phase.

   a. It is likely that the construction (and decommissioning) phase(s) may have a short-term *medium* impact on the ambient air quality if emissions are unmitigated, and a *low* impact if mitigation measures are effectively implemented.
2. The modelling demonstrates compliance with hourly, daily and annual NAAQS concentration limits under normal operations for for SO_2, NO_2, particulate matter, (PM_{10} and $PM_{2.5}$), and carbon monoxide (CO).
   a. The operational phase of the project will have a *low* impact (based on design mitigation measures) on ambient SO_2, NO_2, PM, CO, and VOC concentrations, with no additional mitigation required.
3. Annual SO_2 and NO_2 concentrations are unlikely to affect vegetation productivity and reproductive success off-site.
4. The impact of the facility was simulated to be below the NDCR acceptable dustfall rates for all project phases.
   a. The operational phase of the project will have a *low* impact (based on design mitigation measures) on nuisance dustfall.

In summary, it is likely that the Construction (and decommissioning) Phase(s) may have a medium impact on the ambient air quality if emissions are unmitigated, and a low impact if mitigation measures are effectively implemented. The operational phase of the project will have a low impact (based on design mitigation measures) on ambient SO_2, PM, CO, and VOC concentrations, with no additional mitigation required.

From an air quality perspective, it is the opinion of the specialist that the Phinda 320 MW RMPP be authorised and licensed to operate, on condition that:

» Emissions be monitored as per standard practice for the appropriate listed activity, controlled emitters, and non-classified boilers;
» Emissions are maintained at or lower than the Minimum Emission Standards appropriate for the listed activity and controlled emitters;
» Conformance with the environmental management programme requirements.

8.7. Assessment of Impacts on Climate Change

Impacts on climate change associated with the development are expected to occur mainly as a result of the operational phase. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I** for more details).

8.7.1. Results of the Climate Change Impact Assessment

A Greenhouse Gas (GHG) inventory was calculated for the proposed 320MW RMPP to quantify the effects of the Project on climate change. The GHG inventory includes the emissions associated with the construction, planned operations and value chain of the proposed 320MW RMPP. The GHG inventory calculations for this CCIA are based on the worst-case operating scenario of the 320MW RMPP, which is that the five gas turbines will be operating on 100% output for a maximum of 16.5 hours a day, 7 days a week without being offset by the renewable energy generation capacity. However, in practice the 320MW RMPP is anticipated to operate fewer hours than the worst-case scenario, as it will be coupled with equally sized renewable energy generation capacity.

The proposed 320MW RMPP is anticipated to release approximately 1.37 million tCO_2e into the global atmosphere per annum from its operations, of which 1.22 million tCO2e are emitted within South Africa. The emissions outside the boundaries of South Africa are attributed to the production and transport of LPG from source to site (in this case equivalent to the Scope 3 emissions). Over the life of the proposed 320MW RMPP, this will result in approximately 27.4 million tCO_2e emissions being released into the global atmosphere (24.4 million tCO_2e in South Africa).

Climate change models indicate that the proposed location of the 320MW RMPP could experience various climate-related changes. These include (i) increased atmospheric temperatures (ii) increased possibility of heavy rainfall events, leading to flooding, and (iii) increased storm severity. However, the vulnerability assessment indicates that, with adequate protection measures in place, the Alton Industrial Area is an ideal location for such a power generation project. It further supplements the potential contribution of the 320MW RMPP in enabling a transition to a sustainable, low-carbon energy mix in South Africa.

This project has the potential to result in notable annual avoided emissions in the context of gas technologies enabling increased grid flexibility and the associated uptake of intermittent renewable energy. Over the life of the plant and in the broader context of the South African National Grid, these avoided emissions could result in an overall decrease in the GHG emissions for South Africa. The inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid in the order of 2.58 $MtCO_2e$ per annum if the corresponding amount of renewable electricity generation capacity is installed. This is because the power supplied by the project could replace 3.8 $MtCO_2e$ worth of grid electricity per year, but still emitting 1.2 $MtCO_2e$ per year. Over the lifetime of the project, this amounts to a net potential reduction in emissions of 51.6 $MtCO_2e$.

8.7.2. Description of Climate Change Impacts

Potential impacts identified to be associated with the project include:

- The proposed 320MW RMPP will result in GHG emissions from the combustion of fuel for electricity generation during operation, as well as GHG emissions related to construction activities.
- The impacts of climate change are likely to result in increased climate-related vulnerabilities for the proposed 320MW RMPP's core operations, value chain, and social and natural environments.

8.7.3. Impact tables summarising the significance of impacts on Climate Change during construction and operation (with and without mitigation)

Nature: The 320MW RMPP emits GHG emissions into the atmosphere that contribute to anthropogenic climate change.

The worst case Scope 1 emissions associated with the 320MW RMPP amount to approximately 24.4 million tCO_2e over the lifetime of the project (20 years). These are also equivalent to the emissions occurring within South Africa's borders. Thus, approximately 89% of all emissions associated with the 320MW RMPP occur within South Africa, namely 24.4 million tCO_2e over the lifetime of the Project.

The worst case total Scope 3 emissions amount to 2.97 million tCO_2e over the 20-year lifespan of the Project. The Scope 3 emissions originate from the upstream handling of LPG (extraction, processing and transport related activities) and occur internationally. These emissions are included in this assessment as they are approximately 11% of the lifetime

emissions and considered to be significant, in accordance with the ISO 14064-1[10].

The magnitude of the impact of the 320MW RMPP's GHG emissions is determined in Section **Error! Reference source not found.** of the Climate Change Impact Assessment (**Appendix I**). Based on this assessment, the magnitude of the impact of the Project in relation to South Africa's carbon budget is considered to be *very high* over the life of the Project, as the Project's emissions exhaust 0.62% of the carbon budget[11] (where a value greater than 0.227% is considered *very high*).

	Without Mitigation	**With Mitigation**
Extent	International (5)	International (5)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very high (10)	Very high (10)
Probability	Definite (5)	Definite (5)
Significance	**High (100)**	**High (100)**
Status of impact	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes

Mitigation: The 320MW RMPP developers could specify methods for GHG emissions reduction throughout its operations, such as the use of energy-efficient technologies in office spaces, GHG monitoring, and fuel efficiency but these mitigation actions pale in comparison to the emissions produced by the 320MW RMPP's operations.

There are few LPG suppliers available that can meet the fuel demands of the 320MW RMPP. The project developer can aim to source the LPG from the least GHG emission intensive supplier of these suppliers to reduce upstream Scope 3 emissions associated with the extraction and processing of LPG. The transportation distance of the LPG can also be taken into consideration in this choice of supplier.

Residual risks: The residual risk of the 320MW RMPP remains high due to the potential impact of climate change, despite mitigation efforts.

8.7.4. Implications for Project Implementation

It is the opinion of the authors of this report that, in the context of climate change impacts, this 320MW RMPP should receive authorisation based on the outcomes of this CCIA, based on the following key aspects:

- In accordance with South Africa's Integrated Resources Plan (IRP), provision has already been made for the addition of gas-to-power technologies onto the national grid, to meet the demand for a stable supply of electricity, which aligns with South Africa's commitment to the Paris Agreement.
- The use of LPG as a fuel source for electricity generation significantly improves the ability of South Africa's National Grid to incorporate more intermittent renewable energy sources, such as wind and solar. Currently, South Africa's national grid can realistically only draw a small portion of its power from these renewable energy sources, as it is mainly driven by coal-fired power stations. When LPG or natural gas

[10] Standards South Africa, 2006, SANS 14064-1:2006 Greenhouse Gases Part 1: Specification with guidance at the organisational level for the quantification and reporting of greenhouse gas emissions and removals, Pretoria.

[11] Based on the *IPCC 5th Assessment Report's* carbon budget to maintain global warming to 1.5°C.

underpins the national grid as the main fossil fuel, then the majority of the national grid's power can be drawn from renewable energy sources.
» The use of LPG in open cycle gas turbines is considered cleaner than that of coal-fired power generation. Since the South African grid is currently dominated by coal-based power, the introduction of LPG-based power will produce cleaner energy with less associated GHG emissions than that currently generated by coal.
» As a result of the potential avoided emissions associated with the 320MW RMPP, due to the future uptake of renewable energy, the 320MW RMPP has a low overall impact on climate change.

The benefits associated with the presence of the 320MW RMPP cannot be viewed in isolation. We propose that the following conditions be met prior, or as conditions to the approval of the EIA for the 320MW RMPP, regarding the development and climate-related safeguarding of the plant.

» The proposed 320MW RMPP should install monitoring systems throughout their operations to track and adapt to climate change impacts. This includes water consumption meters, total fuel consumption to track GHG emissions, and waste tonnage, annually.
» All infrastructure and process designs must consider the potential impacts of extreme weather events, such as severe storms, on the integrity of the design. This could be achieved through site specific climate trends analysis to determine the scope and scale of changing climate parameters. This information can be developed as part of a site-specific climate change risk register which is assessed and updated at agreed intervals. Considering the nature of climate change an appropriate timeframe for updating such a reporting system is three years.
» Safety protocols that take into account the impacts of climate change must be implemented prior to construction of the 320MW RMPP. This includes the introduction of disaster management policies, as well as onsite employee training, specifically for risk management of extreme weather events.

8.8. Assessment of Visual Impacts

Visual impacts associated with the development are expected to occur during the construction and operational phases. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix K** for more details).

8.8.1. Results of the Visual Impact Assessment

The viewshed analyses were undertaken from the project components, and include the following heights above ground level:

» 20m – gas turbine exhaust stacks
» 10m – LPG storage tanks and substation
» 5m – battery energy storage system
» 6m – buildings and support structures

Potentially sensitive visual receptors within a 1km radius of the power plant may experience a very high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; high within a 1– 3km radius (where/if sensitive receptors are present) and moderate within a 3 – 6km radius (where/if sensitive receptors are present). Receptors beyond 6km are expected to have a low

potential visual impact. The zones of visual influence of the proposed 320MW RMPP (as detailed in the specialist visual impact assessment report) are displayed **in Figure 8.7**.

8.8.2. Description of Visual Impacts

Potential visual impacts are expected during both the construction and operation phases of the project. The following potential impacts have been assessed:

- Construction impacts
- Potential visual impact on sensitive visual receptors located within a 1km radius of the operational power plant
- Potential visual impact on observers travelling along roads located within a 1km radius of the power plant
- Lighting impacts
- Impacts associated with ancillary infrastructure
- The potential visual impact of the proposed power plant on the sense of place of the region

Due to the general absence of sensitive visual receptors within closer proximity to the power plant, with the exception of observers travelling along the R34 arterial road, there are no areas of significant potential visual impact. The R34 road is therefore the only receptor identified as having a potential visual impact of higher significance. Even then it is unlikely that observers would be exposed to the infrastructure due to the depressed nature of the road and the vegetation cover north of the road.

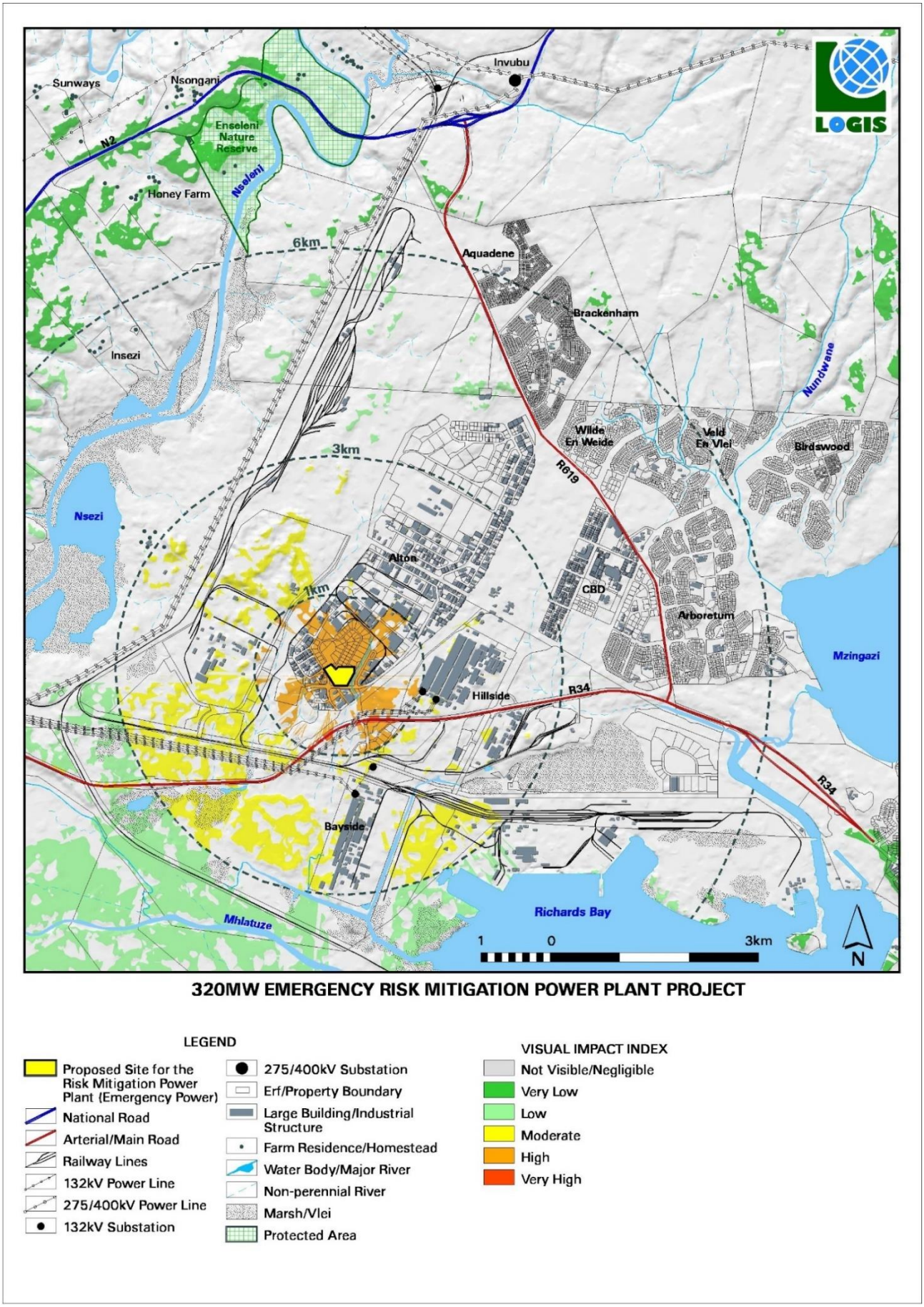

Figure 8.7: Visual impact index

8.8.3. Impact table summarising the significance of visual impacts during construction and operation (with and without mitigation)

Nature: *Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed power plant and ancillary infrastructure*

During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and employees in the area. The project is expected to take between 15 and 18 months to complete.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (48)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain and maintain natural vegetation immediately adjacent to the development footprint.

Construction:

- Ensure that vegetation is not unnecessarily removed during the construction phase.
- Retain and maintain natural features (e.g. rivers, wetlands, rock outcrops, etc.) and vegetation in all areas outside of the activity footprint and along the property perimeter.
- Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
- Rehabilitate all disturbed areas immediately after the completion of construction works.

Residual:

None, provided rehabilitation works are carried out as specified.

Nature: *Potential visual impact on sensitive visual receptors located within a 1km radius of the operational power plant*

The power plant infrastructure and operational activities is expected to have a moderate visual impact on observers within a 1km radius of the operational power plant, both before and after mitigation. This is due to the area between 0-1km being considered areas where the facility would dominate the frame of vision and constitute a very high visual prominence.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	High (8)

Probability	Probable (3)	Probable (3)
Significance	**Medium (48)**	**Medium(42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.
- Consult adjacent landowners (if present) to inform them of the development and to identify any (valid) visual impact concerns.

Operations:

- Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint.
- Retain natural pockets (wetland, river and other sensitive vegetation zones) as buffers within the property and along the perimeter.
- Introducing landscaping measures such as vegetating berms.
- Avoid the use of highly reflective material through painting or galvanising of exposed metals.
- Visually obtrusive structures should be painted in natural soft colours that would blend in with the environment.
- Maintain the general appearance of the site as a whole.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use.
- Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.

Residual:

Potential permanent scarring of the landscape if no rehabilitation is undertaken.

Nature: *Potential visual impact on observers travelling along roads located within a 1km radius of the power plant*

The operation of the 320MW RMPP is expected to have a moderate visual impact on observers travelling along the R34 arterial road (John Ross Parkway) within a 1km radius of the power plant structures. This potential visual impact may be mitigated to low.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (48)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain and maintain natural vegetation immediately adjacent to the development footprint.

Construction:

- Ensure that vegetation is not unnecessarily removed during the construction phase.
- Retain and maintain natural features (e.g. rivers, wetlands, rock outcrops, etc.) and vegetation in all areas outside of the activity footprint and along the property perimeter.

- » Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- » Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- » Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
- » Rehabilitate all disturbed areas immediately after the completion of construction works.

Residual:
None, provided rehabilitation works are carried out as specified.

Nature: *Visual impact on sensitive visual receptors within the region (1 – 6km radius)*

The operational power plant could have a low visual impact on observers located between a 1 – 6km radius of the power plant, both before and after the implementation of mitigation measures.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (26)**	**Low (26)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, however best practice measures are recommended.	

Mitigation:

Planning:

- » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.

Operations:

- » Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint.
- » Retain natural pockets (wetland, river and other sensitive vegetation zones) as buffers within the property and along the perimeter.
- » Introducing landscaping measures such as vegetating berms.
- » Avoid the use of highly reflective material through painting or galvanising of exposed metals.
- » Visually obtrusive structures should be painted in natural soft colours that would blend in with the environment.
- » Maintain the general appearance of the site as a whole.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use.
- » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.

Residual:
Minimal residual impact if mitigation measures are implemented.

Nature: *Lighting impacts*

Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed power plant.

Lighting impacts relate to the effects of glare and sky glow. The source of glare light is unshielded luminaries which emit light in all directions and which are visible over long distances.

Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the amount of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (42)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning & operation:

- Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).
- Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights.
- Make use of minimum lumen or wattage in fixtures.
- Make use of down-lighters, or shielded fixtures.
- Make use of Low Pressure Sodium lighting or other types of low impact lighting.
- Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
- Lighting should be kept to a minimum wherever possible.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties.
- Wherever possible, lights should be directed downwards to avoid illuminating the sky.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement.

Residual:

The visual impact of lighting will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

Nature: Visual *impacts associated with ancillary infrastructure*

On-site ancillary infrastructure associated with the power plant includes internal access roads, a workshop, office buildings, etc. No dedicated viewshed analyses have been generated for the ancillary infrastructure, as the range of visual exposure will fall within that of the power plant operations. The anticipated visual impact resulting from this infrastructure is likely to be of low significance both before and after mitigation.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)

Significance	**Low (20)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:

Planning:

» Retain/re-establish and maintain natural vegetation immediately adjacent to the power plant.

Operations:

» Maintain the general appearance of the infrastructure.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.

» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual:

The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed. Failing this, the visual impact will remain.

Nature: *Potential visual impact of the proposed power plant on the sense of place of the region*

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a mixed rural and developed character, with limited natural land remaining due to forestry, sugar cane cultivation and industrial developments. The areas considered to have a higher visual quality within the region are predominantly associated with the Indian Ocean seaboard. These are not expected to be influenced by the power plant development.

The anticipated visual impact of the proposed power plant on the overall regional visual quality, and by implication, on the sense of place, is generally expected to be of low significance. This is due to the transformed nature and industrial developments already present at and surrounding the proposed development site.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (22)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:

Planning:

» Retain/re-establish and maintain natural vegetation immediately adjacent to the power plant.

Operations:

» Maintain the general appearance of the facility as a whole.

Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual: Potential permanent scarring of the landscape if no rehabilitation is undertaken.

8.8.4. Implications for Project Implementation

The development and operation of the proposed 320MW RMPP and its associated infrastructure is not expected to have a significant visual impact within the larger study area. The location of the proposed power plant within an established industrial area is in line with the principle of consolidating industrial infrastructure within allocated areas. It is also not expected to significantly increase the potential cumulative visual impacts of industrial developments within the region, given the existing industrial nature of the Port of Richards Bay, the future RBIDZ developments, and the planned port expansion endeavours.

Overall, the significance of the visual impacts (should any occur) is expected to range from medium to low as there are no known potential sensitive visual receptors within close proximity of the proposed development. There are no residences located within a 3km radius of the proposed development and no tourist attractions or tourist routes that could be visually impacted.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the proposed power plant.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the development of the 320MW RMPP would be considered to be acceptable from a visual impact perspective and can therefore be authorised subject to the implementation of the recommended mitigation measures and management programme.

8.9. Noise Impacts

Impacts on ambient noise levels associated with the development could potentially occur during the construction and operational phases. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix J** for more details).

8.9.1. Results of Noise Impact Assessment

An assessment of the site was done using available aerial images (GoogleEarth®) to identify potential dwellings that could be considered to be noise-sensitive developments (NSD). The site was visited in July 2020 to confirm the status of these NSD, with the identified NSD indicated on **Figure 8.8**. Also indicated on this figure are generalized 500, 1000 and 2 000m buffer zones.

8.9.2. Description of Noise Impacts

The study area has an industrial character, with various active industrial activities and night-time sound levels typical of urban area (with main roads, business and workshops). The existing night-time sound levels at the siteare higher than the recommended sound levels for residential use (i.e. 55 dBA). As a result, the criteria considered to determine whether a noise impact would result from the development was that the proposed project should not change the existing ambient sound levels with more than 3 dB.

Potential noise impacts are expected during both the construction and operation phases of the project. Potential scenarios were conceptualized for the future proposed construction and operational phases. The following potential impacts have been assessed:

i) Noise during the construction phase

It is estimated that construction will take approximately 15 - 18 months, with mobile equipment and activities generating the maximum noises only 50% of the time. Construction activities will take place at various locations, at different times, with equipment operating under different loads (generating different noise levels).

ii) Noise during the operation phase

The developer is proposing to use five separate, gas turbine generator systems, with the details to be finalized once commercial agreements are reached. For the purpose of the noise model the following noise sources were considered:

» An area noise source, emitting 65 dBA/m2 (re 1 pW), at the decant gantry (LPG depot area) – this to account for potential unaccounted noise sources in this area;
» An area source, emitting 55 dBA/m2 (re 1 pW), over balance of the LPG depot area, to account for trucks driving in this area;

Figure 8.8: Identified noise-sensitive developments and noise buffers associated with the proposed development

Other, minor noise sources include various pumps, potential external cooling fans, the BESS, LPG vaporisation, water demineralisation, ducting and structures vibrating, piping, transformers, traffic; all cumulatively contributing to the total noise levels surrounding the proposed project. Noises from these sources are generally insignificant when compared to the noise from the Gas Turbine System(s).

iii) Traffic

The potential significant source of noise during both the construction and operational phases are additional traffic to and from the site, as well as traffic on the site. Being an industrial area close to busy main roads with significant traffic, these potential noise sources were not investigated.

iv) Decommissioning

While there are numerous activities that can take place during the decommissioning stage, the potential noise impact will only be discussed in general. This is because the noise impacts associated with the decommissioning phase is normally less than both the construction and operational phases for the following reasons:

» Final decommissioning normally takes place only during the day, a time period when existing ambient sound levels are higher, generally masking most external noises for surrounding receptors; and
» There is a lower urgency of completing this phase and less equipment remains onsite (and are used simultaneously) to affect the final decommissioning.

8.9.3. Impact tables summarising the significance of noise impacts during the construction and operation phases (with and without mitigation)

Nature: *Numerous simultaneous construction activities during the day*		
	Without mitigation	**With mitigation**
Extent	Minor at closest receptors (2)	Minor at closest receptors (2)
Duration	Short term (2)	Short term (2)
Magnitude	Local (2)	Local (2)
Probability	Improbable (1 – Closest NSD)	Improbable (1 – Closest NSD)
Significance	**Low (6 - other NSD)**	**Low (6 - other NSD)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No loss of resources.	No loss of resources.
Can impacts be mitigated?	Mitigation is not required.	
Residual: Construction related noises will stop after the construction phase, though the noise impact due to the project will only disappear after decommissioning and closure of the power station is completed.		

Nature: *Potential simultaneous construction activities at night*		
	Without mitigation	**With mitigation**
Extent	Minor at closest receptors (2)	Minor at closest receptors (2)
Duration	Short term (2)	Short term (2)
Magnitude	Local (2)	Local (2)
Probability	Improbable (1 – Closest NSD)	Improbable (1 – Closest NSD)
Significance	**Low (6 - other NSD)**	**Low (6 - other NSD)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No loss of resources.	No loss of resources.
Can impacts be mitigated?	Mitigation is not required.	
Residual: Construction related noises will stop after the construction phase, though the noise impact due to the project will only disappear after decommissioning and closure of the power station is completed.		

Nature: *Various power generation and associated activities during the day*		
	Without mitigation	**With mitigation**
Extent	Minor at closest receptors (2)	Minor at closest receptors (2)
Duration	Long term (4)	Long term (4)
Magnitude	Local (2)	Local (2)
Probability	Improbable (1 – Closest NSD)	Improbable (1 – Closest NSD)
Significance	**Low (8 - other NSD)**	**Low (8 - other NSD)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No loss of resources.	No loss of resources.
Can impacts be mitigated?	Mitigation is not required.	
Residual:		

This impact will only disappear after decommissioning and closure of the power station is completed.

Nature: *Potential power generation and associated activities at night*		
	Without mitigation	**With mitigation**
Extent	Minor at closest receptors (2)	Minor at closest receptors (2)
Duration	Long term (4)	Long term (4)
Magnitude	Local (2)	Local (2)
Probability	Improbable (1 – Closest NSD)	Improbable (1 – Closest NSD)
Significance	**Low (8 - other NSD)**	**Low (8 - other NSD)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No loss of resources.	No loss of resources.
Can impacts be mitigated?	Mitigation is not required.	
Residual: This impact will only disappear after decommissioning and closure of the power station is completed.		

8.9.4. Implications of Project Implementation

Potential scenarios were conceptualized for the future proposed construction and operational phases, with the output of the modelling exercise indicating a potential noise impact of low significance for the construction and operational phases. No mitigation or management measures are required or recommended to reduce noise levels.

Similarly, no additional acoustic studies are recommended for this development, and it will not be required to develop or implement an environmental noise monitoring programme considering:

» the developmental character of the area;
» the results from the night-time ambient sound level measurements;
» the projected low significance of the noise impacts

It is therefore recommended that the proposed 320MW Gas to Power Project be authorized from an acoustic perspective.

8.10. Assessment of Impacts on Heritage Resources

Impacts on heritage resources associated with the development could potentially occur during the construction phase of the project. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details).

8.10.1 Results of the Heritage Impact Assessment (including archaeology and palaeontology)

No heritage resources of significance were recorded within the study site. The desktop study indicated that several human settlements occurred in the general study area; however, none occurred within the 320MW RMPP project area. The study area consists of old agricultural fields.

8.10.2 Description of the Heritage Impacts

Due to the low sensitivity of resources likely to occur in the area, no impacts of high significance are expected. It is however possible that artefacts could be unearthed during construction activities. Impacts on artefacts during construction could result in the destruction of these resources. Isolated stone tools will occur in the study area, however these are of low significance and do not require any mitigation.

It is highly unlikely that human remains will occur in the 320MW RMPP project development area. In the event that human remains are exposed during construction, then all work must stop and the area must be cordoned off.

The general area is of low palaeontological sensitivity. However Cretaceous deposits could occur at 4m+ below the surface. It is unlikely that excavations will extend to these depths.

8.10.3 Impact tables summarising the significance of impacts on heritage related to the PV facility and associated infrastructure during construction and operation (with and without mitigation)

Nature: Impact on Heritage sites Human settlements occur in the general area and have been noted on historical maps. While no settlements are known to occur in the study area, there is a possibility that they might occur. Human burials during this time period were not buried in coffins. The high water tables in the area, before canalization, would have resulted in the rapid decay of human remains. The impact assessment is based on a 'no finds' situation		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (1)	Medium-term (1)
Magnitude	Moderate (0)	Low (0)
Probability	Highly Probable (1)	Probable (1)
Significance	Low (2)	Low (2)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes (to an extent).	
Mitigation: » If human remains are located then all work in that area must cease and KZNARI (0333946543) and the SAPS need to be informed. The area needs to be cordoned off. » If any archaeological or palaeontological remains are located at the site then they can be initially assessed via photographs and emails. Isolated artefacts occur throughout the general area and would not require a field assessment if found.		
Residual Impacts: None		

8.10.4 Implications for Project Implementation

It is highly unlikely that the project will impact on heritage resources. The following recommendations are of relevance to ensure impacts remain of low significance:

» If human remains are located, then all work in that area must cease and KZNARI and the SAPS need to be informed. The area needs to be cordoned off and designated as a no-go area. Public Participation will need to occur with the Mthiyane TA as they would claim these ancestral remains.

» If any archaeological or palaeontological remains are located at the site then they can be initially assessed via photographs and emails. Isolated artefacts occur throughout the general area and would not require a field assessment if found.

8.11 Assessment of Socio-economic Impacts

Impacts on the socio-economic environment associated with the development are expected to occur during both the construction and operation phases of the project. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix M** for more details).

8.11.1 Results of the Socio-economic Impact Assessment

The review of key national, provincial and local policy documents indicates that the development of a gas to power project is supported at all levels. As part of South Africa's long-term energy security planning, as outlined in the Integrated Resource Plan 2019 ("IRP2019"), 2000MW to 3000MW of new generation capacity is required. The Minister of Mineral Resources and Energy has issued a section 34 determination for the procurement of 2000MW of dispatchable electricity generation capacity by means of independent power producers, to which the National Energy Regulator of South Africa ("NERSA") has concurred. With these approvals having been received, the Independent Power Producer Office ("IPP Office") has initiated a procurement programme for 2000MW of dispatchable electricity generation capacity to be commissioned and connected to the electricity grid by no later than December 2022, under a programme entitled the Risk Mitigation Independent Power Producer Procurement Programme ("RMIPPPP").

The City of uMhlathuze Municipality is a key local municipality in the King Cetshawyo District Municipality in terms of GDP contribution. The municipality, as a port city, demonstrates the co-existence of industrial and agricultural activity. Richards Bay is particularly a working town where employment is concentrated. The compounded annual growth rate (CAGR) in the City of uMhlathuze Municipality is similar to that of the district and province. The electricity, gas and water economic sector currently contribute the least to the GDP of the municipality. The unemployment rate is close to a third of the labour force.

The above suggests that the economy can utilise the investment to diversify its economic base and lead to the improvement of standards of living among local households through the increased income levels and access to improved services, which can be achieved by raising the local municipality's revenue base through taxes and rates paid by new businesses. The proposed project is therefore likely to create a positive impact on the local economic development and the socio-economic environment in the municipality in general. Overall, numerous positive socio-economic impacts will occur as a result of the 320MW RMPP and these positive impacts far outweigh any potential negative impacts that might occur.

8.11.2 Description of Socio-economic Impacts

As detailed in Chapter 7, From a social perspective, there are 8 zones considered to be affected by the proposed development and should be assessed i.e. Zone 1: Industry; Zone 2: Harbour; Zone 3: Business; Zone 4: Tourism; Zone 5: Agriculture; Zone 6: Natural; Zone 7: Forestry and Zone 8: Residential. Impacts are expected to manifest differently within each of these zones.

<u>Impacts during the Construction Phase</u>

Impacts during the construction phase are expected as a result of:

» Construction trucks and machinery moving in and out of the site.
» Installing of LPG Storage, Gas Turbines and associated infrastructure

For this 320MW RMPP the construction impacts will be most notable in Zone 1 where the site is located (refer to Table 12 of the socio-economic impact assessment contained in **Appendix M**). The biggest negative impacts will be on traffic with large trucks and machinery moving to and from the site during the 15 to 18-month construction period and LPG trucks moving fuel between the import terminal and the LPG storage facility at the power plant site. Associated with the traffic will be dust on site as site clearing and construction continues as well as noise from machinery and trucks on site during this period.

Positive impacts will include the increase in business output/production in zones 1, 2, 3 and 4. There will be an in migration to Richards Bay which will create a demand for housing and lodging within the area of impact. This will also result in an increase in GDP during the construction period. Short term property values could increase in the residential zone (zone 8) as a result of the influx of workers.

Impacts during the Operation Phase

Impacts during the operation phase are expected as a result of:

» Delivery and storage of initially LPG:
  - LPG procurement
  - Delivery of LPG to the existing LPG import storage terminal at the port of Richards Bay
  - The loading of trucks at the port LPG import terminal, the transport by road, of the LPG to the storage terminal at the power plant site
  - Offloading of LPG from the LPG trucks to the LPG storage terminal at the power plant site
  - Storage of LPG in both the import terminal and the terminal at the power plant site in order to be available for combustion within the power plant
» Power generation:
  - Operation of the simple cycle gas turbine power plant
  - Initially utilising vaporised LPG (which vaporisation will be undertaken on site) and later as and when it becomes available, natural gas
» On site handling and temporary storage of waste materials
» Off-site transport and disposal of waste materials
» On site management of stormwater
» On-going maintenance of the infrastructure

In terms of the operational phase the negative impacts will be limited to traffic, when trucks offload LPG to the bulk storage tanks as well as the transport and disposal of waste material from site (refer to Table 13 of the socio-economic impact assessment contained in **Appendix M**). Other impacts include health and safety with regards to the storage of the LPG as well as the operational aspects of the power plant and gas turbines . There will also be a safety perception impact from the surrounding businesses with regards to the safety of their health and properties should something go wrong with the operational aspects of the power plant.

The positive impacts during the operational phase are the increase in business output/production in zones 1, 2, 3 and 4. This will in turn result in an increase in the local GDP and employment opportunities. The

320MW RMPP will ensure electricity generation as well as improved energy security for the local and regional economies.

8.11.3 Impact tables summarising the significance of socio-economic impacts during construction and operation (with and without mitigation measures)

Impacts during construction

i) Economic Impacts

The economic impact arising from the initial investment will be felt throughout the economy with windfall effects benefitting related sectors in the economy. The effect is allocated according to direct, indirect and induced impacts, together forming the "multiplier effect". These various impacts or spill-over effects spread throughout the economy, contributing to heightened production levels. The initial investment will give rise to a production effect where manufacturers and suppliers of goods and services would experience the need to expand current production levels by ramping up employee numbers and operations. Down-the-line effects will produce a consumption-induced effect on the wider economy - as total salaries paid-out rises, consumer expenditure will lift, thereby raising the sales of goods and services in the surrounding economy.

Table 8.7 illustrates the economic impact during the construction phase of the project. It illustrates the impact during the construction phase and the contribution it will have on the economy in terms of production, GDP, employment and income. The construction of the 320MW RMPP is estimated at 15 to 18 months to be completed with a budget of R 8 000 000 000 (eight billion rand) including interest during construction.

Table 8.7: Economic Impacts during Construction, (Rand, 2020 Prices)

Impact of the Capex	Direct	Indirect	Induced	Total Production
Impact: Production Rand	8 000 000 000	13 970 455 684	10 601 776 563	**32 572 232 247**
Impact: GDP Rand	2 286 539 925	3 993 000 587	3 030 173 173	**9 309 713 685**
Impact: Income Rand	1 090 742 313	1 904 770 894	1 445 475 786	**4 440 988 993**
Impact: Employment	600	1 048	795	**2443**

Source: Urban-Econ Input/Output Economic Modelling, 2020

Nature: *Expenditure associated with the construction of the proposed development will impact on the production of the local economy.*

The construction phase of the proposed power plant will involve activities such as engineering and design, site and infrastructure development, construction of buildings and facilities, installation of machinery and equipment, civil engineering works, and other business activities related to the construction of the 320MW RMPP.

The estimated capital expenditure of the project is R8.0 billion, this will provide a significant injection into the local and regional economies. The total economic impact on production in the economy will be R32.5 billion, this includes an indirect impact of R13.9 billion and an induced impact of R10.6 billion.

	Without enhancement	With enhancement
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	High (8)

Probability	Highly probable (4)	Highly probable (4)
Significance	High (60)	High (60)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» The project developer should use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
» Sub-contracting of local construction companies to occur as far as possible for the construction of facilities, given that gas turbines will be imported.

Residual Impact:
Short term Economic injection into the local and regional economy.

Nature: *Temporary increase in country's GDP due to capital expenditure during the construction period*

A country's gross domestic product (GDP) is the total value of all "final" goods and services, which are produced within the borders of the country in one year. The primary method of expanding GDP levels is through investment into infrastructure and enterprises that generate goods and services. Investment into the creation of new and improved goods and services, creates heightened levels of value added within the economy.

The estimated direct impact of the project on GDP is R2.2 billion with a total impact on GDP of R9.3 billion, this includes an indirect impact of R3.9 billion and an induced impact of R3.0 billion.

	Without enhancement	With enhancement
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	Medium (52)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» The project developer is to use locally sourced inputs where feasible in order to maximize the benefit to the economy.

Residual Impact:
Short term Economic injection into the local and regional economy.

Nature: *The construction of the Risk Mitigation Power Plant will positively impact on the community and beyond by creating a number of job opportunities (albeit temporary).*

The unemployment rate in the City of uMhlathuze is 30% and the number of employed individuals has been increasing in the past six years (Urban Econ Calculations based on Quantec, 2020). The establishment of the proposed plant is expected to create 2 443 jobs over the construction period with the building and construction sector expected to incur the highest increase in labour. The direct employment opportunities during construction will be 600, while the indirect employment opportunities are 1 048 and the induced employment opportunities will be 795 jobs.

	Without enhancement	With enhancement

Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (65)	High (65)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.
» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impact:
No residual impacts are applicable.

Nature: *Employees will develop and enhance skills thereby increasing experience and knowledge.*

Skills are imperative for satisfying job requirements and adequately performing tasks that ultimately boost the economy. The construction of the 320MW RMPP requires a variation of skill sets ranging from semi-skilled construction workers to highly skilled engineers. It is envisaged that 600 direct jobs will be created.

Employees who are new to the market will develop and attain new skills, whilst workers adept in particular skills will sharpen their abilities. In addition, the employees will improve their marketability for future employment and will be perceived positively by future employers.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (70)**	**High (70)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Enhancement:

» In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.
» Facilitate the transfer of knowledge between experienced employees and the staff.
» Perform a skills audit to determine the potential skills that could be sourced in the area.

Residual Impact:
Skills developed during the project can be utilised in future.

Nature: *Employed individuals will increase the income of their respective households and thereby experience an improvement in their standard of living.*

Over a third of the population of the City of uMhlathuze Municipality are classified as low-income earners. The employment creation during the construction period will temporarily increase affected households' income to the value of R4.4 billion in 2020 prices.

Employed individuals will increase the income of their respective households and therefore improve their standard of living for a period of eighteen months. In the context of the proposed power plant, workers employed in the construction as well as their households can expect an improvement in their quality of life and standard of living.

	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» Local employment will benefit local households and the local area.

Residual Impacts:

No residual impacts are applicable.

ii) Social Impacts

Nature: *An impact on the demographics of the area as a result of in-migration in response to job opportunities will occur.*

The job opportunities will most likely trigger in migration and, therefore, it can be suggested that a slight positive shift in the demographics will ensue as a result of the proposed project. Resultantly, migrant workers and job seekers will increase the current population size and possibly increase the male population if an expected male-dominated influx occurs. Furthermore, Richards Bay is largely a working town with numerous migrant workers; thus, the proposed project will exacerbate this status.

Several advantages exist as a result of these demographic changes in the City of uMhlathuze Municipality. These include economic benefits such as increased prosperity and standards of living through the delivery of a better-skilled labour force and a more youthful population. These changes can also stimulate the economy due to increased purchasing power from migrant labour. Demographically, however, increasing male-dominated populations also bring about social ills such as increased prevalence of alcoholism and prostitution.

	Without mitigation	With mitigation
Extent	Regional (3)	Regional (3)
Duration	Short duration (2)	Short duration (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.
» Train unemployed local community members with insufficient skills and increase absorption of local labour thereby decreasing in-migration.
» Adopt policies that address gender in labour recruitment.

Residual Impacts:
Workers remaining after the construction period without work will put strain on public resources.

Nature: *The in-migration of job seekers to the area could be perceived to result in increased criminal activity.*

The perception exists that an influx of jobseekers, and / or construction workers to an area is a contributor to increased criminal activities in an area, such as increased safety and security risk for neighbouring properties and damage to property, increased risk of veld fire, stock theft, and crime etc.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Short duration (2)	Short duration (2)
Magnitude	Low (4)	Minor (2)
Probability	Low Likelihood (2)	Low Likelihood (2)
Significance	Low (16)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:
- Develop a detailed consultation and communication plan with neighbouring property owners to keep them informed with regards to construction progress, issues and potential dangers.
- Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.

Residual Impacts:
A minimal amount of migrant labour will be employed by the proposed project, and remain in the area.

Nature: *An increase in traffic due to construction vehicles and heavy vehicles could create short-term disruptions and safety hazards for current road users.*

Increased traffic due to construction vehicles and heavy vehicles could cause disruptions to road users and increase safety hazards. The use of local roads and transport systems may cause road deterioration and congestion. The movement of workers to and from the site will also cause additional pressure on the current traffic patterns.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short duration (2)	Short duration (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (30)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:
- Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction.
- Provide public transportation service for workers in order to reduce congestion on roads
- Partner with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities
- Transportation contractors must adhere to the road rules and regulations

» Utilise only designated access routes & entrance/exits from the site » Implement appropriate signage & road safety measures at entrance/exit to the site and on site
Residual Impacts: No residual impacts are applicable.

Nature: *Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site.* There will be impacts associated with construction related activities including noise, dust and disruption or damage to adjacent properties. Site clearing activities increase the risk of dust and noise being generated, which can in turn negatively impact on adjacent properties.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short duration (2)	Short duration (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (30)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction. » Install screens around the construction site to reduce the visual impact of construction on surrounding properties » Site watering (or use of appropriate dust suppressant) from time to time to reduce dust emitting from the construction site		
Residual Impacts: No residual impacts are applicable.		

Impacts during operation

i) Economic Impacts

The economic impacts during the operational phase of the 320MW RMPP is illustrated in **Table 8.8.**

Table 8.8: Economic Impacts during the Operational Phase, (Rand, 2020 Prices)

Impact Of The Capex	Direct	Indirect	Induced	Total Production
Impact: Production Rand	250 000 000	201 514 340	223 732 852	**675 247 192**
Impact: GDP Rand	151 826 022	122 380 482	135 873 875	**410 080 379**
Impact: Income Rand	41 912 738	33 784 071	37 509 025	**113 205 834**
Impact: Employment	45	36	40	**122**

Source: Urban-Econ Input/Output Economic Modelling, 2020

Nature: *Expenditure associated with the operation of the proposed development will have a positive impact on production.* Once operational, it is estimated that the proposed 320MW RMPP will stimulate production to the value of around R250 million per annum. It should be noted that this excludes the total revenue to be generated by the plant

considering the electricity tariff and includes only the impact that will be stimulated as a result of the plant's operational expenditure and specifically excluding the cost of LPG. The total annual impact on the production in the country will amount to R675 million per annum.

The power plant will have to acquire inputs from a variety of sectors such as fuel (LPG), trade and accommodation, transport and storage, and government services. Considering that the 320MW RMPP will be located in the City of uMhlathuze Municipality and assuming that the entire production value will be accounted as part of the output of the municipality, the size of the City of uMhlathuze Municipality's economy is expected to increase significantly.

	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	High (60)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» The project developer should make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
» Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:
No residual impacts are applicable.

Nature: *Positive impact on GDP due to operating expenditure during operations.*

The primary method of expanding GDP levels is through investment into infrastructure and enterprises that generate goods and services. Industries that will experience the largest growth in value added, as a result of this, will include the transport, storage and manufacturing sectors. The operating expenditure of the 320MW RMPP will translate into R410 million (2020 prices) of Gross Domestic Product (GDP) through direct and spin-off effects.

	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	Medium (52)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» The project developer is to make an effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
» Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:
No residual impacts are applicable.

Nature: *The operation of the 320MW RMPP will positively impact on the community and beyond by creating a number of job opportunities.*

The proposed power plant will create around 45 direct employment opportunities. A portion of this labour will be sourced from the City of uMhlathuze Municipality while the rest can be expected to be sourced from KwaZulu-Natal and the rest of South Africa. The project will also create 36 indirect employment opportunities and 40 employment opportunities through induced impacts. In total, 122 jobs will be created during the operational phase of the 320MW RMPP.

The estimated direct job creation during operations is estimated at around 45 (excluding contractors), and are made up of 5 highly skilled, 30 skilled positions and 10 semi-skilled or unskilled positions (mainly contractors).

	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	Medium (55)	Medium (55)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Enhancement:

» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impacts:
No residual impacts are applicable.

Nature: *Employees will develop and enhance skills thereby increasing experience and knowledge.*

The specialty of the 320MW RMPP requires and creates scarce skills that will be imperative in the long run if other gas to power projects are developed as envisaged in policy. Directly, 45 jobs are planned to be created for the operations of the 320MW RMPP.

The employment opportunities are for a long-term period of a minimum of 20 years and are thus sustainable and will have a positive impact on skills for benefitting employees. Furthermore, as production and consumption effects filter through the economy creating a demand for more labour, human resources will be trained and skilled within aligned industries.

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (70)**	**High (70)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Enhancement:

» In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.

» Facilitate the transfer of knowledge between experienced employees and the local staff. » Perform a skills audit to determine the potential skills that could be sourced in the area. » Where possible train and empower local communities for employment in the operations of the power plant.
Residual Impacts: Skills obtained during employment could be used in future.

Nature: *Employed individuals will increase the income of their respective households and therefore improve their standard of living.*

For a period of a minimum of 20 years, 45 people will be employed at the power plant. As a result, the benefitting individuals and their respective households will incur an improvement in their standard of living due to the income earned. The income earned also results in increased purchasing power in the local community, given that a proportion of the employed will be based in the municipality. Therefore, the local businesses will experience increased business activity and the local economy will experience a boost.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (52)**	**Medium (52)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Enhancement: » Employing locally will increase benefit to local households and the local area.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Government revenue will be derived from the proposed development.*

The proposed development will provide a sustainable and increased revenue to the local government in the form of property rates and taxes. It will further supplement the revenue derived from national government. Moreover, national government will derive tax-related revenue such as Value-Added Tax (VAT), payroll and income taxes. This is as a result of the employment that will be created and the resultant income that will be earned, thus increasing spending power. As stated previously, the housing backlog and service delivery require attention. Therefore, the increased revenue from the proposed project may assist the municipality whereby constituencies may utilise it for public services. Overall, the allocation of government revenue should improve socio-economic conditions of the population.

	Without enhancement	**With enhancement**
Extent	Municipal (3)	Municipal (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No

Mitigation:
No mitigation measures are required.
Residual Impacts:
No residual impacts are applicable.

Nature: *Improved energy security and energy sector will result due to the development of the 320MW RMPP.*

The 320MW RMPP has the ability and operational flexibility to be turned on or off or be ramped up or down to suit the system demand on an intra-hourly on any day of the week, will additionally increase efficiency. The proposed development, utilising LPG, will create additional demand for natural gas to help accelerate government and Transnet's medium-term planning of importing LNG into Richards Bay, by providing a base load natural gas offtake in Richards Bay that will assist in financially supporting the establishment of gas infrastructure. The introduction of natural gas into Richards Bay will enhance South Africa's gas energy security by establishing a second source of natural gas supply into South Africa in mitigation of Sasol's declining gas reserves in Mozambique, thereby helping to alleviate the gas supply challenges facing the industry.

	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (60)**	**High (60)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Impacts: No residual impacts are applicable.		

ii) Social Impacts

Nature: *Contribution to local economic development and social upliftment.*

Benefits to the local area from Socio-Economic Development (SED) / Enterprise Development (ED) programmes and corporate social investment (CSI) initiatives through their social responsibility programmes will need to happen. The creation of employment opportunities, skills development, and the proposed projects contributions to local economic development will assist to an extent in both alleviating unemployment levels within the area and improving the quality of life.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (52)**	**High (60)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Enhancement:		

» Ensure local businesses and communities benefit from economic and social investments. » Select projects which addresses a need in the local economy and/or communities
Residual Impacts: No residual impacts are applicable.

Nature: *Visual and sense of place impacts.* From a social perspective, the presence of the 320MW RMPP facility could impact the "sense of place" for the local community. Due to the location of the project the sense of place will not be significantly impacted by the project as it is located within an industrial area.		
	Without enhancement	**With enhancement**
Extent	Local (2)	Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Low Likelihood (2)	Low Likelihood (2)
Significance	**Low (20)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Impacts: No residual risks are applicable.		

8.11.4. Implications for Project Implementation

The proposed project is likely to create a positive impact on the local economic development and the socio-economic environment in the municipality in general. Overall, numerous positive socio-economic impacts will occur as a result of the 320MW RMPP and these positive impacts far outweigh any potential negative impacts that might occur.

8.12 Assessment of Impacts on Traffic

Impacts on traffic associated with the development are expected to occur during both the construction and operation phases of the project. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix L** for more details).

8.12.1 Results of Traffic Impact Assessment

Existing Traffic Flows

Existing traffic flows could not be assessed due to the implications of the nationwide lockdown (due to the COVID-19 pandemic) on travel patterns, and traffic counts would not show an accurate reflection of the normal traffic conditions as the lockdown affected both the traffic volumes and traffic composition. In addition, developments that generate less than 50 peak hour trips do not require traffic capacity analyses to be conducted.

It is however possible to generate historic traffic patterns from Google traffic data. On a typical Monday morning (7:30) a medium amount of traffic (indicated in orange) is shown at the signalised intersection of R34/Alumina Alley Street and Kraft Link /Alumina Alley Street. Slight delays are also experienced on the west approach of Kraft link at the intersection of Kraft Link/Geleier Gang. (**Figure 8.9**).

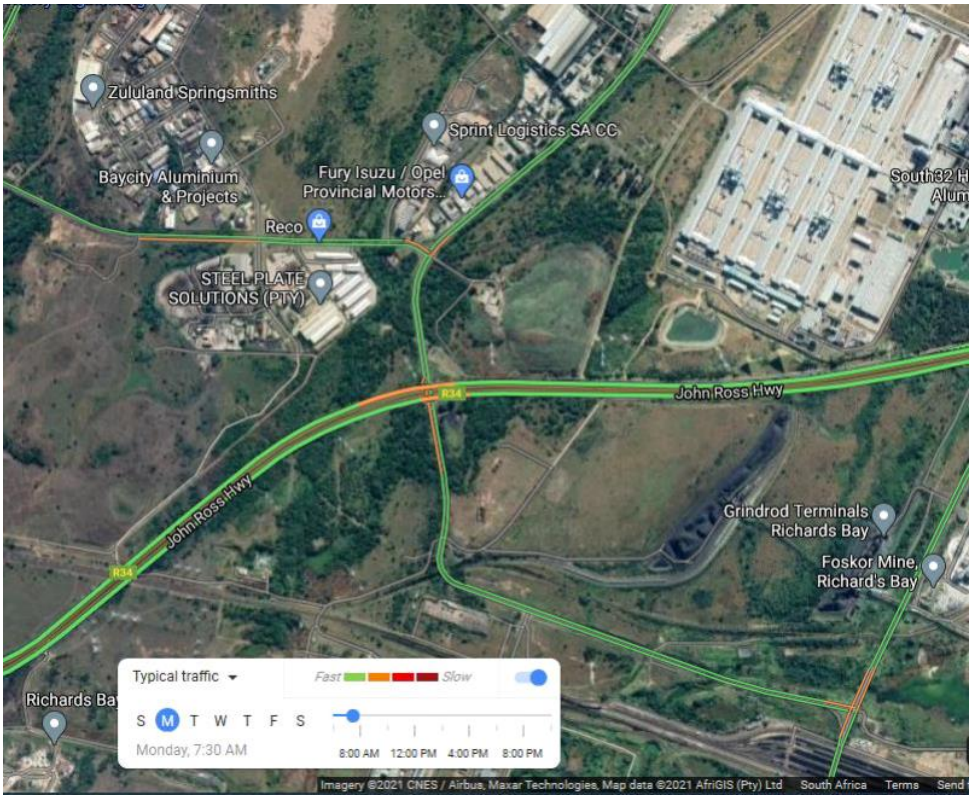

Figure 8.9: Typical Monday AM Traffic

Similarly to the AM traffic, a medium amount of traffic (indicated in orange) is shown at the signalised intersections of R34/Alumina Alley Street and Kraft Link/Alumina Alley Street on a typical Monday afternoon (16:55). Slight delays are also experienced on the west approach of Kraft link at the intersection of Kraft Link/Geleier Gang (**Figure 8.10**).

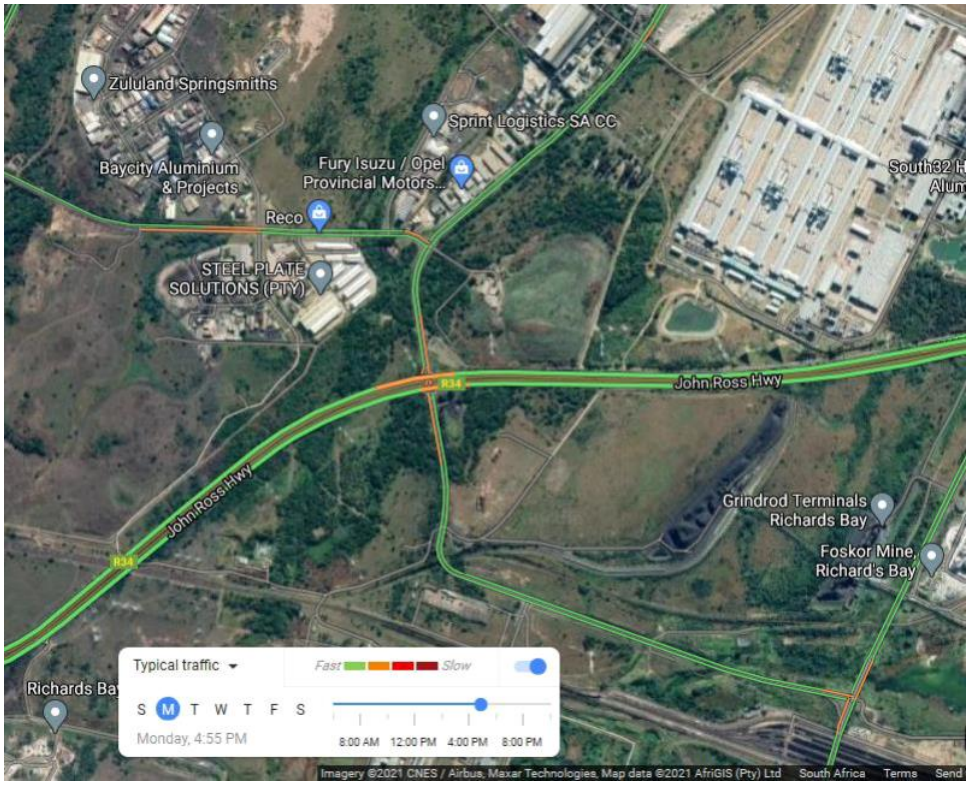

Figure 8.10: Typical Monday PM Traffic

Proposed access

The proposed access point is deemed feasible as it follows an existing road and allows direct access to the proposed site. The proposed emergency access is deemed acceptable as it will not be used as an access point to the proposed site.

8.12.2 Description of Traffic Impacts Assessment

Potential traffic impacts are expected during both the construction and operation phases of the project. The following potential impacts have been assessed:

Construction phase (and decommissioning phase):

» Construction related traffic
» The construction traffic would also lead to noise and dust pollution.
» This phase also includes the construction of roads, excavations, trenching and ancillary construction works that will temporarily generate the most traffic

Operational phase:

» During operation, it is expected that staff and security will visit the facility.
» LPG deliveries will increase traffic on the surrounding road network and will also lead to noise pollution

8.12.3 Impact tables summarising the significance of impacts on traffic during the construction and operation phases (with and without mitigation)

Construction Phase

Nature: *Potential traffic congestion and delays on the surrounding road network and associated noise pollution*

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic. Trips generated by construction site staff have been assumed to be less than 50 trips in the AM peak hour. This is based on a maximum of 600 workers on site per day.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Short (2)	Short(3)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (2)	Probable (2)
Significance	**Medium (45)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Stagger component delivery to site as far possible.
» Reduce the construction period.
» The use of mobile batch plants and quarries in close proximity to the site.
» Staff and general trips should occur outside of peak traffic periods.
» Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods
» Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.

Residual Impacts:

The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network, but the impact on the local traffic will remain moderate. Traffic will return to normal levels after construction is completed.

Nature: *Construction traffic on roads will generate dust. Local air quality will be affected by dust pollution*

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic. Trips generated by construction site staff have been assumed to be less than 50 trips in the AM peak
hour. This is based on a maximum of 600 workers on site per day.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Short (2)	Short(3)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (2)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Dust Suppression of gravel roads during the construction phase, as required.
» Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.

Residual Impacts:

Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period

Nature: *Construction traffic on roads will generate noise i.e. noise pollution due to increased traffic*

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic. Trips generated by construction site staff have been assumed to be less than 50 trips in the AM peak
hour. This is based on a maximum of 600 workers on site per day.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Short (2)	Short(3)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (2)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Stagger component delivery to site as far possible.
» Reduce the construction period.
» The use of mobile batch plants and quarries in close proximity to the site.
» Staff and general trips should occur outside of peak traffic periods.

Residual Impacts:
Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period

Operational Phase

Nature: *Traffic congestion due to an increase in traffic caused by the LPG deliveries, staff trips and trips for maintenance requirements*

Traffic during the operation phase will include occasional maintenance requirements, staff trips (assumed at 45 permanent staff) and LPG deliveries. The operational trips generated will be low and will have a negligible impact on the external road network as trips will not exceed 50 vehicles per hour

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (3)	Small (0)
Probability	Probable (3)	Very improbable (1)
Significance	**Low (27)**	**Low (4)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» LPG deliveries, staff trips and trips for maintenance requirements could be staggered or scheduled to occur outside of peak traffic periods.

» Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods » A larger LPG delivery vehicle could be considered to reduce the number of daily trips
Residual Impacts: The proposed mitigation measures for the operations traffic will result in a reduction of the impact on the surrounding road network, but the impact on the local traffic will remain moderate. The mitigation measures will significantly reduce the trips and associated impact on the surrounding road network

Nature: *Traffic on roads will generate noise i.e. noise pollution due to increased traffic*

Traffic during the operation phase will include occasional maintenance requirements, staff trips (assumed at 45 permanent staff) and LPG deliveries. The operational trips generated will be low and will have a negligible impact on the external road network as trips will not exceed 50 vehicles per hour

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (6)	Small (0)
Probability	Probable (3)	Very improbable (2)
Significance	**Low (24)**	**Low (5)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» LPG deliveries, staff trips and trips for maintenance requirements could be staggered o scheduled to occur outside of peak traffic periods.
» A larger LPG delivery vehicle could be considered to reduce the number of daily trips

Residual Impacts:
Noise pollution cannot be completely mitigated but mitigation measures will significantly reduce the impact.

8.12.4 Implications for Project Implementation

The construction phase traffic, although significant, will be temporary and impacts are considered to have a medium significance without mitigation measures and low with mitigation measures.

During operation, it is expected that staff trips and trips for maintenance requirements to the facility will occur. Approximately 45 full-time employees will be stationed on site, adding approximately 9 trips during the peak hour. LPG deliveries will add approximately 43 truck trips per day (at a maximum) to the surrounding road network (less than 3 truck deliveries per hour over a 16.5-hour operational period). An average of 35 truck deliveries can however be expected per day (approximately 2 per hour). The traffic generated during this phase will be minimal and will not have a significant impact on the surrounding road network

8.13. Quantitative Risk Assessment (Impacts associated with Unexpected Events)

Potential risk impacts and the relative significance of the impacts associated with the development of the 320MW RMPP are summarised below (refer to **Appendix N**).

8.13.1. Results of the Risk Assessment (Impact of unplanned events)

The main aim of the investigation was to quantify the risks to employees, neighbours and the public with regard to the proposed 320 MW RMPP facility at Richards Bay. This risk assessment was conducted in accordance with the MHI regulations and can be used as notification for the facility.

The main activity of the power plant would be the generation of mid-merit power supply to the South African electricity grid. The fuel used to generate power would be LPG, that will be delivered to site by truck. The main hazards that would occur with a loss of containment of hazardous components at the proposed 320MW RMPP facility in Richards Bay include exposure to:

» Thermal radiation from fires;
» Overpressure from explosions.

The following installations were considered for analysis in the Qualitative Risk Assessment (QRA):

» LPG installation, including road tanker offloading bay, LPG storage bullets, LPG vaporisers and pipeline to the respective gensets.
» Battery Energy Storage System (BESS)
» Diesel Storage and Offloading

The combined site risks (i.e. the summation of all risks posed by the site onto works or the public) were calculated. These are represented as Maximum Individual Risks or Societal Risks. The investigation concluded that under the current design conditions, the proposed 320 MW RMPP facility in Richards Bay would be considered as a Major Hazard Installation and would require notification in accordance with the MHI regulations. An MHI Risk Assessment should be completed prior to construction of the terminal once final designs are available.

8.13.2 Description of Risk Impacts

The following negative risk impacts, which could occur through unplanned event, have been identified and assessed for the 320MW RMPP:

» Catastrophic rupture of LPG storage vessel leading to a fireball event, flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects.
» Catastrophic rupture of diesel storage vessel leading to a pool fire with impacts not extending beyond the site boundary.
» Catastrophic rupture of BESS leading to a pool fire with impacts not extending beyond the site boundary.

8.13.3. Impact tables summarising the significance of risk impacts (with and without mitigation measures)

Nature: *Impact associated with LPG Installations* Worst case loss of containment scenario – catastrophic rupture of LPG storage vessel leading to a fireball event, flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (1)
Duration	Very short (1)	Very short (1)

Magnitude	High (8)	High (6)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (11)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible (worst case: death)	Irreversible (worst case: death)
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	Yes
Mitigation: Mitigation would include emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders. Preventive measures would include maintenance procedures to prevent the occurrence of a catastrophic loss of containment from corrosion, fire and gas detection and firewater systems to prevent escalation as well as strict control of ignition sources and other measures, which may be required according to standards such as those prescribed by the South African National Standards system.		
Residual Risks: Even with mitigation, there may be residual risk of occurrence due to failures in protection systems and break-down in procedures and documented systems.		

Nature: *Impact associated with Diesel Installations*

Worst case loss of containment scenario – catastrophic rupture of diesel storage vessel leading to a pool fire with impacts not extending beyond the site boundary.

	Without Mitigation	With Mitigation
Extent	Low (2)	Low (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (6)	High (6)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible (worst case: death)	Irreversible (worst case: death)
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	Yes
Mitigation: Mitigation would include emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders. Preventive measures would include maintenance procedures to prevent the occurrence of a catastrophic loss of containment from corrosion, fire and gas detection and firewater systems to prevent escalation, as well as strict control of ignition sources and other measures, which may be required according to standards such as those prescribed by the South African National Standards system.		
Residual Risks: Even with mitigation, there may be residual risk of occurrence due to failures in protection systems and break-down in procedures and documented systems.		

Nature: *Impact associated with BESS Installations*

Worst case loss of containment scenario – catastrophic rupture of BESS leading to a pool fire with impacts not extending beyond the site boundary.

	Without Mitigation	With Mitigation
Extent	Low (2)	Low (1)

Duration	Very short (1)	Very short (1)
Magnitude	High (6)	High (6)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible (worst case: death)	Irreversible (worst case: death)
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	Yes
Mitigation: Mitigation would include emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders. Preventive measures would include design, installation according to the vendor requirements. Furthermore, the layout separation distances between battery storage units and other units to prevent knock-on effects.		
Residual Risks: Even with mitigation, there may be residual risk of occurrence due to failures in protection systems and break-down in procedures and documented systems.		

8.13.4. Implications for Project Implementation

As a result of the risk assessment study conducted for the proposed 320 MW RMPP facility in Richards Bay, a number of events were found to have risks beyond the site boundary. These risks could be mitigated to acceptable levels.

No fatal flaws were identified that would prevent the project proceeding to the detailed engineering phase of the project and would support the project under the following conditions most of which will be detailed in the MHI study:

» Compliance with all statutory requirements, i.e., pressure vessel designs.
» Compliance with applicable SANS codes, i.e., SANS 10087, SANS 10089, SANS 10108, etc.
» Incorporation of applicable guidelines or equivalent international recognised codes of good design and practice into the designs.
» Completion of a recognised process hazard analysis (such as a HAZOP study, FMEA, etc.) on the proposed facility prior to construction to ensure design and operational hazards have been identified and adequate mitigation put in place.
» Full compliance with IEC 61508 and IEC 61511 (Safety Instrument Systems) standards or equivalent to ensure that adequate protective instrumentation is included in the design and would remain valid for the full life cycle of the tank farm:
  - Including demonstration from the designer that sufficient and reliable instrumentation would be specified and installed at the facility.
» Preparation and issue of a safety document detailing safety and design features reducing the impacts from fires, explosions and flammable atmospheres to the MHI assessment body at the time of the MHI assessment:
  - Including compliance to statutory laws, applicable codes and standards and world's best practice;
  - Including the listing of statutory and non-statutory inspections, giving frequency of inspections;
  - Including the auditing of the built facility against the safety document; and
  - Noting that codes such as IEC 61511 can be used to achieve these requirements;
» Demonstration by 320 MW RMPP owner or their contractor that the final designs would reduce the risks posed by the installation to the South African requirements as prescribed in SANS 1461 (2018).

- Signature of all terminal designs by a professional engineer registered in South Africa in accordance with the Professional Engineers Act, who takes responsibility for suitable designs.
- Completion of an emergency preparedness and response document for on-site and off-site scenarios prior to initiating the MHI risk assessment (with input from local authorities).
- Any increases to the product list or product inventories must be with the approval of the authorities under NEMA. Final acceptance of the facility risks with an MHI risk assessment that must be completed in accordance with the MHI regulations:
  - Basing such a risk assessment on the final design and including engineering mitigation.

8.14. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing 320MW RMPP.

8.14.1. Costs and Benefits associated with the 320MW RMPP

The implementation of the 320MW RMPP at the proposed site is expected to result in a number of social and environmental costs and benefits.

Environmental costs identified for the project include:

- Direct loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the project (which is limited to the development footprint). Areas of ecological sensitivity have been identified onsite and have been included in an environmental sensitivity map prepared for the project.
- The cost of loss of biodiversity has been minimised as a result of the avoidance of areas of high sensitivity, most specifically the 29m buffer adjacent to a channelled valley-bottom wetland.
- Visual impacts associated with the project. The location of the facility within an area characterised by industrial development mitigates the visual impact of the facility to a large extent.
- Change in land-use and loss of land available for agriculture on the development footprint. The cost in this regard is nil due to the designation of the property for industrial use and no potential for agriculture.
- Impacts on ambient air quality. The results of the impact assessment indicate that the operational phase of the project will have a low impact (based on design mitigation measures) on ambient SO_2, PM, CO, and VOC concentrations.
- Impacts in terms of GHG emissions. The potential for avoided emissions as a result of the project being developed as part of a hybrid facility involving renewable energy developments, as well as the opportunity for the gas to power facility to facilitate the introduction of additional renewable energy facilities into the national grid will assist in mitigating this impact.

The positive implications of establishing the project on the demarcated site include:

- The project will result in important socio-economic benefits at the local and regional scale through job creation, procurement of materials and provision of services and other associated downstream economic development. These will persist during the pre-construction, construction and operational phases of development.
- The project is considered to be a suitable land use for the proposed site due to the designated industrial land use zoning. Development of the facility will require the implementation of appropriate

management actions which could have positive impacts on the surrounding areas specifically in terms of alien vegetation and erosion management.

» The project contributes towards the development of additional power generation sources as outlined in the IRP 2019. The project has been bid into the RMIPPPP and is intended to contribute towards the 2000MW of energy required to supplement Eskom's supply in the short- and medium-term.

Apart from impacts associated with GHG emissions, the costs associated with the project are anticipated to occur at a site specific level, the significance of which can be largely reduced through the application of appropriate mitigation measures, and through the appropriate placement of infrastructure within areas of lower sensitivity. The inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid in the order of 2.58 $MtCO_2e$ per annum if the corresponding amount of renewable electricity generation capacity is installed.. Due to the fact that the benefits of the project are expected to occur at a larger scale (i.e. national, regional and local level), the expected benefits of the project are expected to partially offset the localised environmental costs of the project.

8.14.2. Impacts of the Do Nothing Alternative

The following impacts are anticipated with the implementation of the "Do Nothing" option:

» Failure to provide additional power generation capacity in accordance with the Department of Energy's (DoE's) National Integrated Resource Plan (IRP), which has identified the need for dispatchable emergency power generation in the short- to medium-term.
» Failure to provide an additional 320MW of mid-merit electricity generation capacity to the national electricity grid through the RMIPPPP (should the project be selected as Preferred Bidder), which in turn has the opportunity to stimulate economic growth and development
» Failure to realise the potential local economic development and social upliftment benefits associated with the implementation of project.

8.14.3. Conclusion

Although a number of impacts of potential high significance have been identified, no environmental fatal flaws were identified to be associated with the 320MW RMPP through the specialist studies undertaken. Where impacts cannot be avoided, appropriate mitigation has been identified to minimise impacts to acceptable levels. A number of negative impacts have been identified to be associated with the implementation of the do nothing alternative.

The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of 320MW RMPP.

CHAPTER 9. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the 320MW RMPP may have effects (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the 320MW RMPP largely in isolation (from other similar developments).

The IRP includes provision for 3 000MW of gas to power as part of the energy mix up to 2030. In addition to this, the DMRE, under the RMIPPPP in accordance with the IRP 2019, released an RFP to meet a stated electricity supply shortfall of 2000MW of generation capacity. Although the RMIPPPP is technology agnostic, it has been noted that criteria of the RMIPPPP thermal based electricity generation technologies (utilising gas fuel sources such as LPG, methane rich gas or natural gas or liquid fuels such as, or diesel or heavy fuel oils) -based generators as such technologies can be designed to be fully dispatchable.[12]

As a result, there has been a substantial increase in interest in gas to power facility developments in South Africa (largely in Richards Bay and other port cities where importing various forms of gas is possible), with several gas to power facilities being bid into the RMIPPPP. It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts[13] is considered and avoided where appropriate and where the information is available to do so.

This chapter assesses the potential for the impacts associated with the 320MW RMPP to become more significant when considered in combination with the known or proposed gas to power projects and other industrial developments within the Richards Bay area.

9.1 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the 320MW RMPP and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to test, and assess, if such impacts are relevant to the 320MW RMPP within the project site being considered for the development:

- Unacceptable impacts to air quality and contributions to pollutant levels.
- Unacceptable risks and contributions to climate change.
- Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.

[12] Source: https://www.engineeringnews.co.za/article/ipp-office-extends-bid-deadline-for-r40bn-risk-mitigation-programme-2020-11-02

[13] Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R326) as the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

- Unacceptable risk to water resources through disturbance associated with construction activities and increased runoff and erosion during the operation phase.
- Unacceptable loss of heritage resources.
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion.
- Unacceptable impact to socio-economic factors and components.
- Unacceptable risk and degradation due to traffic related impacts.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by gas to power facility developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by industrial facility developments that are in closer proximity to each other. For practical purposes, a sub-regional scale of 10km has been selected for this cumulative impact evaluation. The potential for cumulative impacts is summarised in the sections which follow and has been considered within respective specialist studies in varying degrees (refer to **Appendices D – N**). The approach taken by the various specialists in assessing cumulative impacts is informed by the scale at which the impact is likely to occur, as well as surrounding developments.

9.2 Relevant Development Considerations within the 10km area surrounding the proposed project

Figure 9.1 indicates the location of the 320MW RMPP in relation to all known and viable large-scale industrial developments located within a radius of 10km from the project site. These developments were identified during stakeholder consultations and using information available in the public domain at the time of this assessment. In the case of 320MW RMPP there are eleven (11) large-scale industrial developments within the 10km radius of the project site (refer to **Figure 9.1** and **Table 9.1**), all at various stages of development. At the time of writing this EIA Report, 10 facilities are operational and 1 has been authorised but is not operational.

Table 9.1: Large-scale industrial developments within a 10km radius of the 320MW RMPP project site

Development Name	Approximate distance from 320MW RMPP	Project Status
Bayside Aluminum Richards Bay	1.8 km south	Existing
Hulamin (previously Isizinda)	1.8 km south	Existing
Foskor Richards Bay	2.2km east	Existing
Mondi Richards Bay	1.1km west	Existing
Port Richards Bay	3.5km south east	Existing
Richards Bay Coal Terminal	6.5km south east	Existing
South32 Aluminum	1.4km east	Existing
Tata Steel	2.6km north east	Existing (non-operational)
Bidvest Tank Terminals	6.7 km south east	Existing
Fermentech Fertilizer Supplier	3km south east	Existing
Elegant Afro Chemicals Chlor Alkali Plant	3km north east	Authorised

There are a number of gas to power projects proposed within the Richards Bay area. In considering the cumulative impact, it is important to consider the policy framework for gas to power generation and the likelihood of proposed projects proceeding to implementation. As stated previously, the IRP provides for a maximum of 3000 MW of power to be generated by gas to power technologies up to 2030 and the current 2000 MW RMIPPPP is technology agnostic with a number of developers proposing gas to power projects in response hereto.. **Figure 9.2** indicates the location of 320MW RMPP in relation to all other gas to power facilities proposed under either the 3000MW gas to power programme or the 2000MW RMIPPPP located within a radius of 10km from the project site. These projects were identified using information gathered during stakeholder consultation and current knowledge of projects being proposed in the area. In the case of the 320MW RMPP, there are three (3) RMIPPPP facilities and two other gas to power facilities located within a 10km radius of the project site (refer to **Figure 9.2** and **Table 9.2**), all at various stages of development as detailed in the table below.

Table 9.2: RMPP projects and other energy facilities located within a 10km radius of the proposed 320MW RMPP.

Project Name	Brief Project Description	Approximate distance from 320MW RMPP	Project Status / Likelihood
Projects bid into the RMIPPPP			
Richards Bay Gas to Power 2	Gas to power facility with 400MW generation capacity.	2.6km north east	Has been bid into RMPPPP. If selected as preferred bidder will be operational by not later than 31 December 2022 (as per the RMIPPPP requirements) Project has been Authorised. EA amendment in process.
Karpowerships 540MW	Floating mobile powership in the Port of Richards Bay with 540MW generation capacity, although the RMIPPPP imposes a limit of 450MW per project.	3.9km south east	Has been bid into RMPPPP. If selected as preferred bidder will be operational by no later than 31 December 2022 (as per the RMIPPPP requirements). EIA in process.
Proposed Projects being developed to bid into the yet to be announced/ gazetted 3000MW gas to power IPP procurement programme			
Richards Bay CCPP	Eskom Gas power facility with 3000MW generation capacity.	2.5km west	This project currently falls outside of the current 3000MW gas to power allocation as the Minister has determined that this allocation will be procured from independent power producers and not from Eskom. Project has been Authorised.
Nseleni Independent Floating Power Plant	Floating mobile powership in Richards bay harbour with 2800MW generation capacity.	1.3km south	It is unclear from the publicly available documents if this project is being developed in accordance with the 3000MW gas to power programme. Implementation of the project is dependent on the authorisation outcome of Karpowerships since both projects are proposed to be located within the port of uMthlathuze. EIA in progress

Not all projects listed above will be developed and implemented. Under the existing power procurement programmes announced by the government there are two phases of power development nationally that will, in worst case scenario, contribute to cumulative impact in Richard's Bay, i.e. the RMIPPPP for which the procurement process is currently underway, and the 3000MW gas to power procurement process which is still in the planning phase and yet to commence. The assessment below takes into consideration both of these procurement programmes as follows:

Phase 1: RMIPPP Projects

From an RMIPPPP development perspective, only those projects selected as Preferred Bidder following the adjudication of bids and that subsequently achieve financial close to commence construction, will be implemented. Considering the number of bids received by the IPP Office in this regard (28 in total and comprising in excess of 5000MW of generating capacity compared to the 2000MW proposed to be procured under this programme), it is considered unlikely that all three projects in Richards Bay located in Richards Bay that have bid under this programme would be successful in their bids and be developed. In addition, not all proposed gas to power developments will be granted the relevant permits by the competent authorities (DEFF, Department of Mineral Resources and Energy, National Energy Regulator of South Africa, and Eskom) due to the following reasons:

- there are existing limitations on the electricity evacuation capacity in Richards Bay or physical challenges in the connection of certain of the RMIPPPP projects to the grid;
- there are certain regulatory approvals in respect of the importation of LNG into Richards Bay in support of certain of the RMIPPPP bids that may not be granted in terms of the National Ports Act;
- not all applications may receive a positive environmental authorisation or other environmental permits;
- not all proposed facilities may eventually be granted a generation license by the National Energy Regulator of South Africa and sign a Power Purchase Agreement with Eskom; and
- all developers may not be successful in securing financial support to advance their projects further.

Phase 2: 3000MW Gas to Power Programme

From a 3000MW gas to power procurement programme perspective, a maximum of 3000MW could potentially be developed within Richards Bay, which assumes the full allocation for gas to power under IRP 2019. It is likely that not all proposed gas to power developments in Richards Bay will be granted the relevant permits by the competent authorities (DEFF, Department of Mineral Resources and Energy, National Energy Regulator of South Africa) or that the full allocation of 3000MW will be made available to Richards Bay due to the following reasons:

- The Minister for Mineral Resources and Energy has publicly expressed a preference for the importation of LNG and the generation of electricity therefrom to be allocated to the Port of Coega as opposed to Richards Bay and it is expected that, at best, only a portion of the 3000MW allocation will be allocated to Richards Bay
- There are certain regulatory approvals in respect of the importation of LNG into Richards Bay and the floating of power barges within the port of Richards Bay by certain developers that may not be granted;
- not all applications will receive a positive environmental authorisation;
- not all proposed facilities will eventually be granted a generation license by the National Energy Regulator of South Africa and sign a Power Purchase Agreement with Eskom; and
- not all developers will be successful in securing financial support to advance their projects further.

There is a level of uncertainty as to whether all the above-mentioned RMIPPPP facilities and projects being developed in anticipation of the commencement of the 3000MW gas to power programme and in certain instances it is clear that certain of the projects are mutually exclusive.

In respect of the three projects located in Richards Bay that have been bid into the RMIPPPP, it is theoretically possible, although unlikely, that all three of these projects could be procured for implementation, as the combined generation capacity of all three projects is less than the 2000MW being procured under the RMIPPPP.

In respect of the two projects located in Richards Bay that are understood to be proposed response to the yet to commence 3000MW gas to power programme, these projects are mutually exclusive of each other as each project on its own would account for 100% of the allocation under the procurement programme. Further to this, the Nseleni floating project is likely to be mutually exclusive to the Karpower RMIPPPP project as both projects are proposed to be located in the same location within the port of Richards Bay.

This uncertainly results in it being difficult to quantitatively assess the potential cumulative impacts of these projects. The cumulative impacts of industrial developments, RMIPPPP facilities and projects being developed in response to the 3000MW gas to power programme in the broader Richards Bay area and the 320MW RMPP are therefore qualitatively assessed in this Chapter, considering the worst case scenario.

9.3 Potential Cumulative Impact Associated with the project

This assessment is based on information which is currently available. The following potential impacts are considered:

- Cumulative impacts on terrestrial biodiversity and ecology

- Cumulative impacts on aquatic resources
- Cumulative impacts on surface and groundwater
- Cumulative impacts on air quality
- Cumulative impacts to climate change
- Cumulative visual impacts
- Cumulative impacts on heritage resources
- Cumulative socio-economic impacts
- Cumulative impacts on traffic

No cumulative impacts associated with noise have been identified and are therefore not assessed within this section of the report.

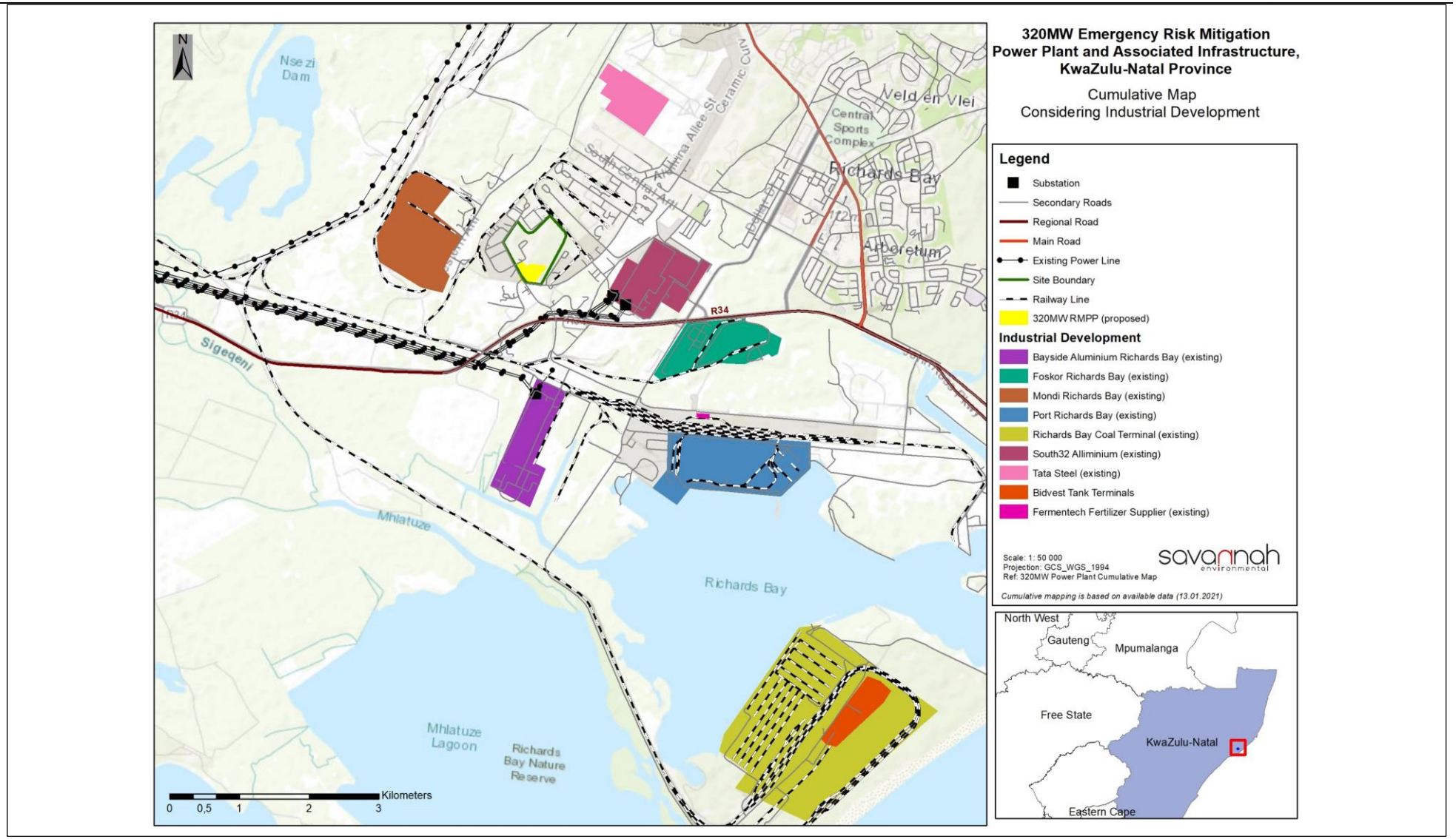

Figure 9.1: Identified large scale industrial developments located within a 10km radius of 320MW RMPP project site that are considered as part of the cumulative impact assessment for the project.

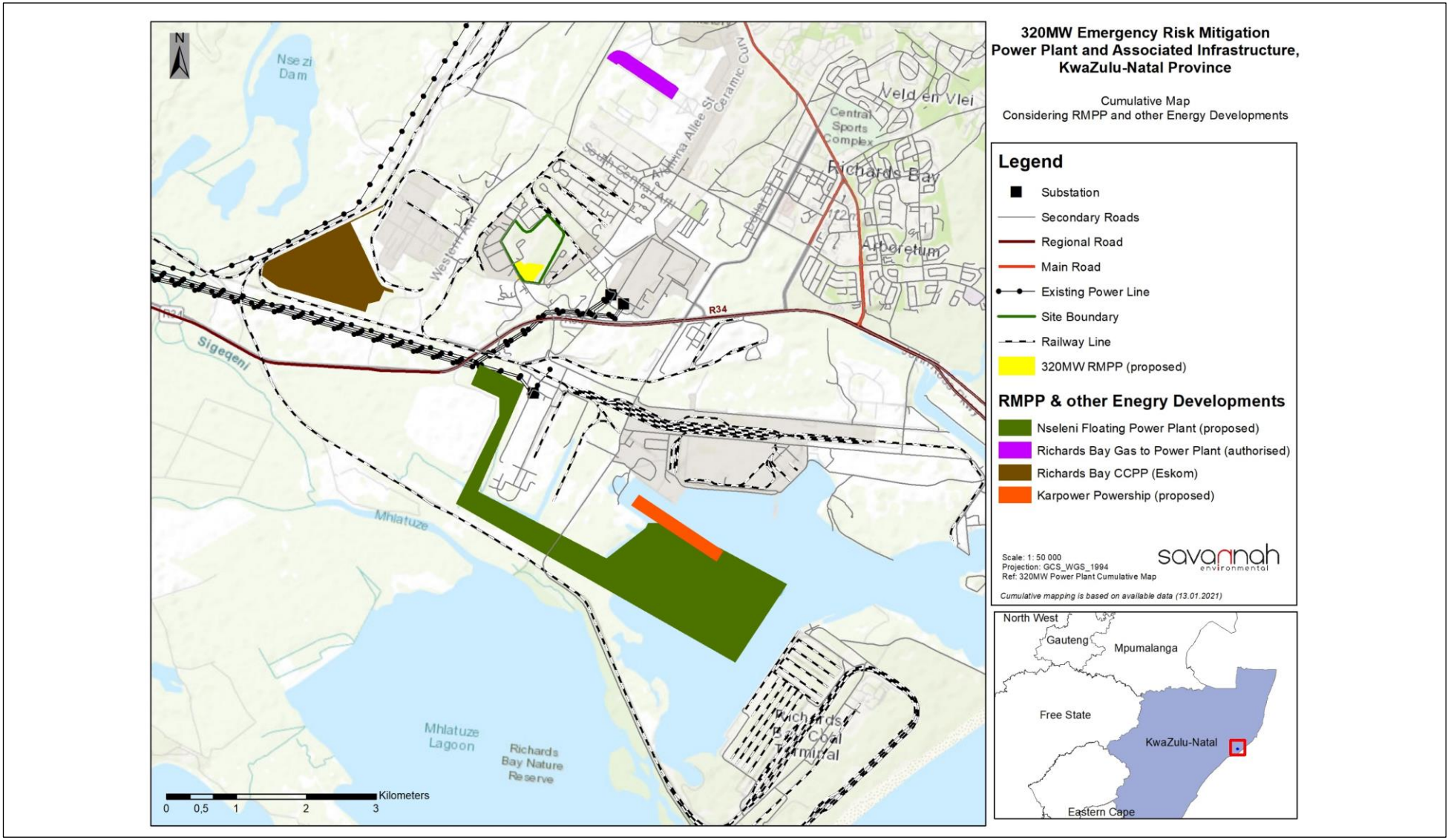

Figure 9.2: Identified RMPP projects and other energy developments located within a 10km radius of the 320MW RMPP project site that are considered as part of the cumulative impact assessment for the project

9.3.1. Cumulative Impact on Terrestrial Biodiversity

The proposed development site is located within an industrial area of Richards Bay, where the majority of the natural vegetation has been cleared and replaced with hard surfaces. Given that no critical habitats were identified on the site and no protected species were recorded, impacts are expected to occur at a local scale with the implementation of mitigation as recommended in Chapter 8. Therefore, from a terrestrial biodiversity perspective, cumulative impacts of the development were assessed in relation to the development area (i.e., the location within an already developed industrial area). The cumulative impacts during the construction and operational period of the proposed development on the terrestrial biodiversity-ecosystem include the loss of vegetation and terrestrial habitat, the potential loss of faunal species and species of concern, habitat fragmentation, the infestation of alien invasive species and the impact of emissions on the surrounding vegetation and animal species.

Nature: Cumulative impacts on terrestrial biodiversity The proposed development site has a long history of transformation and therefore the impacts on the terrestrial environment are likely to be limited as the species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types. Protected species such as *Crinum stuhlmannii* and *Zoothera guttata* have potential to occur on the proposed development site. However, no protected species were observed during the site visits. The cumulative impacts during the construction and operational period of the proposed development can be mitigated by the implementation of the suggested mitigation measures, the Stormwater Management Plan and implementation of a buffer around the wetland area.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (2)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (30)	Medium (52)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	Yes
Can impact be mitigated?	Yes	Yes
Mitigation: » A minimum impact approach must be adopted. Only vegetation in the project footprint must be removed, leaving adjacent buffer vegetation intact.		

9.3.2 Cumulative Impact on Aquatic Biodiversity

The proposed development site is located within an industrial area of Richards Bay, where the large majority of the natural vegetation has been cleared and replaced with hard surfaces. To protect the industrial area, a historic stormwater drainage channel was constructed to mitigate flooding. This channel runs to the east of the proposed development site. Although it has historically been artificially channelled, the channel bed is earthen and therefore functions as a natural river and associated wetland unit. The surrounding land uses have thus impacted on the aquatic systems, although the major impacts in terms of channelisation took place several years ago. Given that there are no direct impacts on aquatic biodiversity as a result of the proposed development, impacts are expected to occur at a local scale with the implementation of mitigation as recommended in Chapter 8. Therefore, from an aquatic biodiversity perspective, cumulative impacts of the development were assessed in relation to the development area (i.e., the location within an already developed industrial area).

The cumulative impacts during the construction and operation of the proposed development on the aquatic ecosystem includes the clearing of vegetation causing alteration of the current hydrological flow patterns and a related increased risk of sedimentation and erosion downstream at outlet structures.

Nature: Cumulative impacts on aquatic biodiversity An increase in hardened surfacing will result in an increase in surface water runoff especially during precipitation events and if uncontrolled, will potentially entrain suspended and dissolved sediments from stockpiles (during construction), hydrocarbons, and other chemicals (construction and operation), potentially affecting water quality of the river.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Low (1)	Medium (3)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	High (8)
Probability	Very improbable (1)	Probable (3)
Significance	Low (10)	Medium (48)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	Yes
Can impact be mitigated?	Yes	Yes
Mitigation: » Demarcation of the wetland buffer is required prior to the commencement of construction activities. No construction activities, or movement of construction vehicles must be allowed within the buffer zone » Natural open spaces outside the development footprint should be left in their undeveloped state. » In proximity to the Phragmites – Typha channelled valley bottom wetland and buffer, successful re-vegetation is crucial to stabilise soils and limit infestation by invasive alien plant species. Rehabilitation should be undertaken on a progressive basis in these areas. » Extra care must be taken to prevent any potentially hazardous substances from entering the watercourse during heavy rainfall events by implementing mitigation plans, such as the Stormwater Management Plan;		

9.3.3 Cumulative impacts on Surface and groundwater resources

Potential impacts on surface and groundwater associated with the proposed 320MW RMPP could further impact on the already degraded water quality in the area. Cumulative impacts on localised groundwater and surface water quality were therefore assessed in terms of the development of the 320MW RMPP and existing and proposed future developments in the larger area.

Nature: Cumulative Impacts of the 320MW RMPP and all existing and proposed developments in the larger area, during the Construction Phases and Operational Phases on the subsurface groundwater aquifers and surface water resources.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local/Site (1)	Local (3)
Duration	Short-term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Medium (30)
Status (positive or negative)	Negative	Negative
Reversibility	High	High

Irreplaceable loss of resources?	No	Yes
Can impact be mitigated?	Yes	Yes

Mitigation:

- Implement appropriate measures to ensure strict use and management of all hazardous materials used on site.
- Implement appropriate measures to ensure strict management of potential pollutants (e.g., hydrocarbons from vehicles and machinery, emergency backup generators, maintenance equipment, etc.)
- Ensure appropriate ablutions facilities are available.
- Surface and stormwater runoff must be diverted through an oil/water separator before leaving the site.
- Emergency spill kits must always be present on site.
- Good housekeeping practices must be implemented.
- Immediate reporting of significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.
- Implement appropriate measures to ensure strict control over the behaviour of workers during the Operational Phase of the Power Plant.
- Working protocols incorporating pollution control measures (including approved Standard Operating Procedures (SOP)) should be clearly set out in the Environmental Management Plan (EMP).
- Implement appropriate surface and groundwater monitoring programmes during construction.

9.3.4 Cumulative impacts on Air Quality

Impacts associated with the 320 MW RMPP could become more significant when considered in combination with the known or proposed gas to power projects, and existing industrial activities within the Richards Bay area. The cumulative effect on air quality of the three proposed RMIPPPP projects, the Eskom gas-to-power facility and the current baseline was calculated using extrapolated, simulated and/or measured concentrations to estimate the range of cumulative impact. The cumulative Impact of the proposed facility and the existing baseline could result in elevated ambient air pollutant concentrations for SO_2, NO_2, and PM_{10}.

Three scenarios were considered by the air quality specialist in terms of possible cumulative impact:

- Scenarios 1: Baseline together with the 320 MW RMPP
- Scenario 2: Baseline, 320 MW RMPP and other RMIPP projects
- Scenario 3: Baseline, RMIPP projects and the Eskom 3000MW CCPP project (which is authorised)

In this regard, the following conclusions were made:

Scenario 1:

Cumulative SO_2 and NO_2 concentrations are likely to be lower than the applicable NAAQS across the domain and the contribution from the 320 MW RMPP is low (less than 3% for hourly, daily and annual SO_2; less than 5% for hourly and annual NO_2). Cumulative PM_{10} concentrations may exceed the daily NAAQS at Harbour West, Scorpio, and Arboretum (uMthlathuze) monitoring stations due to the elevated baseline concentrations in those areas. However, the contribution from the 320 MW RMPP will be minimal.

Scenario 2:

The additive effect of the two additional RMIPPPP projects equate to less than 14% of the applicable NAAQ limit concentrations and standards and is therefore in line with the general guideline suggested by the

International Finance Corporation that projects contribute less than 25% of air quality guidelines and standards to allow for future sustainable development in the airshed (IFC, 2007).

Scenario 3:

- the range of cumulative hourly, daily, and annual SO_2 concentrations are lower than the applicable NAAQS;
- the lower end of the range of cumulative hourly NO_2 concentrations is lower than the NAAQ limit concentration but the upper end of the range suggests that exceedances of the NAAQ limit could occur in some areas of the domain and are associated with existing developments since the majority of the estimated cumulative concentration is due to the extrapolated baseline concentrations and the Eskom facility and not with the RMIPPPP projects;
- the range of cumulative annual NO_2 concentrations is close to the NAAQS where the largest contributions are associated with the existing sources and the Eskom facility;
- cumulative daily PM_{10} - based on an atypically high measured concentration - exceeds the NAAQS, however, the contribution from the gas-to-power projects is low (less than 7% at the low end of the cumulative range); and,
- cumulative annual PM_{10} is elevated but is below the NAAQS and the contribution from the gas-to-power projects is low (less than 10% at the low end of the cumulative range).

The tables below provide an assessment of the impacts associated with Scenario 1.

»

Nature: *Impact significance rating for the Project on the Cumulative SO_2 and NO_2 in Richards Bay*

The Cumulative Impact of the proposed facility and the existing baseline would result in elevated ambient air pollutant concentrations. The normal operation of the proposed gas-to-power plant will result in emission of gaseous pollutants including: SO_2 and NO_2. Increased ambient concentrations of these pollutants may result in negative human health impacts. Cumulative impacts, to short- and long-term ambient concentrations, were assessed to be minor since the pollutants of current concern in Richards Bay (SO_2 and PM) will have relatively small incremental increases from the normal operation of the 320 MW RMPP. The cumulative impact of the project and other projects in the area may result in short-term ambient NO_2 concentrations above NAAQS within the domain but these are likely to be localised near the source(s).

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Local (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	No
Can the impacts to mitigated?	To some extent	To some extent

Potential mitigation measures:

- Liaise with industry to optimise abatement controls to minimise emissions
- Use community and industry fora to discuss air pollution issues and progress towards minimising impacts
- Promote the use of cleaner heat sources (electricity, LPG, and/or bioethanol gel) for cooking, heating and lighting by residents.

Residual impacts:
Expected to be low if mitigation measures can be effectively implemented.

Nature: *Impact significance rating for the Project on the Cumulative PM10 in Richards Bay* The Cumulative Impact of the proposed facility will not add substantively to the existing baseline. The baseline particulate concentrations across Richards Bay are elevated with exceedances of the NAAQS measured at monitoring stations near the harbour operations. The existing ambient concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall. The overall impact of the proposed project considered in isolation will have relatively small incremental increase from the baseline conditions, the cumulative impact of the project and other projects in the area is likely to result in human health impacts.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Probable (3)	Likely (4)
Significance	**Low (21)**	**Medium (56)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	No
Can the impacts to mitigated?	To some extent	To some extent
Potential mitigation measures: » Liaise with industry to abatement controls to minimise fugitive emissions especially particulates. » Use community and industry fora to discuss air pollution issues and progress towards minimising impacts » Promote the use of cleaner heat sources (electricity, LPG, and/or bioethanol gel) for cooking, heating and lighting by residents.		
Residual impacts: Expected to be low if mitigation measures can be effectively implemented.		

9.3.5 Cumulative impacts to Climate Change

In terms of climate change, cumulative impacts of the 320MW RMPP as a result of GHG is not limited to the scale for cumulative impacts as determined earlier in this chapter (refer to **Section 9.1**). In addition, the context within which the EIA reporting requirements were developed to describe and assess environmental impacts (including cumulative impacts) have yet to be applied to GHG emissions, with a global impact. Therefore, no cumulative impact table has been compiled.

The GHG emissions from the proposed 320MW RMPP cannot be directly linked to any particular climate change effects within the local context. However, the proposed 320MW RMPP's emissions will contribute to climate change on a global scale, which will, ultimately, impact South Africa. South Africa's Nationally Determined Contribution (NDC) submitted in Paris in 2015 sets out the nation's emissions trajectory up to 2050. South Africa's emissions are expected to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter (the 'peak, plateau and decline trajectory'). The country's pledge for the peak, plateau and decline (PPD) trajectory is set to emit between 398 $MtCO_2e$ and
614 $MtCO_2e$ between 2025 and 2030. As stated in the Chapter 8, the magnitude of the impact of the Project in relation to South Africa's carbon budget is considered to be very high over the life of the Project,

as the Project's emissions exhaust 0.62% of the carbon budget (where a value greater than 0.227% is considered very high).

However, this project has the potential to result in notable annual avoided emissions in the context of gas technologies enabling increased grid flexibility and the associated uptake of intermittent renewable energy. The inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid in the order of 2.58 $MtCO_2e$ per annum if the corresponding amount of renewable electricity generation capacity is installed. This is because the power supplied by the project could replace 3.8 $MtCO_2e$ worth of grid electricity per year, but still emitting 1.2 $MtCO_2e$ per year. Over the lifetime of the project, this amounts to a net potential reduction in emissions of 51.6 $MtCO_2e$.

9.3.6 Cumulative Visual impacts

The 20MW RMPP is located entirely within the existing Alton Industrial Area. The viewshed analyses of the 320MW RMPP illustrated the ability of the existing industrial and commercial structures and buildings to absorb the visual exposure, and to contain the potential visual impacts to within 1km of the site. The intention of the establishment of the Alton Industrial Area, and ultimately the RBIDZ, is to concentrate industrial development within specific areas.

The anticipated cumulative visual impact of the proposed power plant is expected to be of moderate significance, which is considered to be acceptable from a visual perspective. This is due to the transformed nature and industrial developments already present at the proposed development site.

Nature of Impact: *Cumulative visual impact* The potential cumulative visual impact of the power generating activities on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Local **(2)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Probable **(3)**	Probable **(3)**
Significance	**Medium (42)**	**Medium (45)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation immediately adjacent to the power plant. Operations: » Maintain the general appearance of the facility as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: Potential permanent scarring of the landscape if no rehabilitation is undertaken.		

9.3.7 Cumulative impacts on Heritage Resources

Several human settlements occurred historically in the general study area; however, none occurred within the 320MW RMPP project area. The study area consists of old agricultural fields. Although unlikely, the potential to unearth archaeological artefacts and human graves during construction was considered in the cumulative assessment. Impacts are considered in relation to other planned developments in the area.

Nature: *Cumulative impact on heritage resources* *Any sites in the area are subsurface and probably in a secondary context. These sites will be of low significance, except potential human graves.*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Very short (1)	Permanent (1)
Magnitude	Low (1)	Low to Moderate (1)
Probability	Probable (1)	Probable (1)
Significance	**Low (3)**	**Low (3)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	low
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	The cumulative impacts of the proposed project can be mitigated if needed. However since most of the sites are of low significance, no mitigation is required. If human remains are found then they can be mitigated.	
Mitigation: » If human remains are located then all work in that area must cease and KZNARI (0333946543) and the SAPS need to be informed. The area needs to be cordoned off.If any archaeological or palaeontological remains are located at the site then they can be initially assessed via photographs and emails. Isolated artefacts occur throughout the general area and would not require a field assessment if found. »		

9.3.8 Cumulative Socio-economic impacts

The existing and planned developments that could be identified (refer to **Table 9.1.** and **Table 9.2** above) created the conditions for cumulative social effects. Both positive and negative impacts are expected to occur. Negative impacts relate to demographic shifts whereas positive impacts include increased production, GDP, employment, skills and household income.

Table 9.3: Socio-economic impacts identified to be associated with the other projects in the zone of influence of the facility under review

Socio- Economic Impact	Description	Status
Increase in Production	The initial investment spend on the project will inject significant business sales/ production for the local and regional economy. The economic impact arising from the initial investment will be felt throughout the	**Positive**

	economy with windfall effects benefitting related sectors in the economy.	
Employment Creation	Increase in employment creation for the local workforce.	**Positive**
Demographic Shifts	Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.	**Negative**

Nature: *Increase in economic production*.

The initial investment spend on the project will inject significant business sales/ production for the local and regional economy. The economic impact arising from the initial investment will be felt throughout the economy with windfall effects benefitting related sectors in the economy.

	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Medium (45)	Medium (45)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings	High	

Mitigation:
No mitigation measures are required.

Nature: *Increase in the number of employment opportunities*.
Increase in employment creation for the local workforce.

	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Medium (45)	Medium (45)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings	High	

Enhancement:
» Employment of local residents as far as possible should be encouraged.

Nature: *Demographic shifts*

Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.		
	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Medium term (3)	Medium term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (48)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings	High	
Mitigation: » Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration. » Provide training for unemployed local community members with insufficient skills and thus increase absorption of local labour thereby decreasing in-migration. » Manage recruitment and marketing for vacancies with a preference of residents within the municipality.		

9.3.9 Cumulative impacts on Traffic

Impacts on traffic are expected along routes used for delivery of project components, construction equipment and materials during operation and along routes used for delivery of LPG during operation. The construction and decommissioning phases of the 320MW RMPP are considered to be the only significant traffic generators. The duration of these phases are short term (i.e. the impact of the generated traffic on the surrounding road network is temporary and facility, when operational, do not add any significant traffic to the road network).

In terms of the cumulative impact, the impact of the project when considered together with other projects in the area is expected to be low. This is based on the fact that, even if all similar projects within the area are constructed at the same time, the respective roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

Nature: Traffic generated by the proposed development and the associated congestion, noise and dust pollution.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	High (5)
Duration	Short (3)	Medium-term (3)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Stagger component delivery to site.
- Dust suppression.
- Reduce the construction period.
- The use of mobile batch plants and quarries in close proximity to the site.
- Staff and general trips should occur outside of peak traffic periods.

9.3.10 Cumulative impacts of Unplanned Events

The cumulative impacts for the project considered the LPG, diesel, and BESS installations of the project in the context of similar installations in the industrial area. Due to the nature of the expected impact, cumulative impacts were considered at a localised level within the industrial area.

Nature: *Cumulative Impacts associated with unexpected events*

Potential impact on surrounding human populations, including possibility of serious injury or death as a result of major industrial accidents from hazardous materials used on-site.

	Overall impact of the proposed project in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Low (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	High (6)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (11)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible (worst case: death)	Irreversible (worst case: death)
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	Yes

Mitigation:

Mitigation would include emergency response arrangements and systems, such as alarms to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment from corrosion, fire and gas detection and firewater systems to prevent escalation as well as strict control of ignition sources and other measures, which may be required according to standards such as those prescribed by the South African National Standards system.

9.4 Conclusion on Cumulative impacts

Cumulative impacts are expected to occur with the development of the 320MW RMPP throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The assessment of the cumulative impacts was undertaken through the consideration of impacts in isolation and compared to the cumulative impacts of the 320MW RMPP and other industrial developments at a scale specifically identified by each specialist.

The significance of the cumulative impacts associated with the development of 320MW RMPP ranges from low to medium, depending on the impacts being considered. A summary of the cumulative impacts as assessed in this chapter is included in **Table 9.2** below.

Table 9.2: Summary of the cumulative impact significance for the 320MW RMPP

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial Biodiversity	Medium	Medium
Aquatic Biodiversity	Low	Medium
Surface and Groundwater	Low	Medium
Air Quality	Low	Medium
Visual	Medium	Medium
Heritage	Low	Low
Socio-Economic	Medium (Positive) Medium (Negative)	Medium (Positive) Medium (Negative)
Traffic	Low	Low
Risk Assessment (unplanned events)	Low	Low

The following can be concluded regarding the cumulative impacts of the 320MW RMPP:

- **Terrestrial Biodiversity:** The cumulative impacts to terrestrial biodiversity are of medium significance. Given that no critical habitats were identified on the site and no protected species were recorded, impacts are expected to occur at a local scale with the implementation of mitigation, and are not considered to pose an unacceptable risk or impact.
- **Aquatic Biodiversity:** The cumulative impacts to aquatic biodiversity are of medium significance. Given that there are no direct impacts on aquatic biodiversity as a result of the proposed development, impacts are expected to occur at a local scale with the implementation of mitigation, and are not considered to pose an unacceptable risk or impact.
- **Air Quality:** Impacts associated with the 320 MW RMPP could become more significant when considered in combination with the known or proposed gas to power projects, and existing industrial activities within the Richards Bay area. The addition of the 320MW RMPP to the existing emissions baseline within the Richards Bay area is expected to result in impacts of medium significance. As the contribution of the 320MW RMPP to the cumulative SO_2, NO_2 and PM10 concentrations will be minimal, the cumulative impacts of the project are not considered to pose an unacceptable risk or impact.
- **Climate change:** the proposed 320MW RMPP's emissions will contribute to climate change on a global scale, which will, ultimately, impact South Africa. However, the inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid as the addition of the 320MW RMPP to the national grid has the potential to enable the expansion of South Africa's renewables generation capacity in execution of South Africa's energy transition strategy.
- **Visual:** The viewshed analyses of the 320MW RMPP illustrated the ability of the existing industrial and commercial structures and buildings to absorb the visual exposure, and to contain the potential visual impacts to within 1km of the site. The anticipated cumulative visual impact of the proposed power

plant is expected to be of medium significance, which is not considered to be unacceptable from a visual perspective.

- **Heritage (including archaeology and palaeontology):** The cumulative impacts to heritage are unlikely to occur and expected to be of low significance. Should any artefacts or graves be unearthed during construction, potential impacts on these and can be mitigated. Impacts on heritage resources are not considered to pose an unacceptable risk or impact.
- **Socio-economic:** Both positive and negative socio-economic impacts are expected to occur at a regional level. Negative impacts relate to demographic shifts whereas positive impacts include increased production, GDP, employment, skills and household income. These impacts are expected to be of medium positive and medium negative significance and are not considered to pose an unacceptable risk or impact.
- **Traffic:** Impacts on traffic are expected along routes used for delivery of project components, construction equipment and materials during operation and along routes used for delivery of LPG during operation. The cumulative impact, the impact of the project when considered together with other projects in the area is expected to be low and is not considered to pose an unacceptable risk or impact.
- **Unexpected events**: The cumulative impacts for the project considered the LPG, diesel, and BESS installations of the project in the context of similar installations in the industrial area. Due to the nature of the expected impact, cumulative impacts were considered at a localised level within the industrial area. These impacts are expected to be low significance, which is considered acceptable from a risk perspective.

Based on the specialist cumulative assessment and findings, the development of the 320MW RMPP, other industrial activities, RMPP projects, and gas power developments within a 10km radius, it can be concluded that cumulative impacts will be of a low to medium significance, depending on the impact being considered. Impacts associated with climate change are potentially high but can be mitigated through avoided emissions as the addition of the 320MW RMPP to the national grid has the potential to enable the expansion of South Africa's renewables generation capacity in execution of South Africa's energy transition strategy There are no impacts or risks identified as unacceptable with the development of 320MW RMPP when considered together with other developments within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

The limited potential for cumulative impacts and risks makes the location of this project within the identified site of the Alton Industrial area a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

CHAPTER 10. CONCLUSIONS AND RECOMMENDATIONS

Phinda Power Producers (Pty)(Ltd) (Phinda) proposes to develop an Emergency Risk Mitigation Power Plant (RMPP) and associated infrastructures, with a generating capacity of up to 320MW. The proposed project is to be known as the 320MW RMPP. The Project site is located in Alton core industrial area adjacent to Richards Bay Industrial Development Zone (IDZ), and approximately 8km south west of Richards Bay city centre, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province. The facility will have an installed generating capacity of up to 320MW, to operate with liquified petroleum gas (LPG) as an initial source and will convert to utilising natural gas once this is available in Richards Bay.

The 320MW RMPP has been initiated by Phinda in partnership with Globaleq Africa Limited and Mainstream (hereafter referred to as the Project Consortium), in response to the procurement process initiated by the Independent Power Producer Office (IPP Office) in August 2020 for the procurement of up to 2000MW of dispatchable generation capacity from a range of technologies in the short- to medium-term under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). This allocation is in accordance with the new generation capacity required as specified in the Integrated Resource Plan 2019 and accompanying ministerial determination from the Minister for the Department of Mineral Resources and Energy (DMRE) to which the National Energy Regulator of South Africa (NERSA) has concurred. A bid under the RMIPPPP has been submitted by the Project Consortium for the proposed 320MW RMPP as part of a hybrid project solution.

As the 320MW RMPP has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction and operation of the project. The nature and extent of the 320MW RMPP and associated infrastructure, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this EIA Report.

10.1 Legal Requirements as per the EIA Regulations, 2014 (as amended). For the undertaking of an EIA Report

This chapter of the EIA report includes the following information required in terms of Appendix 2: Content of EIA Report.

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in 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 report	A summary of the findings of the specialist studies undertaken for 320MW RMPP has been included in section 10.2.
3(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 containing the key findings of the environmental impacts of 320MW RMPP has been included as section 10.4. Sensitive environmental features located within the study area and development area, overlain with the proposed development footprint have been identified and are shown in Figure 10.1. A summary of the positive and negative impacts associated

Requirement	Relevant Section
	with 320MW RMPP has been included in section 10.2.
h (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in section 10.5.
3(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.	All conditions required to be included in the Environmental Authorisation of the 320MW RMPP have been included in section 10.5.
3(p) 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 320MW RMPP should be authorised has been included in section 10.5.

10.2 Evaluation of the 320MW RMPP

The preceding chapters of this report together with the specialist studies contained within **Appendices D-M** provide a detailed assessment of the potential impacts that may result from the development of the proposed 320MW RMPP. This chapter concludes the environmental assessment of the 320MW RMPP by providing a summary of the results and conclusions of the assessment of the development area. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws were identified in the detailed specialist studies conducted It is recommended that mitigation measures are implemented to reduce impacts to acceptable levels. The potential environmental impacts associated with 320MW RMPP identified and assessed through the EIA process include:

- Impacts on Terrestrial Biodiversity
- Impacts on Wetland and Aquatic Biodiversity
- Impacts on Geo-Hydrology & Surface Water
- Impacts on Air Quality
- Impacts on Climate Change
- Visual impacts
- Impacts on ambient Noise Levels
- Impacts on Archaeology & Palaeontology
- Socio-Economic impacts
- Traffic impacts
- Impact due to unplanned events

10.2.1 Impacts on Terrestrial Biodiversity

The vegetation within the proposed development site was broadly classified into two vegetation communities, namely *Helichrysum - Chrysanthemoides* coastal grasslands, and a small portion (approximately 1,4 hectares) of the development site consisted of *Eucalyptus* plantations. A *Phragmites - Typha* channelled valley bottom wetland community was recorded outside of the eastern border of the development site. Vegetation on the site was considered to be of medium to low sensitivity.

Potential impacts on the terrestrial biodiversity as determined through the Terrestrial Biodiversity Assessment (**Appendix D**) are expected to be associated with the construction phase and are related to the loss of vegetation and terrestrial habitat. Potentially, this results in a loss of fauna and flora species, migration corridors and the potential loss of protected species and species of special concern. Disturbance of the natural vegetation by the proposed activities may furthermore accelerate the growth of exotic species. However, the proposed development site has a long history of transformation and therefore the impacts on the terrestrial environment are likely to be limited as the species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types.

No protected species were observed during the site visit. A search and rescue operation will however be required during a follow-up site visit, prior to construction, to ensure that none of the potential species prevalent in the area (*Crinum stuhlmannii* and *Zoothera guttata*), and with the potential to be found on the site, are on site or harmed. The specialist concluded that the site was found not to be critical for meeting the biodiversity targets and thresholds required to ensure the persistence of viable populations of species and the functionality of ecosystems within a CBA. In addition, it was determined that the site does not fall within any IFC critical habitat as described in the Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (updated 2019).

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts associated with 320MW RMPP can be reduced to medium and low. It is the opinion of the specialists that should the mitigation measures recommended herein be adhered to, the impacts can be reduced to an acceptable level resulting in minimal negative residual biodiversity impacts.

10.2.2 Impacts on Wetland and Aquatic Biodiversity

Four wetland units were identified within the Aquatic Biodiversity Assessment (**Appendix E**) as falling within the Department of Human Settlement, Water and Sanitation's 500 m regulated area. Two were classified as *Phragmites - Typha* channelled valley bottom wetlands; one located to the west of the proposed development site and the other along the eastern border of the site. Two *Imperata cylindrica* depression wetlands are located upstream on Erf 1854 at the northern boundary of the 500 m regulatory area. These depression wetlands will not experience change to any of the four main wetland drivers, viz. habitat, biota, flow and water quality by the proposed development.

The *Phragmites - Typha* channelled valley bottom located at the eastern boundary of the site has experienced a moderate change in ecosystem processes and a loss of natural habitats has taken place but the basic ecosystem functions are still predominantly unchanged. Even though this wetland was artificially channelled in the 1970's, this wetland is ecologically important and sensitive at a local scale. A 29 m buffer has been set for the wetland based on a combination of the EKZNW biodiversity guidelines (EKZNW 2016) and the guidelines for the determination of buffer zones for rivers, wetlands and estuaries by Macfarlane et al. (2017). The proposed development has taken cognisance of the buffer zone, excluding activities from this area.

A risk assessment was also undertaken according to the Department of Water and Sanitation Risk Assessment Guidelines and the results produced were of 'low' impacts in respect of all aspects.

Since the proposed project is located outside the *Phragmites - Typha* channelled valley bottom wetland and the 29m buffer which has been set for the wetland, the impacts on aquatic biodiversity are expected

to be negligible with the implementation of mitigation measures. It is the opinion of the specialists that should the recommendations be implemented, the impacts will be at acceptable levels, poses no fatal flaws and the project may be approved.

10.2.3 Impacts on Geohydrology and Surface Water

The following can be deduced from the baseline groundwater and surface water sampling undertaken in the area (refer to **Chapter 7**):

» Non-conformances of borehole water quality to SANS 241:2015 drinking water requirements
» Groundwater contamination is most likely attributed to industrial activities to the north-west and north-east of the site.
» Sources of surface water contamination are likely attributed to industrial activities to the north of the project site. Of particular concern, are the elevated Microbiological Determinants (Total Coliforms, E.coli and Standard Plate Count) suggesting recent and/or long-term sewerage contamination.

The Geohydrological and Surface water Assessment (**Appendix F**) concluded that the degraded ground and surface water quality in the area is most likely attributed to surrounding industrial activities. The impacts of the project on water quality are however of low significance. Implementation of a ground and surface water monitoring programme is recommended during the construction phase of the 320MW RMPP. The monitoring programme will essentially be implemented to document and establish the long-term and historical baseline and/or ambient groundwater and surface water chemistry of the area prior to, and during development of the 320MW RMPP facility.

From a ground and surface water quality perspective, no objections for the project not to proceed was determined, and therefore the development may occur within the proposed development boundaries.

10.2.4 Impacts on Air Quality

The Air Quality Assessment (**Appendix H**) assessed baseline air quality at the site for thoracic particulates (with a diameter less than 10 µm – PM10), inhalable particulates (with an aerodynamic diameter less than 2.5 µm – $PM_{2.5}$), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) using baseline data for the period 2016 to 2019. Impacts are expected during construction and operation.

Construction (and decommissioning) activities are likely to result in emissions of particulate and gaseous pollutants due to civil and building work and from vehicle traffic. The nature of emissions from construction activities is highly variable in terms of temporal and spatial distribution and is also transient. Increased ambient concentrations of fine particulates and gaseous pollutants may result in negative human health impacts. Increased nuisance dustfall is likely as a result of wind-blown dust emissions from the working areas. Increased nuisance dustfall rates will likely result in negative impact on dustfall at nearby residences and on potentially on plants. Unmitigated particulate emissions were conservatively found to exceed assessment criteria for up to 400 m but not at any residential areas, schools, and/or medical facilities. Areas to the south of the project site are more likely to be affected, especially in the short-term, due to the predominant winds. The impact of gaseous pollutants is likely to be minor.

The normal operation of the proposed 320MW RMPP open cycle power station will result in emission of gaseous and particulate pollutants including: SO_2, NO_2, PM, CO, and VOCs. Increased ambient

concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall. Unmitigated emissions of these pollutants were found to comply with the assessment criteria and off-site impacts are unlikely. Residential receptors, schools, and medical facilities are unlikely to be affected. Areas to the north east of the project site are more likely to be affected in the long-term, due to the predominant winds.

The findings from the air quality impact assessment are summarised as follows:

» The stand-alone impact of the 320 MW RMPP on ambient air quality is likely to be low during normal operation and based on mitigation measures included in the proposed plant design.
» The 320 MW RMPP, in isolation, is unlikely to make a substantive (less than 5%) contribution to cumulative ambient air pollutant concentrations. However, the cumulative contribution of gas-to-power projects in the Richards Bay airshed, could – in the medium- to long-term – add up to 14% of the National Ambient Air Quality Standards, most strongly influencing the ambient NO2 concentrations.
» The baseline air pollutant concentrations show exceedances of short-term (hourly and/or daily average) pollutant concentrations due to existing sources of pollution in the airshed. The potential exists, therefore, that the cumulative impact may (in the medium- to long-term) reflect exceedances of the NAAQS but the contribution of the gas-to-power projects will be limited and acceptable.

From an air quality perspective, it is the opinion of the specialist that the project be authorised and licensed to operate, on condition that:

» Emissions be monitored as per standard practice for the appropriate listed activity, controlled emitters, and non-classified boilers.
» Emissions are maintained at or lower than the Minimum Emission Standards appropriate for the listed activity and controlled emitters.
» Conformance with the environmental management programme.

10.2.5 Impacts on Climate Change

The proposed 320MW RMPP's emissions will contribute to climate change on a global scale, which will, ultimately, impact South Africa. South Africa's Nationally Determined Contribution (NDC) submitted in Paris in 2015 sets out the nation's emissions trajectory up to 2050. South Africa's emissions are expected to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter (the 'peak, plateau and decline trajectory'). The country's pledge for the peak, plateau and decline (PPD) trajectory is set to emit between 398 $MtCO_2e$ and 614 $MtCO_2e$ between 2025 and 2030.

As determined through the Climate Change Impact Assessment (**Appendix I**), the magnitude of the impact of the Project in relation to South Africa's carbon budget is considered to be very high over the life of the Project, as the Project's emissions exhaust 0.62% of the carbon budget (where a value greater than 0.227% is considered very high). However, the use of gas as an energy source in electricity generation is less emissions intensive than diesel or coal-based power. Thus, the use of gas for electricity generation will reduce the amount of GHG emissions and pollutants produced in the generation of electricity. The inclusion of the 320MW RMPP onto the grid could contribute to a potential net reduction in GHG emissions from the grid if the corresponding amount of renewable electricity generation capacity is installed.

Based on the findings of the climate change assessment, it is the opinion of the specialist that the 320MW RMPP be authorised and licensed to operate on condition that all recommendations are implemented prior to, or as conditions to the approval of, the EIA.

10.2.6 Visual Impacts

The Visual Impact Assessment (**Appendix K**) undertaken determined that the 320MW RMPP is not expected to have a significant visual impact within the larger study area. Due to the general absence of sensitive visual receptors within closer proximity to the power plant, with the exception of observers travelling along the R34 arterial road, there are no areas of significant potential visual impact. The R34 road is therefore the only receptor identified as having a potential visual impact of higher significance. Even then it is unlikely that observers would be exposed to the infrastructure due to the depressed nature of the road and the vegetation cover north of the road.

The anticipated visual impacts , post mitigation, range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed power plant.

Considering all factors, it is recommended that the 320MW RMPP project as proposed be supported, subject to the implementation of the recommended mitigation measures and management programme.

10.2.7 Noise Impacts

The study area has an industrial character, with various active industrial activities and night-time sound levels typical of urban area (with main roads, business and workshops). The existing night-time sound levels at the site are higher than the recommended sound levels for residential use (i.e. 55 dBA). As a result, the criteria considered to determine whether a noise impact would result from the development was that the proposed project should not change the existing ambient sound levels with more than 3 dB.

The Noise Impact Assessment (**Appendix J**) included the conceptualisation of potential scenarios for the future proposed construction and operational phases, with the output of the modelling exercise indicating a potential noise impact of low significance for the construction and operational phases. No mitigation or management measures are required or recommended to reduce noise levels.

Similarly, no additional acoustic studies are recommended for this development, and it will not be required to develop or implement an environmental noise monitoring programme considering:

» the developmental character of the area;
» the results from the night-time ambient sound level measurements;
» the projected low significance of the noise impacts

It is therefore recommended that the proposed 320MW RMPP gas to power project be authorized from an acoustic perspective.

10.2.8 Impacts on Archaeology and Palaeontology

No heritage resources of significance were recorded within the study site. The desktop study indicated that several human settlements have the potential to occur in the general study area; however, none occurred within the 320MW RMPP project area. The study area consists of old agricultural fields.

Although considered unlikely, the main issue for this project from a heritage perspective will be the potential to intersect human remains during excavations for the development of the 320MW RMPP (**Appendix G**). The impact significance is assessed as low. No impacts on archaeological and palaeontological resources are expected in this project study area.

The specialist study recommended that the proposed 320MW RMPP road should be authorised from an archaeological perspective with the implementation of the recommended mitigation measures, when required.

10.2.9 Socio-economic Impacts

The Socio-economic Impact Assessment (**Appendix M**) identified both positive and negative impacts to be associated with both the construction and operation phases of the project.

During the construction phase, the positive impacts expected to occur include impact on production, impact on GDP, employment creation, skills development, and improvements of household income and standard of living. The significance of the positive construction phase impacts ranges from high to medium, following the implementation of the recommended enhancement measures.

Negative impacts expected to occur during construction include those associated with in-migration of people, safety and security impacts, impacts on daily living and movement patterns, and nuisance impacts associated with noise and dust. The significance of the negative construction phase impacts is expected to be low, following the implementation of the recommended mitigation measures. No negative impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, mainly only positive impacts are expected and include impact on production, impact on GDP, employment creation, skills development, improvements to household income and standard of living, increased government revenue, improvement in energy sector generation and economic and social upliftment. The significance of the impacts for the operation phase are medium to high, following the implementation of the recommended enhancement measures.

The only negative impacts identified for the operational phase relates to impacts on sense of place. As a result of the industrial nature of the area within which the project is proposed, the impact is expected to be of low significance.

Overall, numerous positive socio-economic impacts will occur as a result of the 320MW RMPP and these positive impacts far outweigh any potential negative impacts that might occur. It was concluded by the specialist that the development of the 320MW RMPP is supported from a social perspective.

10.2.10 Traffic Impacts

Impacts on traffic are expected along routes used for delivery of project components, construction equipment and materials during operation and along routes used for delivery of LPG during operation. The Traffic Impact Assessment (**Appendix L**) identified that the main potential traffic impacts will occur during the construction and decommissioning phases where the delivery and decommissioning of the components of the proposed facility will generate significant traffic. The duration of these phases is short term, i.e. the impact of the traffic generated during the construction and decommissioning phases of the proposed facility on the surrounding road network is temporary, and will be low significance with implementation of mitigation measures. The operational phase of the proposed facility, which includes the delivery of LPG to the site, will not add any significant traffic to the road network.

The proposed access point is deemed feasible as it follows an existing road and allows direct access to the proposed site. The proposed emergency access is deemed acceptable as it will not be used as an access point to the proposed site.

Based on the outcome of the assessment, the impacts associated with the 320MW RMPP are considered acceptable from a traffic impact perspective with the implementation of the recommended mitigation measures and the specialist concluded that it can therefore be authorised.

10.2.11 Impact of Unplanned Events

The Quantitative Risk Assessment (QRA) assessed the risk impacts of the 320MW RMPP associated with the project site for the life-cycle of the project. The following installations were considered for analysis:

- LPG installation, including road tanker offloading bay, LPG storage bullets, LPG vaporisers and pipeline to the respective gensets.
- Battery Energy Storage System (BESS)
- Diesel Storage and Offloading

The main risks identified for the 320MW RMPP in the QRA (**Appendix N**) due to loss of containment of hazardous components include exposure to thermal radiation from fires and overpressure from explosions. A large release of LPG could extend to the Alton industrial area and could reach the Mondi site to the west. No residential area or vulnerable institutions would be seriously impacted with the construction and operation of the 320 MW RMPP. Impacts assessed for the LPG, diesel and BESS installations were determined to be of low significance.

No fatal flaws were identified that would prevent the project proceeding to the detailed engineering phase of the project and the specialist concluded that they support the project subject to the mandatory completion of a Major Hazard Installation (MHI) risk assessment prior to construction of the 320MW RMPP.

10.1.12 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the 320MW RMPP throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The assessment of the cumulative impacts was undertaken through the consideration of impacts in isolation and compared to the cumulative impacts of the 320MW RMPP and other industrial developments at a scale specifically identified by each specialist (refer to **Appendix D** to **Appendix N** and Chapter 9 of the EIA).

The significance of the cumulative impacts associated with the development of 320MW RMPP ranges from low to high, depending on the impacts being considered.

Based on the specialist cumulative assessment and findings, the development of the 320MW RMPP, other industrial activities, RMPP projects, and gas power developments within a 10km radius, it can be concluded that cumulative impacts will be of a low to medium significance, depending on the impact being considered. Impacts associated with climate change are potentially high but less than what would result from the alternative use of coal or diesel and can be mitigated through avoided emissions as the addition of the 320MW RMPP to the national grid has the potential to enable the expansion of South Africa's renewables generation capacity in execution of South Africa's energy transition strategy. There are no impacts or risks identified to be considered as unacceptable with the development of 320MW RMPP when considered together with other developments within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

The limited potential for cumulative impacts and risks makes the location of this project within the identified site of the Alton Industrial area a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

10.2. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the project site, specific environmental features and areas were identified which will be impacted by the placement of the 320M RMPP. The current condition of the features identified (i.e. intact or disturbed) informed the sensitivity of the environmental features and the capacity for disturbance and change associated with the proposed development. The environmental sensitivity features and areas identified within the development site are illustrated in Figure 10.1. The only area of high sensitivity identified is the *Phragmites - Typha* channelled valley bottom located at the eastern boundary of the site. Even though this wetland was artificially channelled in the 1970's, this wetland is ecologically important and sensitive at a local scale. A 29 m buffer has been set for the wetland based on a combination of the EKZNW biodiversity guidelines (EKZNW 2016) and the guidelines for the determination of buffer zones for rivers, wetlands and estuaries by Macfarlane et al. (2017). The proposed development has taken cognisance of the buffer zone, excluding activities from this area.

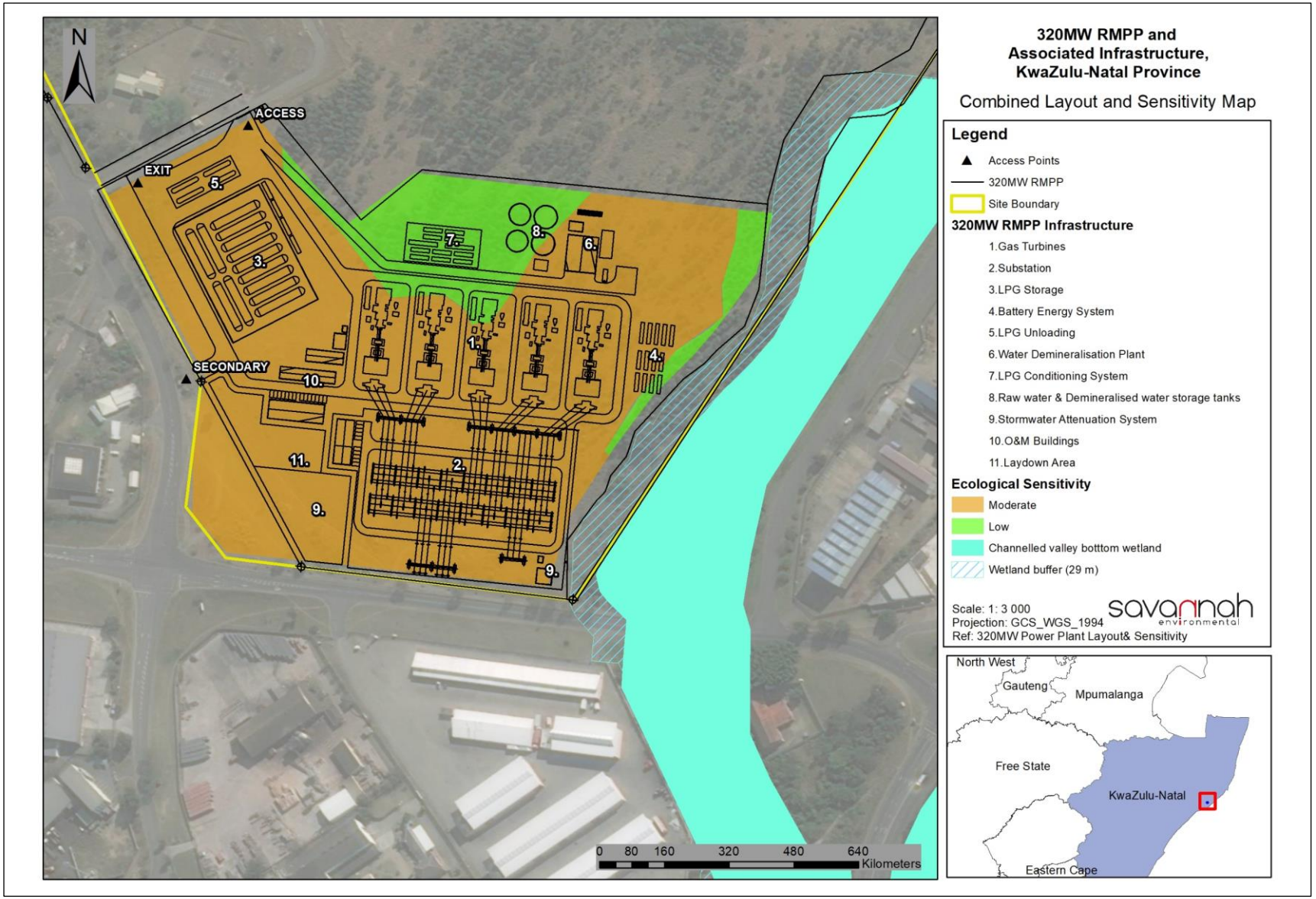

Figure 10.1: Environmental sensitivity map of the project site overlain by the layout assessed for 320MW RMPP

10.4. Overall Conclusion (Impact Statement)

The construction and operation of the 320MW RMPP on the project site located near Alton, Richards Bay in the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality has been proposed by Phinda A technically viable project site and development footprint was proposed by the developer and assessed as part of the EIA process. The environmental assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA Report.

The developer has proposed a technically viable and suitable layout for the project and associated infrastructure which has been assessed as part of the independent specialist studies. The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of 320MW RMPP. All impacts associated with the project can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

The layout map (including all associated infrastructure) is included as **Figure 10.4** and is considered to be the preferred layout for 320MW RMPP. This layout has taken cognisance of the identified wetland and associated 29m buffer zone, excluding activities from this area. The layout is therefore considered as the most appropriate from an environmental perspective and is considered to be acceptable within all fields of specialist study undertaken for the project.

Through the assessment of the development of the 320MW RMPP within the project site it can be concluded that the development of the facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

10.5. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer which avoids all identified highly sensitive environmental features within the project site, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the 320MW RMPP is acceptable within the landscape and can reasonably be authorised (**Figure 10.4**). The recommended validity period for the environmental authorisation is 10 years.

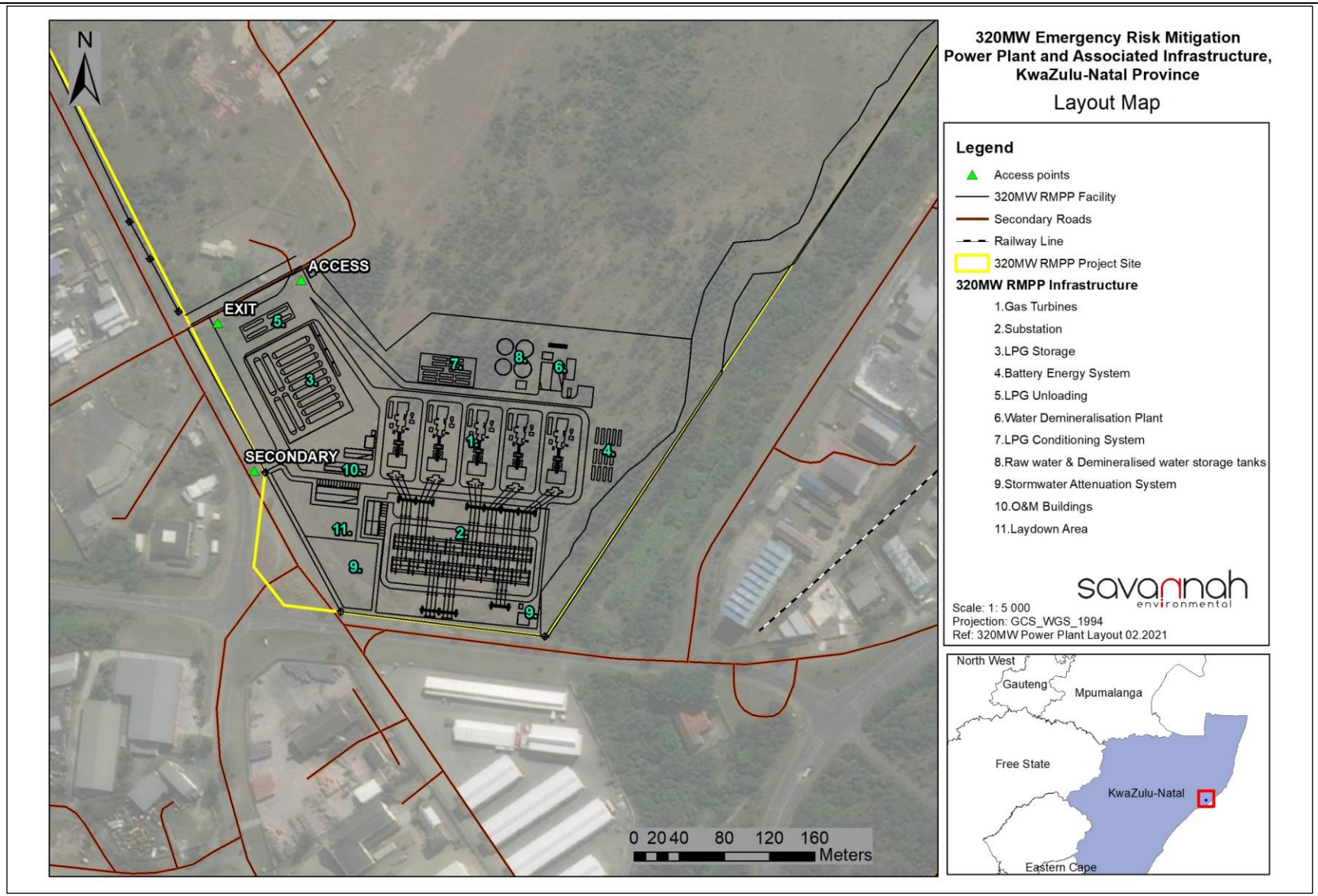

Figure 10.4: Layout map of the preferred development footprint for the 320MW RMPP, as was assessed as part of the EIA process (A3 map included in **Appendix N**)

The authorisation would include the following key infrastructure and components:

- Main Power Island consisting of aeroderivative gas turbines operated in open cycle comprising of air intake, air filter structures and exhaust stack for the generation of electricity using LPG.
- Battery storage system and emergency generator for start-up power to the first gas engine / turbine.
- Auxiliary transformers.
- Balance of Plant systems.
- Dry Cooling systems.
- Auxiliaries.
- Four LPG truck unloading gantries connected onsite by pipeline to the LPG storage.
- LPG storage comprising of up to 10 000m^3 of storage in total, comprising of 13 bullets.
- LPG vaporisation and onsite piping to deliver gas to the turbines.
- Demineralisation water treatment plant.
- Clarified water storage tanks and demineralised water storage tanks.
- Three effluent reticulation systems - 1) sanitary wastewater system; 2) zero liquid discharge system for treatment of demineralisation plant effluent and 3) oily water separator and storm water drainage system including attenuation basin.

The following key conditions would be required to be included within an authorisation issued for the 320MW RMPP:

- The 320MW RMPP must be located on Remainder of Erf 1854 and Portion 2 of Erf 1854 within the Alton Industrial Zone, Richards Bay.
- All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices D to M**, are to be implemented.
- The EMPr as contained within **Appendix K** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the 320MW RMPP in order 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.
- A pre-construction walk-through of the final development footprint for species of conservation concern that may be affected and that can be translocated as well as comply with the KZN Nature Conservation Ordinance and DEDT&EA permit conditions, must be undertaken prior to the commencement of the construction phase.
- Before construction commences individuals of listed species within the development footprint that would be affected, must be counted, and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey, if required. Permits from the relevant provincial authorities, i.e. the KZN DEDT&EA, must be obtained before the individuals are disturbed.
- The project footprint must be kept as small as possible.
- An alien vegetation management plan should be compiled during the planning phase and implemented concurrently with the commencement of construction. Regular inspection for alien and invasive vegetation, to limit their spread into the wetland.
- Obtain all other mandatory and environmental permits for the project, as required.

CHAPTER 11. REFERENCES

Air Quality

Amdur, M. (1978). Effects of Sulfur Oxides on Animals. In J. Nriagu, *Sulphur in the Environment. Part II: Environmental Impacts* (pp. 61 -74). Toronto: John Wiley and Sons.

Carslaw, D. (2019). *The openair manual - open-source tools for analysing air pollution data. Manual for version 2.6-5.* King's College London.

Carslaw, D., & Ropkins, K. (2012). openair - an R package for air quality data analysis. *Environmental Modelling and Software, 27-28*, 52 - 61.

CEPA/FPAC Working Group. (1999). *National Ambient Air Quality Objectives for Particulate Matter. Part 1: Science Assessment Document.* Gatineau, Quebec: Canadian Environmental Protection Agency (CEPA) Federal-Provincial Advisory Committee (FPAC) on Air Quality Objectives and Guidelines.

CERC. (2004). *ADMS Urban Training. Version 2. Unit A.*

CLRTAP. (2017). *Mapping Critical Levels for Vegetation, Chapter III of Manual on methodologies and criteria for modelling and mapping critical loads and levels and air pollution effects, risks and trends.* Germany: UNECE Convention on Long-range Transboundary Air Pollution and German Environment Agency (Umweltbundesamt – UBA) . Retrieved 08 26, 2020, from https://www.umweltbundesamt.de/en/manual-for-modelling-mapping-critical-loads-levels?parent=68093

Coppock, R., & Nostrum, M. (1997). *Toxicology of oilfiend pollutants in cattle and other species.* Vegreville, Alberta: Alberta Research Council, ARCV97-R2,.

Corn, M., Kotsko, N., Stanton, D., Bell, W., & Thomas, A. (1972). Response of Cats to Inhaled Mixtures of SO2 and SO2-NaCl Aerosol in Air. *Archives of Environmental Health, 24*, 248-256. doi:https://doi.org/10.1080/00039896.1972.10666079

Costa, D., & Amdur, M. (1996). Air Pollution. In C. Klaasen, M. Amdur, & D. J, *Casarett and Doull's Toxicology: The Basic Science of Poisons* (pp. 857-882). New York: McGraw-Hill.

Cox, B., Gasparrini, A., Catry, B., Fierens, F., Vangronsveld, J., & Nawrot, T. (2016). Ambient Air Pollution-Related Mortality in Dairy Cattle: Does It Corroborate Human Findings? *Epidemiology, 27*(6), 779-786. doi:10.1097/EDE.0000000000000545

Ernst, W. (1982). Monitoring of particulate pollutants. In L. Steubing, & H.-J. Jager (Ed.), *Monitoring of Air Pollutants by Plants: Methods and Problems 24 - 25 September 1981* (pp. 121 - 128). Osnabriick (F.R.G.): Proceedings of the International Workshop,.

Farmer, A. (1993). The effects of dust on vegetation—a review. *Environmental Pollution, 79*(1), 63-75. doi:https://doi.org/10.1016/0269-7491(93)90179-R

Gonzalez-Salazar, M., Kirsten, T., & Prchlik, L. (2018). Review of the operational flexibility and emissions of gas- and coal-fired power plants in a future with growing renewables. *Renewable and Sustainable Energy Reviews, 82*(1), 1497-1513. doi:10.1016/j.rser.2017.05.278

Harmens, H., Mills, G., Hayes, F., Williams, P., Temmerman, L., Emberson, L., . . . Fuhrer, J. (2005). *The International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops Annual Report (2004/05).*

Hirano, T., Kiyota, M., & Aiga, I. (1995). Physical effects of dust on leaf physiology of cucumber and kidney bean plants. *Environmental Pollution, 89*, 255-261.

IFC. (2007). *Environmental, Health, and Safety Guidelines: General EHS Guidelines - Air Emissions and Ambient Air Quality.* Washington DC: International Finance Corporation, part of the World Bank Group. Retrieved from https://www.ifc.org/ehsguidelines

Krotkov, N., Lamsal, L., Marchenko, S., Celarier, E., Bucsela, E., Swartz, W., . . . and the OMI core team. (2019). *OMI/Aura NO2 Cloud-Screened Total and Tropospheric Column L3 Global Gridded 0.25 degree x 0.25 degree V3.* NASA Goddard Space Flight Center, Goddard Earth Sciences Data and Information Services Center (GES DISC),. Retrieved from https://doi.org/10.5067/Aura/OMI/DATA3007

Li, C., Krotkov, N., & Leonard, P. (2020). *OMI/Aura Sulfur Dioxide (SO2) Total Column L3 1 day Best Pixel in 0.25 degree x 0.25 degree V3.* Greenbelt, MD, USA: Goddard Earth Sciences Data and Information Services Center (GES DISC),. Retrieved from https://doi.org/10.5067/Aura/OMI/DATA3008

Menzel, D. (1994). The toxicity of air pollution in experimental animals and humans: the role of oxidative stress. *Toxicology Letters, 72*(1-3), 269-277.

MFE. (2004). *Health effects of CO, NO2, SO2, ozone, benzene and benzo(a)pyrene in New Zealand, Air Qualit Technical Report No. 43.* Wellington, New Zealand: New Zealand Ministry for the Environment. Retrieved from https://www.mfe.govt.nz/sites/default/files/air-quality-tech-report-43.pdf

Naidoo, G., & Chirkoot, D. (2004). The effects of coal dust on photosynthetic performance of the mangrove, Avicennia marina in Richards Bay, South Africa. . *Environmental Pollution, 127*, 359-366.

Newman, J. (1979). Effects of industrial air pollution on wildlife. *Biological Conservation, 15*(3), 181-190. doi:https://doi.org/10.1016/0006-3207(79)90039-9

NPI. (2008). *Emission Estimation Technique Manual for Combustion Engines. Version 3.*

Obaid, J., Ramadan, A., Elkamel, A., & Anderson, W. (2017). Comparing non-steady state emissions under start-up and shut-down operating conditions with steady state emissions for several industrial sectors: A literature review. *Energies, 10*(179), 15pp. doi:10.3390/en10020179

Platnick, S., Hubanks, P., Meyer, K., & King, M. (2015). *ODIS Atmosphere L3 Monthly Product (08_L3)*. NASA MODIS Adaptive Processing System, Goddard Space Flight Center. Retrieved from http://modaps.nascom.nasa.gov/services/about/products/c6/MOD08_M3.html

Ricks, G., & Williams, R. (1974). Effects of atmospheric pollution on deciduous woodland part 2: effects of particulate matter upon stomatal diffusion resistance in leaves of Quercus petraes (Mattuschka) Leibl. *Environmental Pollution,* 6(2), 87–109. doi:https://doi.org/10.1016/0013-9327(74)90026-3

Spencer, S. (2001). Effects of coal dust on species composition of mosses and lichens in an arid environment. . *Arid Environments, 49*, 843-853.

Tiwary, A., & Colls, J. (2010). *Air pollution: Measurement modelling and mitigation. 3rd edition.* London and New York: Routledge.

Tiwary, A., & Colls, J. (2010). *Air pollution: measurement, monitoring and mitigation* (3rd Edition ed.). Oxon: Routledge.

US EPA. (1998). *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts.* Research Triangle Park, NC.: U.S. Environmental Protection Agency EPA-454/R-98-019.

US EPA. (2000). *AP42, 5th Edition, Volume 1, Chapter 3: Stationary Internal Combustion Sources, 3.1 Stationary Gas Turbines.*

US EPA. (2011). *AP 42, 5th Edition, Volume I, Chapter 13: Miscellaneous Sources, 13.2.1 Paved Roads.* Retrieved from http://www.epa.gov/ttn/chief/ap42/

Van den Hoven, R. (2011). Air Pollution and Domestic Animals. In A. (. Moldovean, *Air Pollution New Developments* (pp. 179-202). Rijeka: Intech.

Warner, J. X., Wei, Z., Strow, L., Dickerson, R., & Nowak, J. (2016). The global tropospheric ammonia distribution as seen in the 13-year AIRS measurement record. *Atmospheric Chemistry and Physics, 16*, 5467 - 5479. doi:10.5194/acp-16-5467-2016

Aquatic

Airshed Planning Professionals (2021) *Atmospheric Impact Report: Proposed 320 MW Emergency Risk Mitigation Power Plant, near Richards Bay, KwaZulu-Natal Province*. Report number: 20SAV03. Midrand, South Africa (February 2021).

Anderson, G. 2019. Heritage Survey of the Proposed 3140MW Combined Cycle Power Plant (CCPP) Power Project at Erf 1854 Alton, Richards Bay, KwaZulu-Natal. For Exigent Engineering. Umlando: Archaeological Surveys and Heritage Management, September 2019.

Davies Lynn & Partners, 2019. Phinda Combined Cycle Power Plant (CCPP) on Lot 1854, Alton, Richards Bay. Preliminary Geotechnical Investigation, September 2019.

Department of Water Affairs and Forestry (DWAF). 1999. *Resource Directed Measures for Protection of Water Resources.* Volume 4. Wetland Ecosystems Version 1.0. Pretoria.

Du Plessis J, Russo IM, Child MF. 2016. A conservation assessment of *Mastomys* spp. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

DWAF. 2005. *A practical field procedure for identification and delineation of wetlands and riparian areas.* Department of Water affairs and Forestry. Pretoria. South Africa.

DWAF. 2008. *Updated manual for the identification and delineation of wetlands and riparian areas.* Department of Water affairs and Forestry. Pretoria. South Africa.

Department of Water Affairs (DWA). 2014. *Resource Directed Measures: Reserve determination study of selected surface water and groundwater resources in the Usutu/Mhlathuze Water Management Area. Wetland Prioritisation.* Report produced by Tlou Consulting (Pty) Ltd. Report no: RDM/WMA6/CON/COMP/1013.

EKZNW (2010) Terrestrial Systematic Conservation Plan: Minimum Selection Surface (MINSET). Unpublished GIS Coverage [tscp_minset_dist_2010_wll.zip], Biodiversity Conservation Planning Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.

Ezemvelo KZN Wildlife (2016) KZN Biodiversity Spatial Planning Terms and Processes, Version 3.3 Unpublished Report, Biodiversity Spatial Planning and Information Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.

Ewart-Smith, J., Ollis. D., Day J. and Malan H. 2006. *National Wetland Inventory: Development of a Wetland Classification System for South Africa.* Water Research Council project number K8/652.

Exigent, 2007. Ecological Assessment and Wetland Delineation for Erf 1854 Alton Development. Compiled for Moondream Trading.

Kotze. D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.S. and Collins, N.B. 2005. WET-EcoServices: A technique for rapidly assessing ecosystem services supplied by wetlands.

KZN CBA Irreplaceable version 26012016 (2016). GIS Coverage [KZN_CBA_Irreplaceable_wll_26012016]. Biodiversity Spatial Planning and Information, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202

Macfarlane, D.M. & Bredin, I.P., 2017. Buffer Zone Guidelines for Rivers, Wetlands and Estuaries Part 1: Technical Manual. WRC Report No TT 715-1-17, Water Research Commission, Pretoria.

Mucina, L. & Rutherford, M.C. 2006. *The vegetation of South Africa, Lesotho and Swaziland.* Strelitzia, 2006

Ollis, D., Snaddon, K., Job, N. and Mbona, N. 2013. *Classification System for Wetlands and other Aquatic Ecosystems in South Africa USER MANUAL: Inland Systems*. SANBI Biodiversity Series 22.

Phipson, J. S. 2020. An Agricultural Potential and Soils Impact Assessment, Mitigation measures and Recommendations for the Civil Works associated with the proposed 320MW Emergency Risk Mitigation Power Generation Initiative located in the Alton Industrial Complex and situated on Portion 2 of Erf 1854, Rem of Erf 1795 and Portions 1 of 1795 and Portion 1 of Erf 1795 Richards Bay, in the uMhlathuze Local Municipality, King Cetshwayo District Municipality, Province of KwaZulu-Natal, in extent 7.5 Ha. Mzansi Agriculture: Agribusiness and Environmental Consultant, 14 September 2020.

Roberts, D.L., Botha, G.A., Maud, R.R., Pether, J. (2006) Coastal Cenozoic Deposits. In: Johnson, M.R., Anhauser, C.R. and Thomas, R.J. (Eds.), The Geology of South Africa. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria, 605-628.
South African National Biodiversity Institute (2006-2018). *The Vegetation Map of South Africa, Lesotho and Swaziland*, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018.
SDF, 2018. Spatial Development Framework of the City of uMhlathuze Local Municipality, 2017/2018-2021/2022
Van Wyk, B-E, Gericke, N. 2003. *People's plants. A guide to useful plants of Southern Africa*. Briza Publications, Arcadia.
Van Wyk, B-E, Smith, G. 2003. *Guide to the Aloes of South Africa*. Briza Publications, Arcadia.
Van Wyk, B., & Van Wyk, P., 1997. *Field guide to trees of Southern Africa*. Struik Publishers, Cape Town.
Water Research Council, 2018. Development of Citizen Science Water Resource Monitoring Tools and Communities of Practice for South Africa, Africa and the World (WRC Project No. K5/2350).

Websites:

http://pza.sanbi.org/typha-capensis

Heritage

Anderson, G. and Anderson, L. 2009. Heritage Survey Of The Proposed Expansion To The Transnet National Ports Authority, Richards Bay. For MSA Environmental, Legal & Mining Services
Anderson, G. and Anderson, L. 2010a. Heritage Survey Of The Proposed Richards Bay Central Industrial Area. For Coastal & Environmental Services
Anderson, G. and Anderson, L. 2010b. Heritage Survey Of The Nozelela Minerals Sands (Pty) Ltd 33kv Transmission Line. For SRK Consulting
Anderson, G. and Anderson, L. 2015. Alton South Transnet Railway, Richards Bay, KwaZulu-Natal For Exigent Environmental
Anderson, G. and Anderson, L. 2004 – 2018. Annual Report For Archaeological Surveys Of The Zulti North Mining Lease. Report For RBM
Anderson, G. and Anderson, L. 2004 – 2015. Annual reports for Hillendale Mine. Tronox KZN Sands.
Anderson, G. 2020. Heritage Survey Of The Proposed 3140mw Combined Cycle Power Plant (Ccpp) Power Project At Erf 1854 Alton, .Richards Bay, KwaZulu-Natal. For Exigent Engineering
Griffiths, S, 1996. Competition for Land between Conservation and Low Income Settlement Users: The Classical Case of Reserve 6 in Richards Bay., Master's Thesis: University Of Natal
Ntuli, H.S. 2019. Memories Of Victims: The Historical Trajectory Of The Removal Of People From Mandlanzini, South Africa. *Southern Journal For Contemporary History*44 (2):74-95

Noise

Autumn, Lyn Radle. 2007. The effect of noise on Wildlife: A literature review.
Ann Linda Baldwin. 2007. Effect of Noise on Rodent Physiology.
Brüel & Kjær. 2007. Investigation of Tonal Noise.
Colin O'Donnell, Jane Sedgeley. 1994. An Automatic Monitoring System for Recording Bat Activity. 5th ed. Department of Conservation.
Committee of Transport Officials. 2012. TRH 26, South African Road Classification and Access Management Manual. Version 1.0.2012.

Everest and Pohlmann. 2009. Master Handbook of Acoustics. Fifth Edition.
European Commission. 1996. European Commission Green Paper – Future Noise Policy. (Com (96) 540).
European Environmental Agency, 2010. Good practice guideline on noise exposure and potential health effects. EEA Technical report, No. 11/2010, Copenhagen.
Environment & We an International Journal of Science & Technology. "2001. Ambient noise levels due to dawn chorus at different habitats in Delhi. Pg. 134.
Department of Transport. 1988. Calculation of Road Traffic Noise.
D B Stephens and R d Rader. 1983. Effects of Vibration, Noise and Restraint on Heart Rate, Blood Pressure and Renal Blood Flow in the Pig. Department of Physiology and Biophysics University of Southern California Equipment list and Sound Power Level source: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm.
H.C Bennet-Clark. 1994. The Scaling of Song Frequency in Cicadas. The Company of Biologist Limited.
International Finance Corporation. 2007. General EHS Guidelines – Environmental Noise Management.
International council of Mining & Metals. 2006. Good Practice Guidance for Mining and Biodiversity. Pg. 63.
International Organisation for Standardisation. 2002. ISO 13473-2:2002. Characterization of pavement texture by use of surface profiles — Part 2: Terminology and basic requirements related to pavement texture profile analysis.
International Organisation for Standardisation. 1996. ISO 9613-2. Acoustics – Attenuation of sound during outdoors - Part 2: General method of calculation.
Ivan Juragea. 2014. The Environmental Noise Directive at a turning Point. Directorate-General for the Environment, European Commission, p.2.
Janssen, S.A., Vos, H., 2009. A comparison of recent surveys to aircraft noise exposure-response relationships. TNO, Delft.
J.C. Hartley. 1991. Can Bush Crickets Discriminate Frequency? University of Nottingham.
Milieu. 2010. Inventory of Potential Measures for a Better Control of Environmental Noise. DG Environment of the European Commission.
Musina L. & Rutherford. 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
National Park Services. 2000. Soundscape Preservation and Noise Management. Pg. 1.
Norton, M.P. and Karczub, D.G. 2003. Fundamentals of Noise and Vibration Analysis for Engineers. Kjær Second Edition.
South Africa. 1996. National Road Traffic Act, 1996 (Act No. 93 of 1996).
Panatcha Anusasananan, Suksan Suwanarat, & Nipon Thangprasert. 2012. Acoustic Characteristics of Zebra Dove in Thailand. Pg. 4.
South African National Standards. 2004b. SANS 10357:2004. The calculation of sound propagation by the Concave method.
South African National Standards. 2005. SANS 9614-3:2005. Determination of sound power levels of noise sources using sound intensity – Part 3: Precision method for measurement by scanning.
South African National Standards. 2008a. SANS 10103:2008. The measurement and rating of environmental noise with respect to annoyance and to speech communication.
South African National Standards. 2008b. SANS 10328:2008. Methods for environmental noise impact assessments.
South African Water Research Commission. 2009. Water Resources of South Africa (WR2005). WRC Report No.: K5/1491. South Africa: WRC Publications.
Van Riet, W. Claassen, P. van Rensburg, J. van Viegen and L. du Plessis. 1998. Environmental potential atlas for South Africa. Pretoria.
World Health Organization. 1999. Protection of the Human Environment. Guidelines for Community Noise.

World Health Organization. 2009. Night Noise Guidelines for Europe.
Wei, B. L. 1969. Physiological effects of audible sound. AAAS Symposium Science, 166(3904). 533-535.

Quantitative Risk Assessment

CPR 12E (2005). *Methods for Determining and Processing Probabilities ("Red Book")*. Fourth Edition. Apeldoorn: TNO.
CPR 14E (1997). *Methods for the Calculation of Physical Effects ("Yellow Book")*. Third Edition. Apeldoorn: TNO.
CPR 18E (1999). *Guidelines for Quantitative Risk Assessment ("Purple Book")*. First Edition, Apeldoorn: TNO.
DOL (2001). *Occupation Health and Safety Act, 1993: Major Hazard Installation Regulations (No. R692)*. Regulation Gazette. No. 7122, Pretoria, Republic of South Africa: Government Gazette.
HSE (2011). *PADHI: HSE's Land Use Planning Methodology*. Available at: Health and Safety Executive Website. http://www.hse.gov.uk/landuseplanning/ methodology.htm
IGEM/TD/2 (2012) *Assessing the risks from high pressure natural gas pipelines*. Kegworth Institution. of Gas Engineers and Managers
RIVM (2009). *Reference Manual BEVI Risk Assessments*. Edition 3.2. Bilthoven, the Netherlands: National Institute of Public Health and the Environment (RIVM).
SANS 1461 (2018). *Major hazard Installation- Risk Assessment*. Edition 1, Pretoria, South African Bureau of Standards (SABS)
STEPHENS, M. (1970). *Minimizing Damage to Refineries*. US Dept. of the Interior, Offices of Oil and Gas.
https://spectrum.ieee.org/energywise/energy/batteries-storage/dispute-erupts-over-what-sparked-an-explosive-liion-energy-storage-accident

Terrestrial Biodiversity

Airshed Planning Professionals (2021) *Atmospheric Impact Report: Proposed 320 MW Emergency Risk Mitigation Power Plant, near Richards Bay, KwaZulu-Natal Province*. Report number: 20SAV03. Midrand, South Africa (February, 2021).
Anderson, G. 2019. Heritage Survey of the Proposed 3140MW Combined Cycle Power Plant (CCPP) Power Project at Erf 1854 Alton, Richards Bay, KwaZulu-Natal. For Exigent Engineering. Umlando: Archaeological Surveys and Heritage Management, September 2019.
BirdLife International (2021) Important Bird Areas factsheet: Richards Bay Game Reserve. Downloaded from http://www.birdlife.org on 24/01/2021.
Davies Lynn & Partners, 2019. Phinda Combined Cycle Power Plant (CCPP) on Lot 1854, Alton, Richards Bay. Preliminary Geotechnical Investigation, September 2019.
Department of Water Affairs and Forestry (DWAF). 1999. *Resource Directed Measures for Protection of Water Resources.* Volume 4. Wetland Ecosystems Version 1.0. Pretoria.
du Plessis J, Russo IM, Child MF. 2016. A conservation assessment of Mastomys spp. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
Du Preez, L.H. and Carruthers, V.C. 2009. *A complete guide to the frogs of Southern Africa*. Random House Struik, Cape Town.
EKZNW (2010) Terrestrial Systematic Conservation Plan: Minimum Selection Surface (MINSET). Unpublished GIS Coverage [tscp_minset_dist_2010_wll.zip], Biodiversity Conservation Planning Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.

Ezemvelo KZN Wildlife (2016) KZN Biodiversity Spatial Planning Terms and Processes, Version 3.3 Unpublished Report, Biodiversity Spatial Planning and Information Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.
Exigent, 2007. Ecological Assessment and Wetland Delineation for Erf 1854 Alton Development. Compiled for Moondream Trading.
Exigent, 2020. Wetland delineation and functionality assessment for the proposed Combined Cycle Power Plant (CCGT) power project at Erf 1854 Alton, Richards Bay, KwaZulu-Natal.
Hilton-Taylor, C. 1996. *Red Data list of southern African Plants.* Strelitzia 4. National Botanical Institute. Pretoria.
Grundling, P. & Grobler, R. 2005. Peatlands and Mires of South Africa. Stapfia 85, zugleich Kataloge der OÖ. Landesmuseen Neue Serie 35, 379-396.
IUCN 2002. *IUCN Red List categories*. Prepared by the IUCN Species Survival Commission, Gland, Switzerland.
Klein, H. (compiler) 2002. *Weeds, alien plants and invasive plants*. PPRI Leaflet Series: Weeds Biocontrol, No 1.1. ARC-Plant Protection Research Institute, Pretoria. pp. 1-4.)
KZN CBA Irreplaceable version 26012016 (2016). GIS Coverage [KZN_CBA_Irreplaceable_wll_26012016]. Biodiversity Spatial Planning and Information, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202
Landcare South Africa. Brochure. *CARA Legislation Made Easy. The Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA)*.
Mucina, L. & Rutherford, M.C. 2006. *The vegetation of South Africa, Lesotho and Swaziland.* Strelitzia, 2006
Phipson, J. S. 2020. An Agricultural Potential and Soils Impact Assessment, Mitigation measures and Recommendations for the Civil Works associated with the proposed 320MW Emergency Risk Mitigation Power Generation Initiative located in the Alton Industrial Complex and situated on Portion 2 of Erf 1854, Rem of Erf 1795 and Portions 1 of 1795 and Portion 1 of Erf 1795 Richards Bay, in the uMhlathuze Local Municipality, King Cetshwayo District Municipality, Province of KwaZulu-Natal, in extent 7.5 Ha. Mzansi Agriculture: Agribusiness and Environmental Consultant, 14 September 2020.
Roberts, D.L., Botha, G.A., Maud, R.R., Pether, J. (2006) Coastal Cenozoic Deposits. In: Johnson, M.R., Anhauser, C.R. and Thomas, R.J. (Eds.), The Geology of South Africa. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria, 605-628.
South African National Biodiversity Institute (2006-2018). *The Vegetation Map of South Africa, Lesotho and Swaziland*, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018.
Van Wyk, B-E, Gericke, N. 2003. *People's plants. A guide to useful plants of Southern Africa*. Briza Publications, Arcadia.
Van Wyk, B-E, Smith, G. 2003. *Guide to the Aloes of South Africa*. Briza Publications, Arcadia.
Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. 2000. *Medicinal Plants of South Africa*. Briza Publications, Arcadia.
Van Wyk, B., & Van Wyk, P., 1997. *Field guide to trees of Southern Africa*. Struik Publishers, Cape Town.

Websites:

http://pza.sanbi.org/typha-capensis

Traffic

- Google Earth Pro
- Google Maps

• SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
• SANS 1518:2011 Edition 4 – "Transport of dangerous goods — Design, construction, testing, approval and maintenance of road vehicles and portable tanks"
• SANS 10087:2011 Edition 4 - The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial and industrial installations
• National Road Traffic Act (Act No. 93 of 1996)
• National Road Traffic Regulations, 2000
• The Technical Recommendations for Highways (TRH 11): Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
• TMH16, Volume 1 - South African Traffic Impact and Site Traffic Assessment Manual, August 2012

Visual

Chief Directorate National Geo-Spatial Information, varying dates. *1:50 000 Topographic Maps and Data.*
DEA, 2014. *National Land-cover Database 2013-14 (NLC2013-14) and 2018 (NLC2018).*
DEA, 2019. *South African Protected Areas Database (SAPAD_OR_2019_Q4).*
DEA&DP, 2011. Provincial Government of the Western Cape. *Guideline on Generic Terms of Reference for EAPS and Project Schedules.*
Department of Environmental Affairs and Tourism (DEA&T), 2001. *Environmental Potential Atlas (ENPAT) for the KwaZulu-Natal Province.*
NASA, 2018. *Earth Observing System Data and Information System (EOSDIS).*
National Botanical Institute (NBI), 2004. *Vegetation Map of South Africa, Lesotho and Swaziland (Unpublished Beta Version 3.0)*
Oberholzer, B. (2005). *Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.*
The Environmental Impact Assessment Amendment Regulations. In Government Gazette Nr. 33306, 18 June 2010.