Richards Bay Combined Cycle Power Plant (CCPP) Project

KwaZulu-Natal Province

Environmental Impact Assessment Report

March 2019

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PROJECT DETAILS

Title	:	Environmental Impact Assessment Process: Environmental Impact Assessment Report for the Richards Bay Combined Cycle Power Plant (CCPP) project, KwaZulu-Natal Province.
DEA Ref. No.	:	To be announced
Authors	:	Savannah Environmental (Pty) Ltd Shaun Taylor Jo-Anne Thomas Nicolene Venter
Client	:	Eskom Holdings SoC Ltd
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When used as a reference this report should be cited as: Savannah Environmental (2019) Richards Bay Combined Cycle Power Plant (CCPP) project, KwaZulu-Natal Province.

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

Eskom Holdings SOC Ltd (Eskom) proposes to develop a Combined Cycle Power Plant (CCPP) and associated infrastructure, with an installed generating capacity of up to 3 000MW. The proposed project is to be known as the Richards Bay CCPP (RB CCPP), and will be fuelled using natural gas as the main fuel resource and diesel as a back-up resource. The project site is on Portion 2 and Portion 4 of Erf 11376. The site is located in the Richards Bay Industrial Development Zone (IDZ) Phase 1D, approximately 6km south west of Richards Bay, and 4km south west of Alton, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province.

In terms of NEMA, the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)), the development of RB CCPP requires Environmental Authorisation (EA) from the National Department of Environmental Affairs (DEA) subject to the completion of an EIA process, as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326). The need for EA subject to the completion of the EIA process is triggered by the inclusion of, amongst others, Activity 2 of Listing Notice 2 (GNR 325).

Eskom Holdings SoC Ltd (Applicant) has appointed Savannah Environmental (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA process for the proposed RB CCPP and associated infrastructure, KwaZulu-Natal Province.

Savannah Environmental has prepared this EIA Report on behalf of Eskom Holdings SoC Ltd. The Savannah Environmental team for this project includes:

» **Jo-Anne Thomas** – Director at Savannah Environmental (Pty) Ltd. Jo-Anne has a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.
» **Shaun Taylor** – Environmental and lead permitting consultant at Savannah Environmental. Shaun has a Master's degree in Aquatic Health. He has approximately ten (10) years of experience consulting in the environmental field. His competencies are in environmental impact assessments mainly within the renewable energy (wind and solar) sector, as well as for infrastructure (roads, water pipeline and power line) related projects.
» **Nicolene Venter** is a Social and Public Participation Consultant at Savannah Environmental. Nicolene has a Higher Secretarial Certificate from Pretoria Technicon, and a Certificate in Public Relations from the Public Relation Institute of South Africa at Damelin Management School. Nicolene has over 21 years of experience as a Public Participation Practitioner and Stakeholder Consultant, and is a Board Member of the International Association for Public Participation Southern Africa (IAP2SA). Nicolene's experience includes managing the stakeholder engagement components of large and complex environmental authorisation processes across many sectors, with particular experience in the power sector. Most notably on large linear power lines and distribution lines, as well as renewable energy projects.

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

In order to adequately identify and assess potential impacts associated with the project, independent specialists have been appointed as part of the project team and has provided specialist input into this EIA Report. The CV detailing the independent specialist consultants' expertise and relevant experience is provided in **Appendix A**.

This report aims to provide detail pertaining to the significance and potential impacts of the proposed RB CCPP project in order for interested and affected parties to be informed of the proposed activity, to provide comment, and for the competent authority to be able to reach a decision in this regard.

The potential environmental impacts associated with the RB CCPP identified and assessed through the EIA process include:

» Impacts on ecology, flora, fauna and avifauna.
» Impacts on surface water resources.
» Impacts to soils, land-use and agricultural potential.
» Impacts on geohydrology.
» Impacts on heritage resources, including archaeology and palaeontology.
» Impacts on air quality.
» Impacts on climate change.
» Visual impacts on the area imposed by the components of the facility.
» Positive and negative socio- economic impacts.
» Traffic impacts.

As the project could pose risks to the communities in the area (as a result of fires or possible explosions), a quantitative risk assessment was undertaken.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of RB CCPP within the project site. Eskom has proposed a technically viable and suitable design and layout for the project site and associated infrastructure, which have been assessed as part of the independent specialist studies. All impacts associated with the proposed layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. However, as impacts on wetlands cannot be avoided, approval of a wetland offset plan will be required to be undertaken prior to construction of the proposed RB CCPP facility.

The draft EIA report is available for review from **Sunday, 24 March to Friday, 26 April 2019** at the following locations:

» Richards Bay Public Library, No. 5 Kruger Rand Road, Richards Bay;
» Empangeni Public Library Cnr. Union & Maxwell Streets, Empangeni;
» https://www.savannahsa.com/public-documents/energy-generation/

To obtain CD copies, further information, register on the project database, or submit written comment, it was advised to please contact:

Please submit your comments by **Friday 26 April 2019** to:
Nicolene Venter of **Savannah Environmental** 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.

All comments received during the review period have been included within the Comments and Responses report (**Appendix C8**) herein submitted to the Department of Environmental Affairs (DEA) for decision-making.

EXECUTIVE SUMMARY

Eskom Holdings SOC Ltd (Eskom) proposes to develop a Combined Cycle Power Plant (CCPP) and associated infrastructure, with an installed generating capacity of up to 3 000MW. The proposed project is to be known as the Richards Bay CCPP (RB CCPP), and will be fuelled using natural gas as the main fuel resource and diesel as a back-up resource. The project site is on Portion 2 and Portion 4 of Erf 11376. The site is located in the Richards Bay Industrial Development Zone (IDZ) Phase 1D, approximately 6km south west of Richards Bay, and 4km south west of Alton, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province (**Figure 1**).

The main infrastructure associated with the facility includes the following:

» Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
» HRSG to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
» Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
» Bypass stacks associated with each gas turbine.
» Dirty Water Retention Dams and Clean Water Dams
» Storm water channels
» Waste storage facilities (general and hazardous).
» Exhaust stacks for the discharge of combustion gases into the atmosphere.
» A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
» Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (to be supplied by the Local Municipality).
» Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
» Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
» A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process
» Diesel off-loading facility and storage tanks.
» Ancillary infrastructure including access roads, emergency access road warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
» A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process.

After a site selection and environmental screening assessment, the project site was considered to be feasible from a technical perspective due to its location in relation to the Port of Richards Bay (where the fuel supply is expected to be available), access to the grid, extent of the property, i.e. 71ha, and access from the surrounding area. It was therefore concluded that this site be taken forward for detailed investigation through the EIA process.

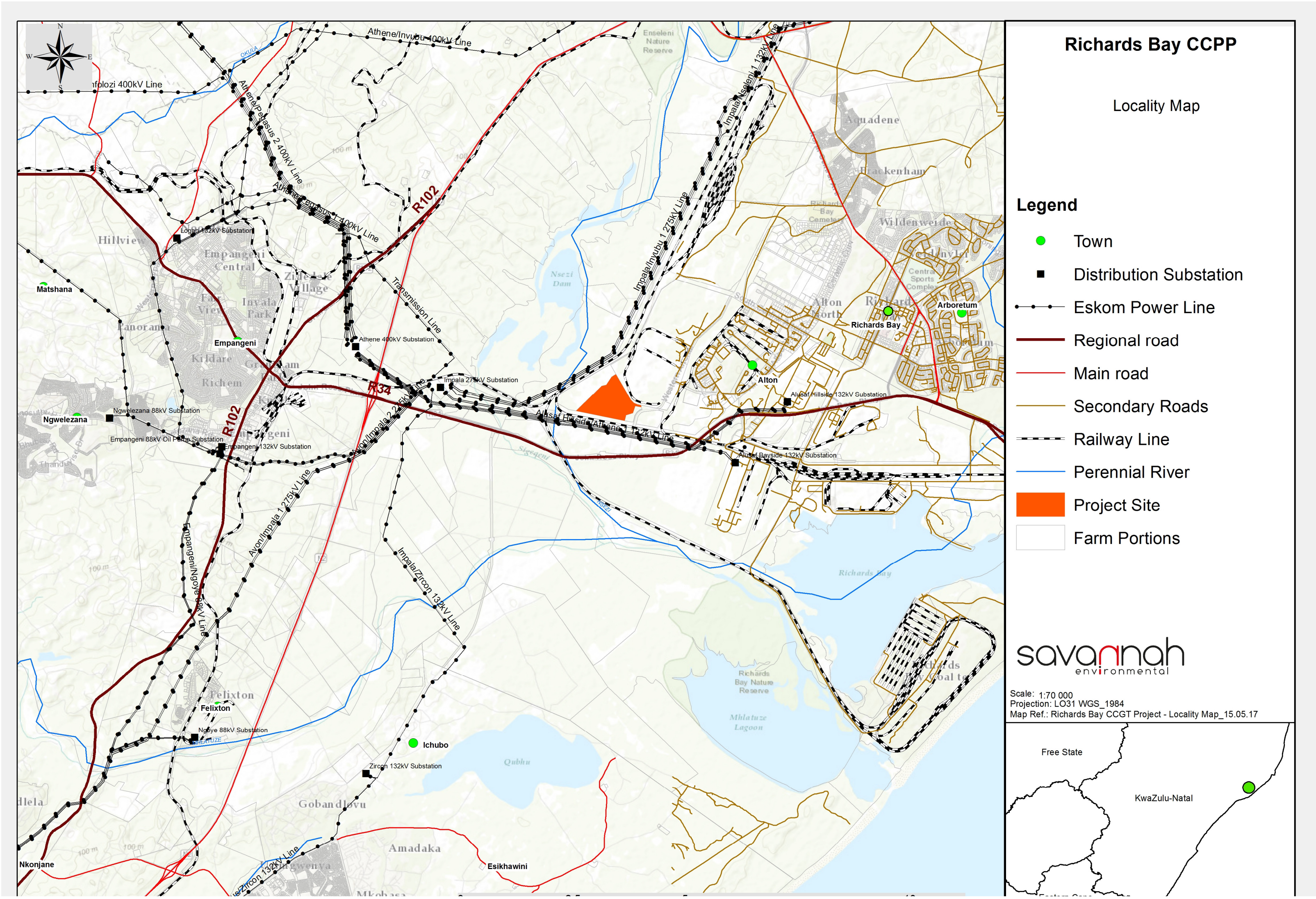

Figure 1: Locality map illustrating the location of the project site under investigation for the RB CCPP

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures and wetland offset plan are implemented, as specified by the specialists.

The potential environmental impacts associated with the RB CCPP identified and assessed through the EIA process include:

» Impacts on ecology, flora, fauna and avifauna.
» Impacts on surface water resources.
» Impacts to soils, land-use and agricultural potential.
» Impacts on geohydrology.
» Impacts on heritage resources, including archaeology and palaeontology.
» Impacts on air quality.
» Impacts on climate change.
» Visual impacts on the area imposed by the components of the facility.
» Positive and negative socio- economic impacts.
» Traffic impacts.

As the project could pose risks to the communities in the area (as a result of fires or possible explosions), a quantitative risk assessment was undertaken.

Impacts on Ecology (fauna, flora and avifauna)

The Ecological Impact Assessment assessed the impact of the RB CCPP on the sensitive ecological features present within the project site for the life-cycle of the project.

From a vegetation perspective, the project site is not regarded as being particularly sensitive. Reasons for this include the following:
» Extensive developments on surrounding areas have effectively isolated this site from similar plant communities. As a result, plant populations were subdivided and reduced, thereby increasing their probability of extinction (Collinge *et al*., 1996).
» Large areas on the project site showed population increases in *Helichrysum kraussii* and *Dichrostachys cinerea* plants, an indication of past disturbance.
» Deforestation of large woodland tree species particularly within the *Helichrysum kraussii – Parinari capensis*, and to a lesser extent in the *Imperata cylindrica – Syzygium cordatum* vegetation communities.
» In terms of land use planning, the project site falls within a zone intended for the development of High Impact Industry and is not recognised as an area earmarked for conservation.
» The project site falls within the Industrial Development Zone (IDZ) of Richards Bay where future developments are planned. Full restoration of the original environment and biota will thus not be feasible in the long term.
» A number of provincially protected and flora endemic species are present on the project site. However, these species are not restricted to the project site. Threatened plant species that could potentially be present include species such as geophytes and herbs that can be easily translocated.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss of sensitive terrestrial ecosystems, loss of critical biodiversity areas (CBAs), loss of sensitive aquatic ecosystems, loss of natural vegetation, loss / disturbance of local fauna populations, noise and artificial light disturbances, soil erosion and sedimentation, pollution of soils and habitat. Due to the relatively disturbed nature of the site, the significance of the construction phase impacts ranges from medium to low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include introduction and spread of alien invasive plant species and weeds, disturbance of local fauna communities, noise and artificial light disturbance, pollution of soils and habitat. The significance of the impacts for the operation phase are low, following the implementation of the recommended mitigation measures by the specialist.

From the findings of the Ecological Impact Assessment it can be concluded that ecological impacts of medium to low significance can be expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be appropriate and acceptable from an ecological perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

Impacts on Surface Water Resources

The Surface Water Resources Impact Assessment assessed the impact of the RB CCPP on the sensitive water resources present within the project site for the life-cycle of the project. Approximately 91 ha of wetlands have been delineated for the project, with approximately 38ha and 53ha being delineated for the project area and biodiversity offset area to the north of the site, respectively.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss / degradation of wetlands, spread of / or establishment of alien and / or invasive plant species, sedimentation and erosion of watercourses, impaired water quality and alteration of the hydrological regime. The significance of the construction phase impacts ranges from high to medium to low, following the implementation of the recommended mitigation measures by the specialist. Importantly, the impact of high significance relates to the loss of wetlands as a result of the proposed development. In this respect, avoidance, mitigation and rehabilitation options are not possible due to the extent of the proposed development, and therefore a wetland offset plan was deemed required in line with the mitigation hierarchy to offset the significant residual impacts associated with the proposed loss of the wetlands on the project site.

During the operation phase, the anticipated impacts include impaired water quality and alterations in the hydrological regime. The significance of the impacts for the operation phase are medium, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Surface Water Resources Impact Assessment it can be concluded that ecological impacts of high to medium to low significance are expected as a result of the proposed RB CCPP. As mentioned above, a wetland offset plan was deemed required in line with the mitigation hierarchy to offset the significant residual impacts associated with the proposed loss of the wetlands on the project site. This plan has been developed and is under a consultation process with all affected stakeholders.

The proposed development is considered to be acceptable from a surface water resources perspective. The specialist has, therefore, indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures and careful consideration with regards to the requirements of a wetland offset plan.

Impacts on Land Use, Soil and Agricultural Potential

The Soil and Agricultural Potential Impact Assessment assessed the impact of the RB CCPP on the soils present within the project site for the life-cycle of the project.

The soils in the project area are dominated by sandy alluvial soils. the areas with accumulated windblown sands were classified as Namib soils, which accounted for 27.6 ha (38.8 %) of the project area. The areas with moisture at depths greater than 30cm were classified as the Longlands soil form, which accounted for 3.3 ha (4.6 %) of the project area. The soil forms with moisture at or near the surface were classified as Katspruit / Westleigh soil forms, which accounted for 37.5 ha (52.8 %) of the area.

In terms of agricultural potential, the project area is currently being utilised for grazing, no agriculture is possible due to the shallow water table and the sandy nature of the soils present. There are extensive pans across the site and the vegetation is sparse in places. in terms of land potential, the land capability classes were rated to have the following land potentials:

» Class III = L2 (High Potential);
» Class IV = L3 (Good Potential);
» Class V = Vlei (Wetland); and
» Class VIII = L8 (Very Low Potential).

As the development site has been reserved by the City of uMhlathuze Municipality as part of the Industrial Development Zone (IDZ) to house industrialisation and other strategic projects such as gas to power projects, it is not likely that the site would be used for agriculture in the future.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss of agricultural potential and loss of soil resources. The significance of the construction phase impacts ranges from high to medium, following the implementation of the mitigation measures recommended by the specialist. These impacts can be reduced by keeping the footprints minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites.

From the findings of the Soil and Agricultural Potential Impact Assessment it can be concluded that soil and agricultural potential impacts of high to medium significance are expected as a result of the proposed RB CCPP. The proposed development is considered to be appropriate and acceptable from a soils perspective where mitigation is applied and the soil is handled correctly. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

Impact on Geohydrology

The Geohydrology Impact Assessment assessed the impact of the RB CCPP on the sensitive geohydrological features associated with the project site for the life-cycle of the project. According to the 1:500 000 scale hydrogeological map series (Vryheid, Map sheet 2730) and from available hydrogeological information, Richards Bay groundwater occurs within the inter-granular primary aquifer in the semi consolidated and unconsolidated materials deposited during the Tertiary and Quaternary periods. According to Golder (2014) the depths of boreholes measured within the Richards Bay area varies from 30 to 45 metres below ground level (mbgl) and the aquifer testing conducted indicated the hydraulic conductivity ranging from 0.5 to 5 m/d.

The geohydrological data obtained during the Hydrocensus survey in February 2018 indicated that there are two types of aquifers underlying the site including a shallow primary aquifer and a deep fractured aquifer. The current site groundwater level within the shallow primary aquifer varies from 0.64 to 3.89 mbgl. It is anticipated that a fractured aquifer underlying the site is likely to be located at more than 11 mbgl.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include potential impact on groundwater flow direction and groundwater level due to dewatering to facilitate erection of building foundations, potential impact on surface water bodies and groundwater due to on-site accidental fuel spills and leaks/leachate and infiltration of dirty water. The significance of the construction phase impacts ranges from medium to low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include potential impact on local groundwater and surface water bodies due to possible leakage of diesel from storage facilities and/or pipelines and Emergency backup generators, potential impact on groundwater and surface water bodies due to waste water and solid waste discharges. The significance of the impacts for the operation phase are low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Geohydrology Impact Assessment it can be concluded that geohydrological impacts of low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be acceptable from a geohydrological perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

Impacts on Heritage Resources

The Heritage Impact Assessment assessed the impact of the RB CCPP on the sensitive heritage features present within the project site for the life-cycle of the project. No heritage sites of significance (archaeological, palaeontological, cultural or built heritage) were identified within the proposed development site.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include impacts to archaeological, palaeontological or cultural heritage resources which may be unearthed during excavations on the site. The significance of the construction phase impact is low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures. A Chance Find Procedure is to be implemented however for the project should any sites be identified during the construction process.

No potential impacts were identified for the operation phase.

From the findings of the Heritage Impact Assessment it can be concluded that heritage impacts of low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be acceptable from a heritage perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

Impacts on Air Quality

The Air Quality Impact Assessment assessed the impact of the RB CCPP on the air quality associated with the project site and surrounding area for the life-cycle of the project.

The RBCAA operates 12 ambient monitoring stations, measuring meteorological parameters and ambient SO_2, total reduced sulphur, and PM_{10} concentrations. Annual average PM_{10} concentrations were compliant with the NAAQS at all stations and similarity between years at each station is noted. Annual average SO_2 at all stations was compliant with the NAAQS with a slight trend towards improvement (lower SO_2 concentrations) at all stations.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include emissions from particulate and gaseous pollutants. The significance of the construction phase impact is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include sulphur dioxide emissions and other atmospheric pollutant emissions. The significance of the impacts for the operation phase range from medium to low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Air Quality Impact Assessment it can be concluded that air quality impacts of medium to low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be appropriate and acceptable from an air quality perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures and on condition that:

» Emissions due to construction activities be mitigated using good practise guidelines.
» Maintain SO_2 and NO_X emissions near the emission factor estimates.
» To limit the possibility of off-site SO_2 exceedances during emergency events, it is suggested that Emergency 2-type events be avoided as far as practically possible, by using low sulphur (50 ppm) diesel only, when diesel is used as energy source.

Impacts on Climate Change

The Climate Change Impact Assessment assessed the impact of the RB CCPP on the climate change. The assessment only identified that the relevant impacts associated with the project is in the operation phase of the project.

During the operation phase, the impacts expected to occur include climate change impacts of the estimated Greenhouse Gas Emissions from the proposed RB CCPP. The significance of the operation phase impact is high, following the implementation of the recommended mitigation measures by the specialist. The impact of these emissions is considered as high, due to the impact on the national inventory from a single source (i.e. the RB CCPP project site). The proposed project has options to mitigate its carbon emissions. These options include the switching to alternative fuels such as biogas or biodiesel as well as carbon capture and storage where possible. Implementing these technologies will enable the proposed power plant to greatly reduce its greenhouse gas emissions. As such it is advisable that the design of the project takes into account these options to enable the potential retrofit and implementation during the plant's operation phase. Such mitigation actions will help the proposed plant to take on a shared responsibility for climate change mitigation. In addition, it must be noted that, the most important feature of the proposed CCPP power plant is its potential role in enabling a greater uptake of renewable energy onto the South African grid. The load following capacity that it could offer would enable the national grid to accommodate greater proportions of variable renewable energy, such as solar power and wind energy. This would assist in decarbonising the national grid and reduce emissions within South Africa's national greenhouse gas inventory. This will be a positive contribution to the national commitment to mitigate global climate change.

From the findings of the Climate Change Impact Assessment it can be concluded that climate change impacts of high significance are expected as a result of the proposed RB CCPP. However, it is suggested by the climate change specialist that the proposed CCPP plant load-following capability of the plant be used to maximise the uptake of intermittent renewable energy in the South African grid if possible. In this light, it is the view of specialist that the proposed CCPP power plant is the best technology option, and will not materially result in any direct local climate change impacts, subject to the implementation of appropriate mitigation measures as far as possible.

The proposed development is therefore considered to be acceptable from a climate change perspective.

Visual Impacts

The Visual Impact Assessment assessed the impact of the RB CCPP on the sensitive visual receptors associated with the project site for the life-cycle of the project. The proposed development will occur within an area that has been industrialised and where further heavy industrial development is planned, the power plant will largely be viewed against the background of other heavy industrial development. As a result of this, the development of the RB CCPP is unlikely to significantly increase the extent of industrial development that is obvious from most key viewpoints. It will also not influence views over existing rural areas.

The assessment identified impacts within the construction and operation phases of the project.

During the construction, operation and decommissioning phases, the impacts expected to occur include industrialisation of views from Urban areas, protected areas, roads, homesteads, views as seen from the N2 service station, recreational uses on the northern side of the port could be negatively impacted by further Industrialisation of the landscape. The significance of the identified impacts is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Visual Impact Assessment it can be concluded that visual impacts of low significance are expected as a result of the proposed RB CCPP.

The proposed development is therefore considered to be appropriate and acceptable from a visual perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

Socio-economic Impacts

The Socio-economic Impact Assessment assessed the impact of the RB CCPP on the socio-economic baseline environment associated with the project site for the life-cycle of the project. The assessment identified both positive and negative impacts within the construction and operation phases of the project.

During the construction phase, the positive impacts expected to occur include increase in economic production, impact on Gross Domestic Product (GDP), employment creation, skills development and household income and improved standard of living. The significance of the positive construction phase impacts ranges from high to medium, following the implementation of the recommended mitigation measures by the specialist. The impacts of a high and medium significance identified for the project, after implementation of mitigation measures, are notable from a positive perspective.

During the construction phase, the negative impacts are also however expected to occur, which include demographic shift due to influx of migrant labour, increase in demand for housing and pressure on basic services, social facilities and economic infrastructure. The significance of the negative construction phase impacts is low, following the implementation of the mitigation measures recommended by the specialist. No negative impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, only positive impacts are expected and include impact on production, impact on GDP, employment creation, skills development, household income and improved standard of living, government revenue and improvement in energy generation sector. The significance of the impacts for the operation phase are high, following the implementation of the recommended mitigation measures by the specialist. Again, the impacts of a high significance identified for the project, after implementation of mitigation measures, are notable from a positive perspective.

From the findings of the Socio-economic Impact Assessment it can be concluded that the negative socio-economic impacts of low significance are expected as a result of the proposed RB CCPP, whilst mainly positive impacts of high to medium significance were also identified. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation and enhancement measures.

Impacts on Traffic

The Traffic Impact Assessment assessed the impact of the RB CCPP on the traffic volumes and capacity of the road network to accommodate the project site for the life-cycle of the project. The assessment identified impacts within the construction, operation and decommissioning phases of the project. Potential traffic impacts are mainly related to the proposed development access, trip generation and traffic impact on the existing affected road network.

During the construction phase, the impacts expected to occur include traffic impacts during the construction of the RB CCPP. The significance of the construction phase impact is medium following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include traffic impacts during the operation of the RB CCPP. The significance of the impacts for the operation phase are medium, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the decommissioning phase, the impacts expected to occur include traffic impacts during the decommissioning of the RB CCPP. The significance of the construction phase impact is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Traffic Impact Assessment it can be concluded that traffic impacts of medium to low significance are expected as a result of the proposed RB CCPP.

The proposed development is therefore considered to be appropriate and acceptable from a traffic perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the approval of the access and parking layout by the local authority and implementation of the recommended mitigation measures.

Project Risks

The Quantitative Risk Assessment assessed the risk impacts of the RB CCPP associated with the project site for the life-cycle of the project. The following installations were considered for analysis in the Qualitative Risk Assessment (QRA):

» Chlorine;
» Natural gas;
» Diesel;
» Hydrogen;

» LPG; and
» Ammonia.

Consequences for the installations were analysed and assessed, with several worst-case scenarios having the potential to affect individuals located offsite.

During the operation phase, the anticipated impacts include catastrophic rupture of chlorine storage vessel; with subsequent dispersion of toxic vapours over the surrounding area, full bore rupture of incoming natural gas line with flammable vapour dispersion, ignition and flash fire or explosive effects, catastrophic diesel tank rupture with full bund fire and possible bund overtopping, catastrophic rupture of hydrogen storage vessel leading to flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects, 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, and catastrophic rupture of ammonia storage vessel with subsequent dispersion of toxic vapours over surrounding area. The significance of the impacts for the operation phase are low, following the implementation of the recommended mitigation measures. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

The proposed development is therefore considered to be acceptable from a risk perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures as well as compliance with all statutory requirements and 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.

Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of other known projects within the area. The alignment of energy developments with South Africa's National Energy Response Plan and the global drive to reduce greenhouse gas emissions per unit of power generated is, undoubtedly, positive. The economic benefits of the CCPP at a local, regional and national level has the potential to be significant.

The cumulative impacts associated with the RB CCPP have been assessed to be acceptable, with no unacceptable loss or risk expected (**Table 1**).

Table 1: Summary of the cumulative impact significance for RB CCPP

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**
Ecology (Construction Phase)	Medium	High to Medium (depending on the impact being considered)
Water Resources (Construction Phase)	High	High
Land use, soil and agricultural potential (Construction Phase)	High	High
Geohydrology	None	None

Heritage	None	None
Air Quality	None	None
Visual	Low	Low
Socio-Economic (Construction and Operation Phases)	Medium	Medium
Traffic (Construction and Operation Phases)	Low	Low
Risk (Operation Phase)	Low	Low

Based on the specialist cumulative assessment and findings regarding the development of the RB CCPP and its contribution to the overall impact in the area with consideration to cumulative impacts in isolation of the proposed RB CCPP and other known planned developments in the area, it can be concluded that RB CCPP cumulative impacts will be of medium to high significance in the construction phase and low to medium in the operation phase. On this basis, the following can be concluded considering the RB CCPP:

» The construction of the project will not result in the unacceptable loss of threatened or protected plant species as the site proposed for development has already been largely transformed through past and current land use practices. The proposed development is acceptable from an ecological perspective.
» The construction of the project will not result in the unacceptable loss of water resources provided that the proposed wetland and biodiversity offset plan is adopted and implemented. Opportunities for Eskom to be involved in conservation of other wetland areas in the region which could otherwise be impacted by development must be realised through this offset plan. The proposed development is acceptable from a water resources perspective.
» The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion. This is due to the largely industrial nature of the area surrounding the project site, as well as the zoning of the site for industrial development.
» The project will not significantly increase the negative impact on the socio-economic environment provided that appropriate mitigation measures are implemented. In contrast, there will be numerous positive impacts that can be expected as a result of the proposed RB CCPP in terms of production and employment benefits.
» The project will contribute towards a reduction in greenhouse gas emissions resulting from an alternative energy generation perspective (when compared to coal energy generation), and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.
» The project will not contribute significantly to traffic volumes and can be well accommodated on the existing road network.
» The project will not contribute to the loss of heritage sites as no heritage sites of significance will be affected by the proposed development.
» The project will not contribute significantly to the 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) and is considered Low significance.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed RB CCPP and other development within the RBIDZ: Phase 1D are considered to be acceptable. The limited potential for cumulative impacts and risks makes the location of this project within the RBIDZ: Phase 1D a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

Environmental Sensitivity

From the specialist investigations undertaken for the RB CCPP, the following sensitive areas/environmental features have been identified and delineated within the project site (**Figure 2** and **Figure 3**).

» **Ecology** – The wetland areas within the site provide habitat to threatened fauna species and should be regarded as of **High Sensitivity**. The biodiversity offset area and conservation area located to the north and south beyond the project site, as well as CBA: irreplaceable areas surrounding the project site should be regarded as no-go areas. From a vegetation perspective, the project site is not regarded as being particularly sensitive due to historical and current disturbance.
» **Surface Water Resources** – From a vegetation perspective the sensitivities relating to the proposed development are the presence of:
    i. Provincially protected species, endemic species and species protected under the Natural Forest Act. Removal/destruction of tree species would require permit authorization;
    ii. The potential presence of several Threatened flora species;
    iii. Wetland vegetation over certain parts of the study area.
    * From a fauna perspective, the sensitivities relating to the proposed development are the presence of:
    i. *C. mariquensis* (Near Threatened) and *Hemisus guttatus* (Vulnerable) in wetland areas;
    ii. The potential presence of *Balearica regulorum* (EN);
    iii. The presence of provincially protected bird species.
    * The EIS of the wetland systems was determined to be High (Class B) and Moderate (Class C) for the project area and biodiversity offset area respectively.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of RB CCPP within the project site. Eskom has proposed a technically viable and suitable design and layout for the project site and associated infrastructure, which have been assessed as part of the independent specialist studies. All impacts associated with the proposed layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. However, as impacts on wetlands cannot be avoided, approval of a wetland offset plan will be required to be undertaken prior to construction of the proposed RB CCPP facility.

Through the assessment of the development of the RB CCPP within the project site it can be concluded that the development of the CCPP facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures and the wetland offset plan).

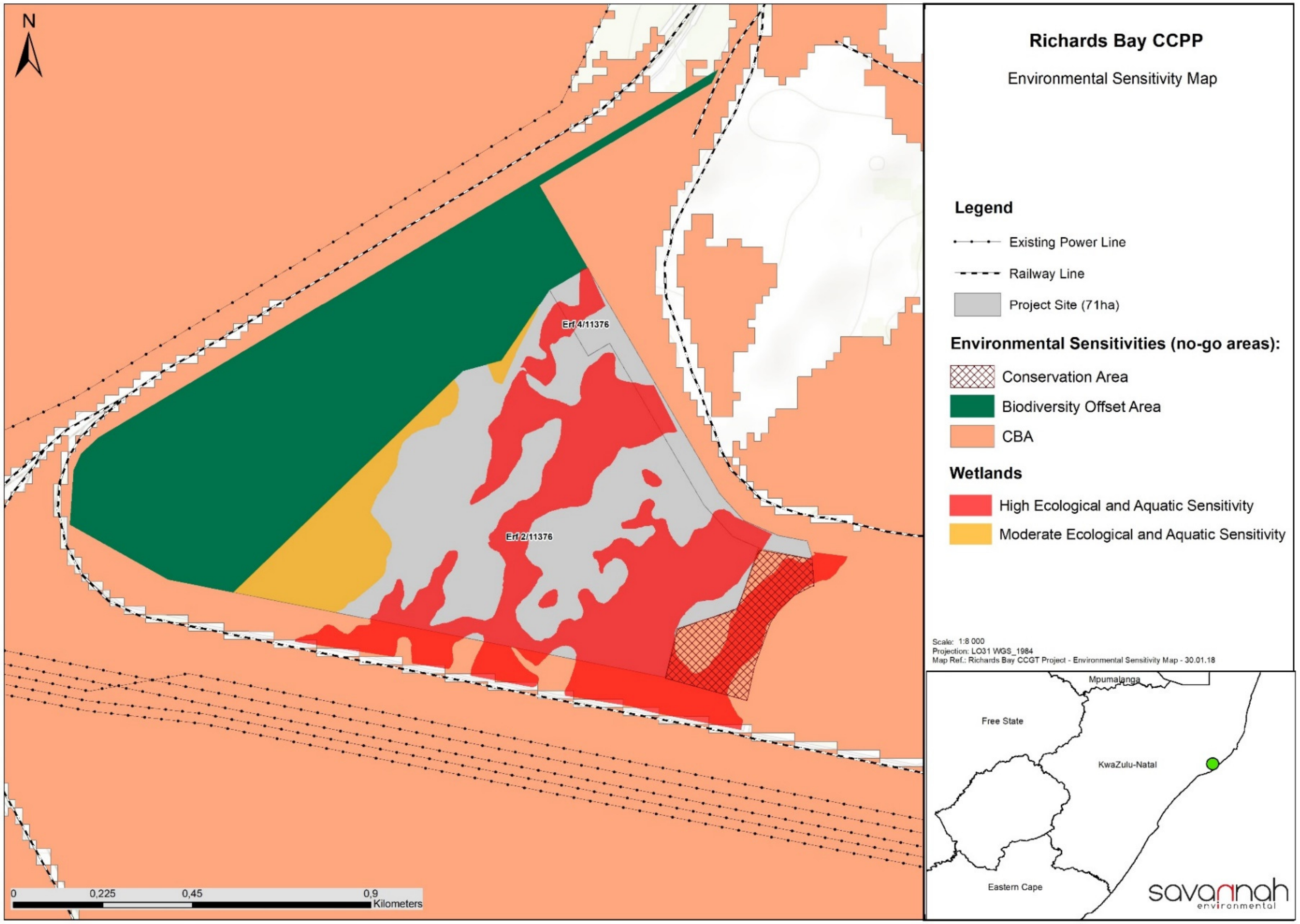

Figure 2: RB CCPP Environmental Sensitivity Map (refer to **Appendix B** for A3 map)

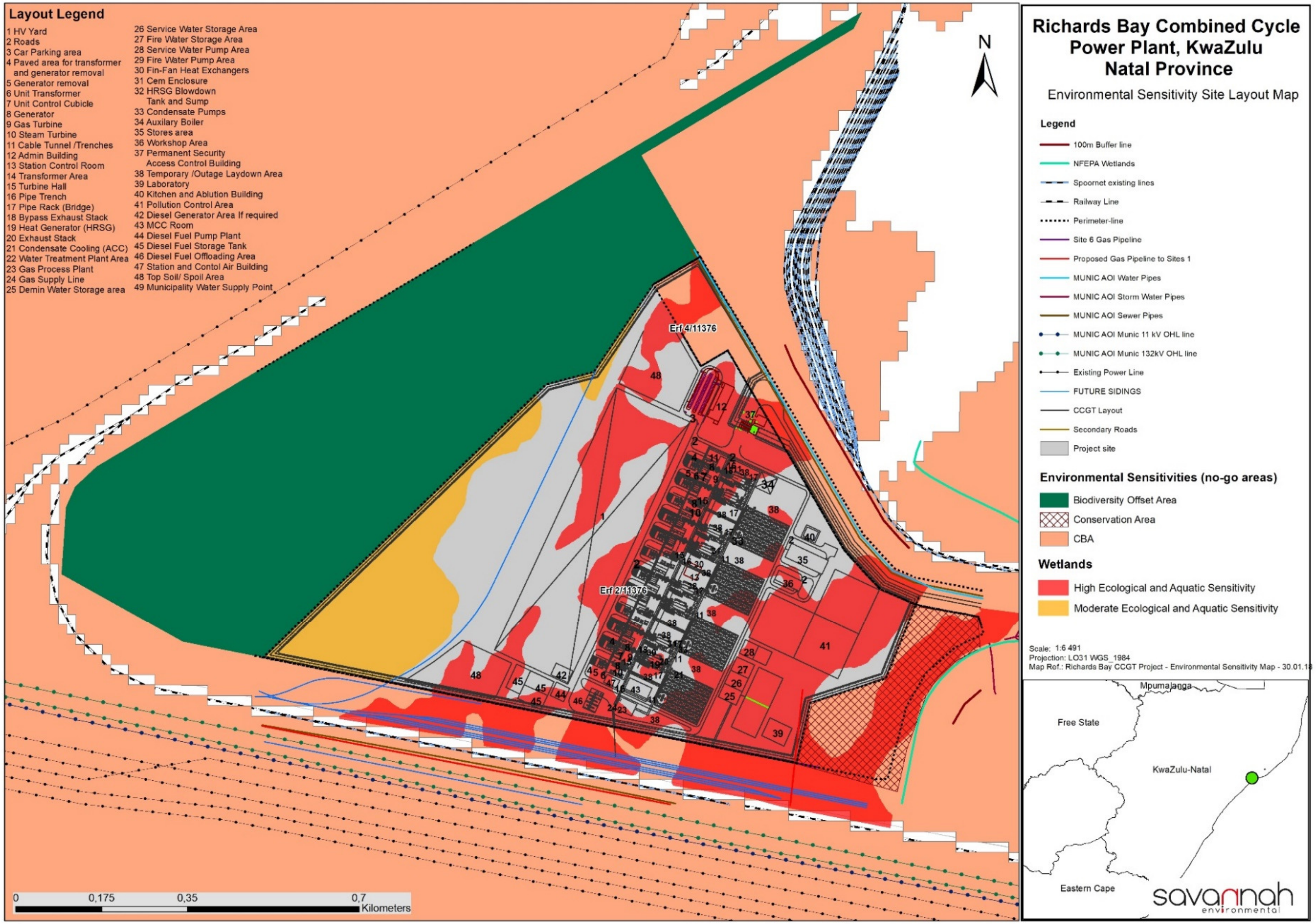

Figure 3: Final preferred layout map of the preferred development footprint for Lichtenburg 1, as was assessed as part of the EIA process, overlain with the environmental sensitivities (refer to **Appendix B** for A3 map)

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
DAFF	Department of Agricultural, Forestry and Fisheries (National)
DEA	Department of Environmental Affairs (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CCPP	Combined Cycle Power Plant
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
EDTEA	Economic Development, Tourism and Environmental Affairs
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
KZN	KwaZulu-Natal
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
MTS	Main Transmission Substation

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
RE	Renewable Energy
REIPPP	Renewable Energy Independent Power Producer Procurement
SABAP	South African Bird Atlas Project
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
SANParks	South African National Parks
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
TNCO	Transvaal Nature Conservation Ordinance (No. 12 of 1983)
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VU	Vulnerable
WB	World Bank
WUL	Water Use License
WWF	World Wide Fund for Nature

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APPENDICES LIST

CHAPTER 1: INTRODUCTION

Eskom Holdings SOC Ltd (Eskom) proposes to develop a Combined Cycle Power Plant (CCPP) and associated infrastructure, with an installed generating capacity of up to 3 000MW. The proposed project is to be known as the Richards Bay CCPP, and will be fuelled using natural gas as the main fuel resource and diesel as a back-up resource. The project site is on Portion 2 and Portion 4 of Erf 11376 (refer to **Figure 1.1**, **Figure 1.2** and **Table 1.1**). The site is located in the Richards Bay Industrial Development Zone (IDZ) Phase 1D, approximately 6km south west of Richards Bay, and 4km south west of Alton, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province.

The purpose of the project is to reduce transmission losses from generation facilities supplying KwaZulu-Natal, by having a generation centre in the KwaZulu-Natal Province. In addition, the project is planned to aid in reducing Eskom's carbon footprint per unit of electricity produced, as power plants using natural gas emit approximately half of the amount of carbon when compared with equivalent coal-fired power plants. This plant also uses considerably less water, thereby supporting Government's commitment to reduce carbon emissions and water usage.

As the project has the potential to impact on the environment, an Environmental Impact Assessment (EIA) process is required to be completed in support of an application for Environmental Authorisation (EA) prior to the commencement of construction and operation of the project.

In terms of the EIA Regulations 2014, as amended in April 2017, a Scoping and EIA study is required to be undertaken for the project. The Scoping Phase of the EIA process was undertaken in 2017, and identified potential environmental impacts that may be associated with the proposed Richards Bay CCPP. The Scoping Report was accepted by the National Department of Environmental Affairs (DEA) on 20 November 2017. It must be noted however, that during the impact phase by independent wetland and biodiversity specialist investigations on site, it was concluded that a wetland offset plan would be required to address significant residual impacts following an assessment through the mitigation hierarchy. In order to plan for the investigation and compile this wetland offset plan, integration of specialist reporting, and subsequent compilation of the Draft Environmental Impact Report, the applicant requested an extension to the timeframes for the EIA, in accordance with Regulation 3(7). However, DEA did not approve the requested extension. For this reason, the application lapsed in March 2018.

Since the findings of the scoping report remain valid and the environmental context has not changed, this Environmental Impact Report will be submitted in line with Regulation 21(2)(a) of the EIA Regulations (2014). The EIA Phase addresses the identified potential environmental impacts and benefits associated with all phases of the project including design, construction, operation and decommissioning, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA Report aims to provide the DEA with sufficient information to make an informed decision regarding the project.

1.1 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 energy supply 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. According to the Department of Energy, 77% of South Africa's Energy is supplied by coal, with Eskom being the main electricity producing company.

The Integrated Resource Plan (IRP) 2010 developed by the Department of Energy states a need for a diversified energy mix to meet the requirements of the country in terms of economic and social growth. The IRP (2010) considers natural gas to have significant potential to add to the energy mix. It is envisaged that the gas-derived electricity will be through open-cycle gas turbines (OCGT) and combined cycle gas turbines (CCGT), which should generate ~5.7GW and ~1.8GW, respectively. While the above-mentioned supply is the target for 2030, the IRP asserts that CCGT technologies and an LNG terminal needs to be built urgently so that the first CCGT capacity is available by 2020 to assist with electricity supply in the short term. The IRP recognises that gas-fired Combined Cycle Gas Turbines (CCGTs) present the most significant potential for developing the gas market in South Africa as it presents significant potential both for power generation, as well as direct thermal uses.

On 22 August 2018 the Draft IRP 2018[1] was released for public comment. This version of the IRP estimates[2] that 8.1GW of gas / diesel generated energy would be required by the end of 2030.

Additionally, this draft IRFP 2016 calls for a higher allocation of energy generating capacities to Open Cycle Gas Turbine and Combined Cycle Gas Turbine facilities, over a longer time horizon, than the IRP 2010. Open Cycle Gas Turbines have been allocated ~13.3GW and Combined Cycle Gas Turbines have been allocated 21.9GW by the year 2050.

In response to the need for a supply of clean and modern forms of electricity at an affordable price, Eskom is proposing the construction of the Richards Bay CCPP. The proposed development site was identified as being the most potentially feasible site from a technical and environmental perspective through a site screening and selection study. The site screening and selection study was undertaken through evaluation of four (04) study sites from an environmental acceptability perspective. After careful consideration of the overall environmental sensitivity of the areas assessed, the current study site (Phase 1D in the IDZ) was considered the most preferred, based on environmental and socio-economic merit (refer to **Chapter 3** and **Appendix Q1** for further details and the full screening report, respectively). The study site was therefore selected to initiate the EIA process for the current proposed project and submission of an application for Environmental Authorisation (EA).

The proposed project will have an installed generating capacity of up to 3 000MW, to operate with natural gas as the main fuel resource and diesel as a back-up resource. The facility will be operated as a mid-merit[3] (~48%) system. The natural gas is to be supplied by potential gas suppliers via a gas pipeline to the CCPP. The Liquefied Natural Gas (LNG) terminal infrastructure at the port and the gas supply pipeline to the

[1] The Draft IRP was made available for comment and review in 2018. This Draft IRP has not yet been promulgated

[2] These figures reflect the new additional capacities within the Proposed Updated Plan for the period ending 2030.

[3] 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.

boundary fence of the Richards Bay CCPP does not form part of the scope of this assessment, nor does the power line connection to the grid. This application focuses only on the Combined Cycle Power Plant (CCPP) and associated infrastructure inside Eskom's boundary fence on site 1D of the Richards Bay IDZ.

The main infrastructure associated with the facility includes the following:

- Gas turbines for the generation of electricity through the use of natural gas (primary fuel resource) or diesel (back-up fuel resource).
- Heat recovery steam generators (HRSG) to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
- Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
- Bypass stacks associated with each gas turbine.
- Dirty Water Retention Dams and Clean Water Dams.
- Storm water channels.
- Waste storage facilities (general and hazardous).
- Exhaust stacks for the discharge of combustion gases into the atmosphere.
- A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
- Water pipelines from the power block to the station's boundary fence and water tanks to transport and store water of both industrial quality and potable quality (potable water is to be supplied by the Local Municipality).
- Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
- Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
- A gas pipeline from the power block to the station's boundary fence and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted that the relevant environmental permitting processes for the gas pipeline construction and operation from the gas supply location to the power station will be undertaken under a separate EIA Process.
- Diesel off-loading facility and storage tanks.
- Ancillary infrastructure including access roads[4], warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
- A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted that the relevant environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process[5].

[4] The western arterial road is an existing tarred road that the project site can be accessed from. The access road and other internal roads will be within the project site.
[5] Currently the power line EIA process is in the Scoping stage.

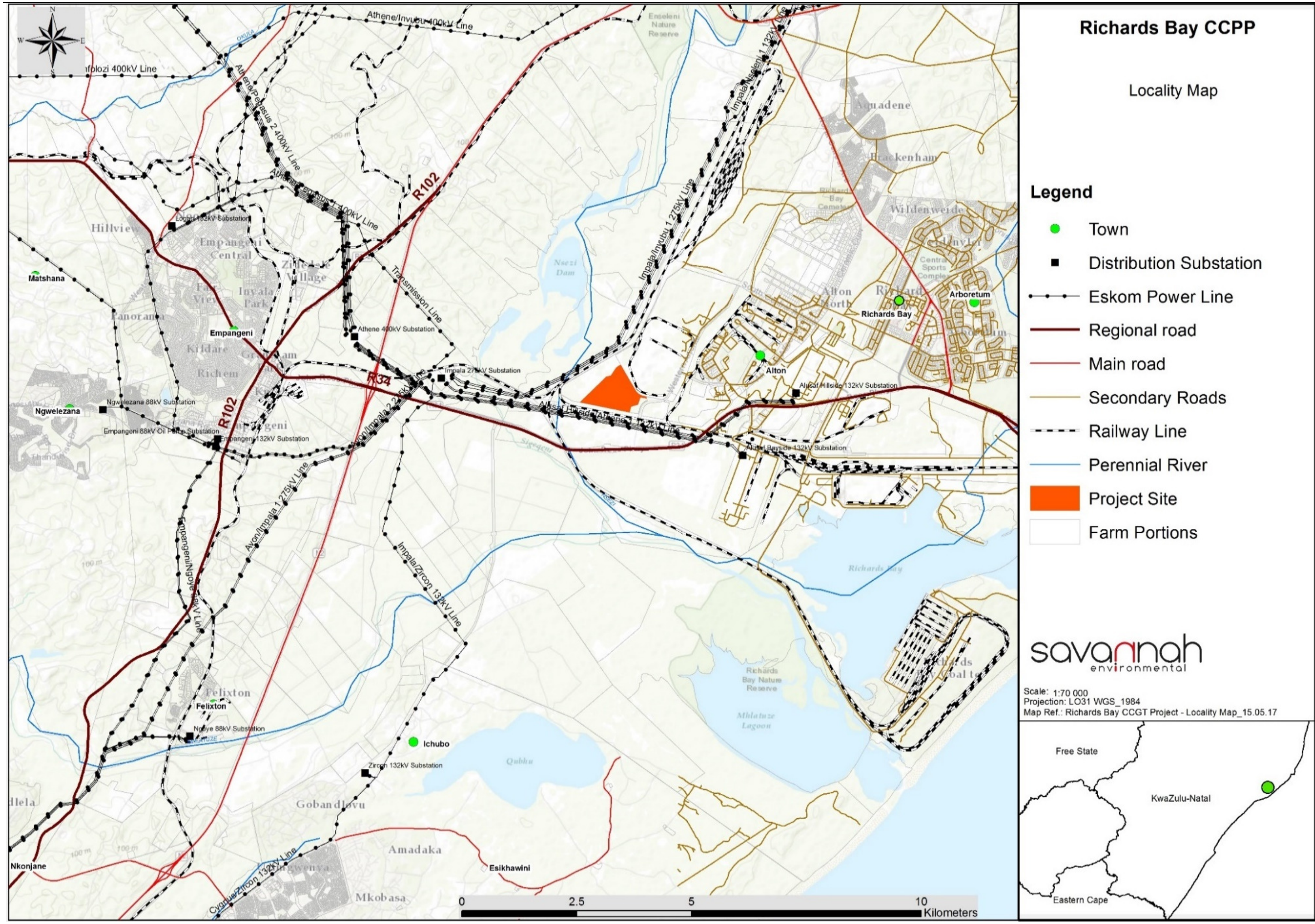

Figure 1.1: Eskom Richards Bay CCPP Locality Map

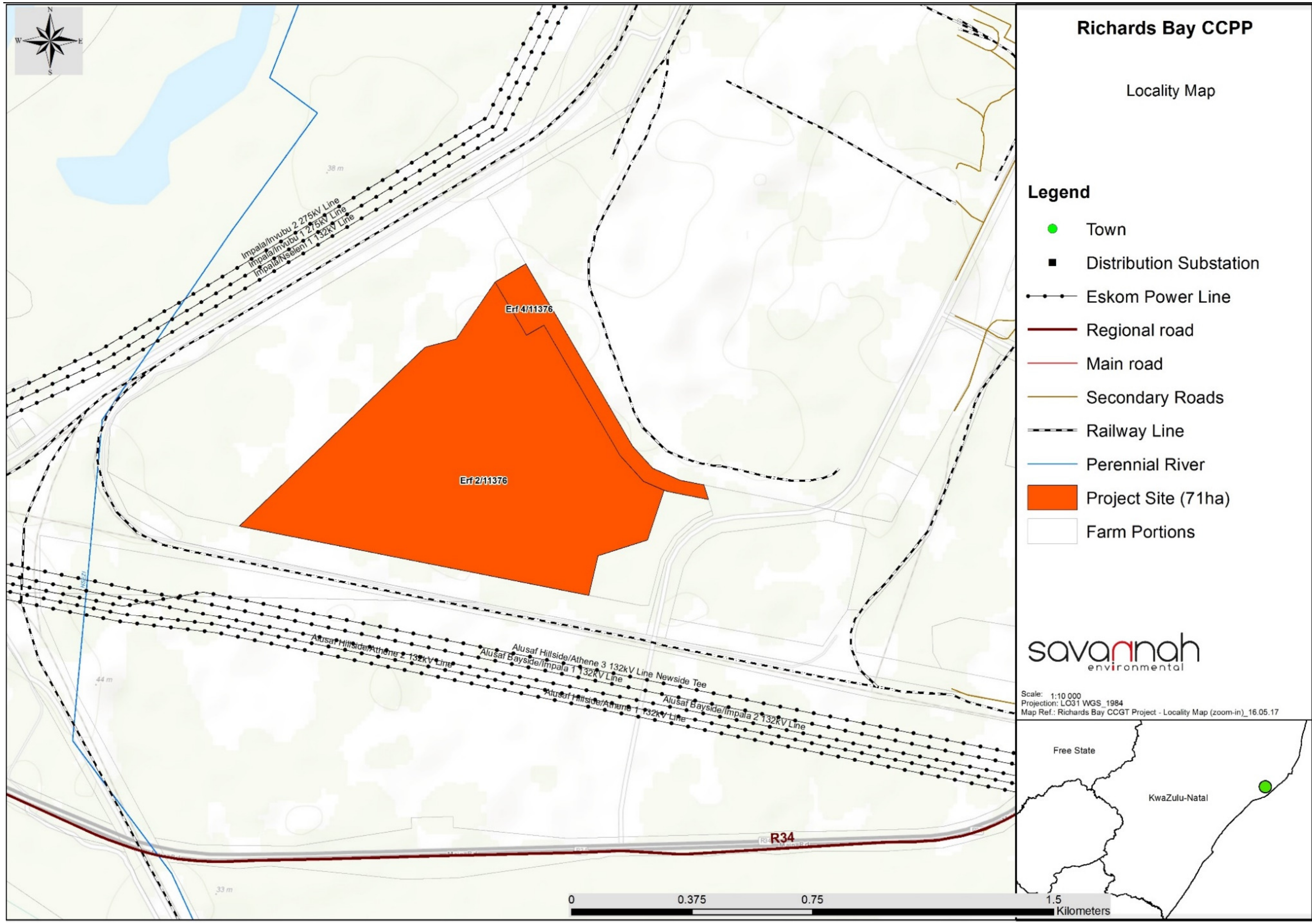

Figure 1.2: Locality map showing the affected properties which form the project site proposed for the development

Table 1.1: Detailed description of the project site identified for the development of the Richards Bay CCPP

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)	Erf 11376
Portion number(s)	» Portion 2 » Portion 4
SG 21 Digit Code (s)	» N0GV04210001137600002 » N0GV04210001137600004
Current zoning	Industrial Use – The affected properties are located within Phase 1D of the Richards Bay Industrial Development Zone and have been reserved for gas-to-power development
Current land use	Communal Grazing

More details regarding the proposed project are included within **Chapter 2** of the EIA Report.

1.1. Requirements for Environmental Authorisation (EA) Process

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to EAs, 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 (CA). The 2014 EIA Regulations, as amended (GNR 326) published under NEMA prescribe the process to be followed when applying for EA, while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without EA from the Competent Authority.

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)), the development of the Eskom Richards Bay CCPP requires EA from the National Department of Environmental Affairs (DEA) subject to the completion of a full Scoping and EIA process, as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326). The need for EA subject to the completion of a full Scoping and EIA process is triggered by the inclusion of, amongst others, Activity 2 of Listing Notice 2 (GNR 325)[6], namely:

"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."

In terms of GNR 779 of 01 July 2016, the National DEA has been determined as the Competent Authority for all projects which relate to the IRP 2010 – 2030, and any updates thereto. The Provincial KwaZulu-Natal

[6] Refer to Chapter 6 for a full list of applicable listed activities.

Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) is therefore the Commenting Authority on the project.

1.2. Overview of the Environmental Impact Assessment (EIA) Process

The EIA process comprises two phases – i.e. a Scoping and EIA Phase – and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in these two phases can be described as follows:

» **The Scoping Phase** includes the identification and description of potential impacts associated with the proposed project through a desktop study considering existing available information, and consultation with affected parties and key stakeholders. This phase considers the broader project site in order to identify and delineate any environmental fatal flaws, "no-go" or sensitive areas which should be avoided. Following these assessments, a Draft Scoping Report is developed, and is subjected to a public review process. After the public review of the Draft Scoping Report, the Scoping Phase culminates in the preparation and submission of a Final Scoping Report and Plan of Study for EIA to the competent authority for decision to continue to the EIA Phase. The Final Scoping Report and Plan of Study for EIA for the Richards Bay CCPP was submitted to DEA on 06 October 2017, and acceptance was received on 20 November 2018, therefore marking the start of the EIA Phase.
» **The EIA Phase** includes a detailed assessment of potentially significant positive and negative direct, indirect, and cumulative impacts identified during the Scoping Phase. The EIA Phase considers a proposed development footprint within the identified project site and includes detailed specialist investigations, field work, and public consultation. Following a public review of the EIA Report, the EIA Phase culminates in the preparation and submission of a Final EIA Report and Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the Competent Authority for review and decision-making. However, given that the original application lapsed in March 2018, this EIA report will be submitted in line with Regulation 21(2)(a) of the EIA Regulations (2014), since the findings of the scoping report remain valid and the environmental context has not changed. The same processes referred to above for a typical EIA Phase process will apply.

1.3. Conclusions from the Scoping Phase

1.3.1. Evaluation of the Proposed Project

The Scoping Study for the Richards Bay CCPP, which commenced in August 2017, was undertaken in accordance with the 2014 EIA Regulations (as amended; GNR326), promulgated in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). The Scoping Report was aimed at detailing the nature and extent of the facility, identifying potential issues considered to be associated with the project and defining the extent of the specialist studies required to be undertaken during the EIA Phase. This was achieved through an evaluation of the project through the consideration of existing information available for the area at a desktop level as well as through limited fieldwork.

The conclusion of the findings of the Scoping Study was that the potential positive and negative impacts identified to be associated with the construction and operation of the Richards Bay CCPP are anticipated to be at a site-specific or localised level, with few impacts extending to a local or national extent. The following section provides a summary of the findings of the specialist studies undertaken. Refer to **Figure 1.3** for the environmental sensitivity map compiled on the basis of these findings.

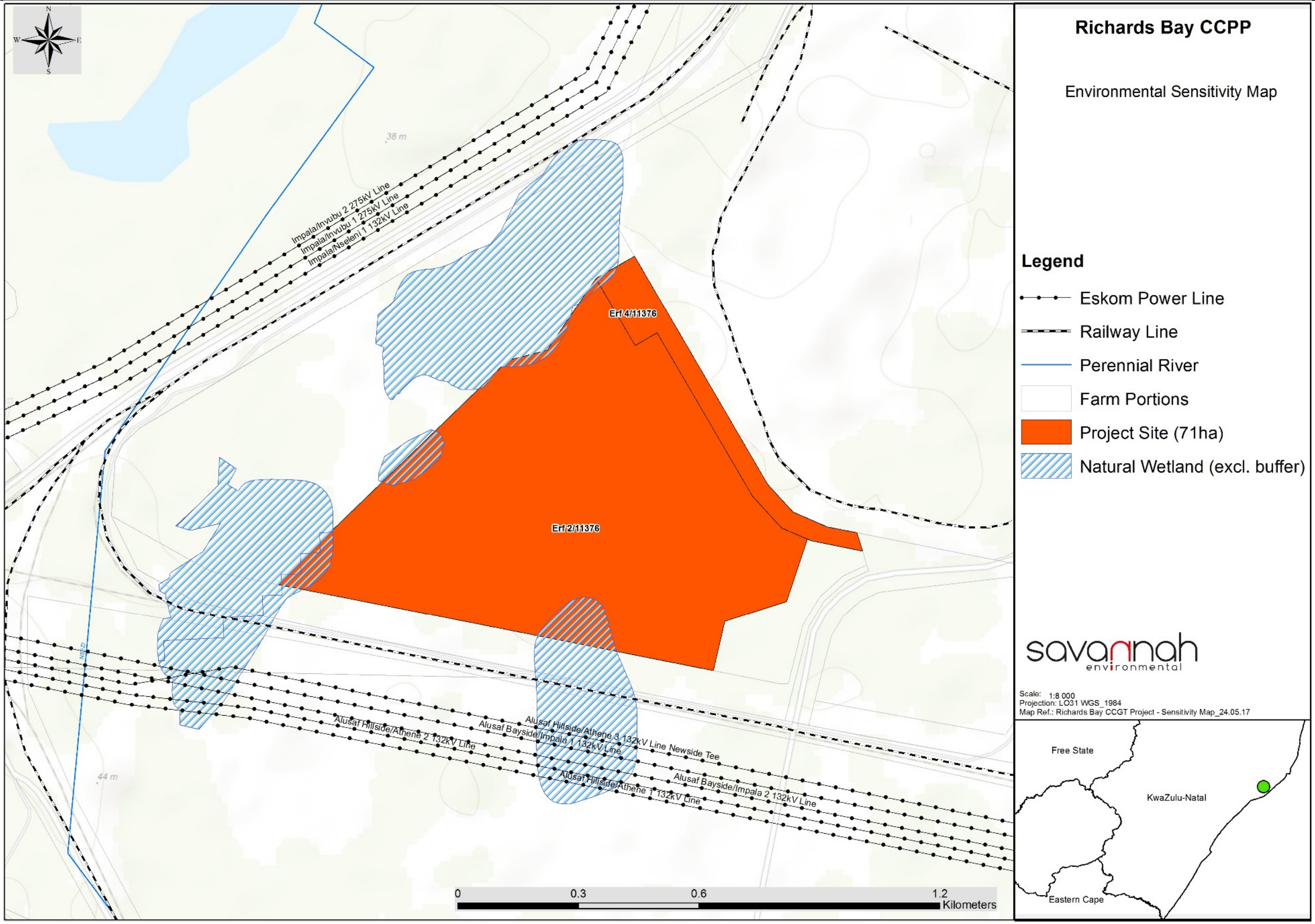

Figure 1.3: Scoping Phase Environmental sensitivity map illustrating the sensitive environmental features located within the Richards Bay CCPP project site

» ***Ecology:*** The construction of the Richards Bay CCPP will impact on ecological features located within the project site. The main potential impacts expected during the construction phase include the loss of critically endangered ecosystems (limited extent), a loss of CBA irreplaceable areas (limited extent), a potential loss of red listed/protected flora and fauna species, the generation of construction noise and emissions which could impact on the ecology of the area, and soil and water contamination. Potential impacts associated with the operation of the Richards Bay CCPP include impacts on species due to alterations in the night time light conditions, disturbance or damage to adjacent habitats due to movement within the area during the construction and operation, degradation of the habitat quality and the alteration of drainage regimes. Impacts on ecological features are likely to occur at the project site and the broader area surrounding the site. As a result of the current largely disturbed nature of the project site, the assessment determined that the development would not result in any irreplaceable loss of ecological features and the consequences of the impacts are expected to be limited. Impacts can be minimised through the implementation of appropriate mitigation measures, as proposed in the Ecology specialist report/EMPr. It was recommended that further assessment of the ecological aspects of the project site be undertaken during the EIA Phase, with specific focus on species of conservation concern. This was undertaken accordingly.

» ***Wetland and Aquatic Features:*** Some wetland features are located within the project site. The development of the Richards Bay CCPP could potentially result in a loss of wetlands, altered hydrology, impaired water quality, loss of ecological services and sedimentation and erosion. The wetlands located within the project site are considered to be in a largely natural state and are ecologically important. The loss of these systems is considered to be significant. If there is a loss of these systems, as a result of the project, any changes to the status and functioning of the systems resulting from indirect impacts are considered to be major negative impacts due to complete loss of the wetlands systems. The significance will be medium-high, despite mitigation. It must be noted that a biodiversity offset area directly adjacent to the project site has been implemented for wetlands and consultation has taken place between the IDZ and the Department of Water and Sanitation regarding the matter. The presence of the biodiversity offset area (which is avoided by the CCPP project site) and the impact of the Richards Bay CCPP project on wetlands, while considering the implemented biodiversity offset area, will be considered in the EIA phase by the specialist. This was undertaken accordingly.

» ***Geo-hydrological features and surface waterbodies:*** During the construction phase groundwater and surface water resources can be affected as a result of on-site accidental spills and leaks due to the presence of construction vehicles and/or fuel storage areas, and migration of the spilled liquids to the surrounding surface waterbodies. During the operation phase groundwater and surface water resources, including the Nseleni River, Nsezi dam, Voor River, Bhizolo Stream and an unnamed dam (receptors), could be impacted due to possible leakage of diesel and/or chemicals from storage facilities and/or pipelines and from emergency backup generator leaks (sources). The significance of the construction and operation impacts on these natural features is expected to be low, subject to the implementation of appropriate mitigation measures. It was recommended that further assessment of the geo-hydrological aspects of the project site be undertaken during the EIA Phase, with specific focus on the groundwater network. This was undertaken accordingly.

» ***Soils and Agricultural Potential:*** The development of the Richards Bay CCPP will impact on the soils and agricultural potential of the project site. The land capability of the project site is classified as Class III which refers to the area being of a moderate agricultural potential. The main potential impacts include loss of agricultural land and/or loss of agricultural potential, disturbances including compaction, physical and chemical alteration of the soils, potential loss of topsoil, increased risk of soil erosion, sedimentation and an increase in the stormwater runoff. The significance of the impact will be determined during the EIA phase, after the site survey has been conducted. This was undertaken accordingly.

» ***Archaeological Resources:*** The construction phase of the Richards Bay CCPP may impact on archaeological resources due to the construction activities which will include excavation into the ground. Stone Age sites are expected to occur within the project site and could be impacted by the development. The impacts of the construction activities on the archaeological resources include potential damage to and destruction of archaeological sites, indirect impacts including impact on the cultural landscape and residual risks including the depletion of the archaeological record of the broader region. The impact is expected to be of a medium-low significance. Further assessment and ground-truthing of the archaeological resources was recommended for the EIA Phase. This was undertaken accordingly.

» ***Palaeontological Resources:*** Loss of palaeontological heritage could occur during the construction phase of the Richards Bay CCPP. Construction activities including excavation of new bedrock which could comprise of sensitive palaeontological resources could result in the damage and destruction of the resources or sealing in of fossils below the ground surface, making these no longer available for scientific consideration. Any fossils occurring within the project site are potentially scientifically and culturally significant and any negative impact on them would be of a high significance. The destruction or inadvertent relocation of any affected fossils will be permanent and irreversible. During a field survey of the project site, no fossiliferous outcrops were discovered. Therefore, it was concluded that the impact will be of a low significance. Due to the lack of fossil outcrops it is considered that the construction and operation of the development footprint and associated infrastructure is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. No further study is required to be undertaken during the EIA Phase.

» ***Air Quality and climate change:*** The construction of the Richards Bay CCPP has the potential to impact on the ambient air quality of the area through elevated daily PM_{10} concentrations due to background PM_{10} and the proximity of the project site to other particulate emission sources. During the operation phase, the Richards Bay CCPP is likely to contribute NO_X, CO, and VOCs to the existing baseline concentrations (including greenhouse gases). The impact is expected to be of a medium-low significance, which will be confirmed during the EIA phase through detailed assessment. Climate change impacts associated with the development of the CCPP relate to the combustion of natural gas at the Richards Bay CCPP which will produce greenhouse gas emissions that will contribute to the global phenomenon of anthropogenic climate change. Climate change is projected to effect many environmental changes across the globe. The Richards Bay CCPP is expected to contribute substantially to South Africa's national emissions inventory. Climate change impacts were recommended to be assessed further during the EIA phase through detailed study which has been undertaken accordingly.

» ***Noise:*** The operation of the Richards Bay CCPP could increase the noise levels in the vicinity of the plant. The site visit did not identify any potential noise-sensitive receptors close to the project site. It is therefore unlikely that the project would result in a noise impact on potential noise-sensitive receptors in the area. It was concluded that the scoping level assessment is sufficient and that a full Environmental Noise Impact Assessment is not required or recommended during this EIA Phase.

- **_Visual:_** Impacts from a visual perspective are expected to occur during the construction and operation phases of the Richards Bay CCPP. The project site is located adjacent to existing heavy industrial development and within an area where further heavy industry is planned (IDZ Phase 1D). It is therefore possible that the development could intensify existing industrial impacts. It is, however, highly unlikely to significantly add to the current area of industrial influence within the surrounding landscape. It is also possible to partly mitigate any additional influence by ensuring that the development occurs in as close a proximity to existing heavy industry as possible. Analysis has also indicated that the affected surrounding landscapes are not likely to be highly sensitive to possible change associated with the Richards Bay CCPP. The significance of the development of the Richards Bay CCPP on the visual aspects is expected to be low to negligible. Further assessment of the visual impact on the surrounding areas has been recommended for the EIA phase and was undertaken accordingly.

- **_Socio-economic aspects:_** The construction of the Richards Bay CCPP will result in both positive and negative socio-economic impacts. During the construction phase the positive impacts will include an increase in the production and GDP-R of the national and local economies, temporary employment opportunities, skills development and household income leading to improved standard of living. These impacts are expected to be of medium significance. Negative impacts expected during the construction phase include a change in the demographics of the area due to an influx of jobseekers, increased pressure on basic services, social and economic infrastructure, and an increased demand in housing within the broader area. These impacts are expected to be of low significance. Positive and negative impacts are expected to occur with the operation of the Richards Bay CCPP. Positive impacts include a sustainable increase in the production and Gross Domestic Production of the national and local economies, long-term employment opportunities, skills development, household income that will improve the standard of living within the area, increased government revenue streams and improved security of electricity. These impacts are expected to be of medium-high significance. The negative impact expected during operation could be impacts on the quality of public health due to emissions from the operating Richards Bay CCPP, combined with existing plant. The expected significance of the negative impact is medium. From the above identified potential impacts it is concluded that the positive impacts outweigh the negative impacts from a socio-economic perspective. Further assessment of the socio-economic aspects within the project site and the surrounding areas has been recommended for the EIA phase. This was undertaken accordingly.

- **_Cumulative Impacts:_** The project site is located adjacent to an existing heavy industrial development and within an area where further heavy industry is planned. The project site is located within the Richards Bay IDZ Phase 1D which has been allocated for the development of a gas facility. Due to the District and Local Municipal development plans for the site, and its location within the IDZ, it is considered unlikely that it could be used for agricultural purposes or for non-industrial development in the future. Other similar facilities within the area include the Mondi Richards Bay Facility located directly adjacent to the project site and a gas-to-power facility which has been authorised to be developed within Phase 1F of the IDZ, located ~5.5km north east of the project site.

No environmental fatal flaws or impacts of very high significance were identified to be associated with the development of the Richards Bay CCPP on the identified project site during the Scoping Phase. This conclusion will be confirmed through the detailed investigation of the development footprint by the independent specialist studies within this EIA Report.

1.3.2. Risks Associated with the Proposed Project

A potential risk associated with the development of the Richards Bay CCPP will be the potential conflict with the land-use of the area and an impact on sensitive environmental features. Communal grazing is currently being undertaken within the project site which will be affected should the development of the Richards Bay CCPP take place. However, as the land is located within the identified IDZ which has been allocated for the purposes of the project, this conflict is considered to be negligible for this project.

Potentially significant environmental risks associated with the project is with the potential loss of wetlands associated with the construction and operational phases of the project and the potential for an increase in air quality impacts associated with the operation phase of the project. Detailed investigation of impacts of the Richards Bay CCPP on wetlands and air quality have been undertaken accordingly within the EIA phase of the study in order to confirm the significance of the potential impacts and risks.

1.3.3. Scoping Phase Conclusion and Recommendations

The findings of the Scoping Report were based primarily on a desktop assessment, with limited fieldwork. Based on this assessment, no environmental fatal flaws were identified within the project site for the Richards Bay CCPP and associated infrastructure. Therefore, no reason could be identified as to why the project could not be evaluated further in a detailed EIA study.

Through the consideration of the environmental sensitivities highlighted during the Scoping Phase, Eskom has designed a facility layout for the Richards Bay CCPP to be located within the project site. The facility layout and the potential impacts of the development (as identified during the Scoping Phase), have been assessed and ground-truthed by the independent specialist studies that form part of this EIA Report (as per the Plan of Study for the EIA included in the Final Scoping Report). The independent specialist studies have provided recommendations for the implementation of avoidance strategies (where required) and mitigation and management measures to ensure that the final recommended facility layout retains an acceptable environmental impact and considers all highly sensitive features located within the project site (see **Chapters 7 – 10** for further details).

1.4. Appointment of an Independent Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for managing the application for EA and supporting a Scoping and EIA process, inclusive of comprehensive, independent specialist studies. The application for EA, and Scoping and EIA process, is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

Neither Savannah Environmental nor any of its specialist consultants are subsidiaries of, or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed PV facility. A signed Environmental Assessment Practitioner (EAP) declaration of interest confirming Savannah Environmental's independence is included in **Appendix A** of this EIA Report.

1.4.1. Details and Expertise of the Environmental Assessment Practitioner (EAP)

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. Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 13 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

This EIA process is being managed by Jo-Anne Thomas as the principal Environmental Assessment Practitioner (EAP) for the project. She is supported by Shaun Taylor and Nicolene Venter.

» **Jo-Anne Thomas** is a Director at Savannah Environmental (Pty) Ltd and the registered EAP for the EIA for this project. Jo-Anne holds a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand, and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has 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. Jo-Anne 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.

» **Shaun Taylor** is an Environmental and Lead Permitting Consultant at Savannah Environmental. Shaun's highest qualification is a Master of Science Degree in Aquatic Health. Shaun has an in-depth understanding of environmental and water related South African legislation. Applicable legislation includes the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Environmental Impact Assessment (EIA) Regulations (2006, 2010 and 2014, as amended) and the National Water Act, 1998 (Act No. 36 of 1998). Over and above a number of other projects, Shaun has successfully conducted and obtained environmental approvals for numerous renewable energy (wind and solar) developments as well as for infrastructure (roads, water pipeline and power line) related projects. Shaun has excellent experience in dealing with the entire environmental authorization (EA) process from beginning to end i.e. submission of applications, undertaking Environmental Impact Assessments and Basic Assessments (BAs), conducting EA amendments, extension applications and compiling Draft and Final Environmental Management Programmes (EMPrs). Shaun is well acquainted and experienced in dealing with the key provincial and national environmental authorities, other organs of state as well as any other key stakeholders.

» **Nicolene Venter** is a Social and Public Participation Consultant at Savannah Environmental. Nicolene has a Higher Secretarial Certificate from Pretoria Technicon, and a Certificate in Public Relations from the Public Relation Institute of South Africa at Damelin Management School. Nicolene has over 21 years of experience as a Public Participation Practitioner and Stakeholder Consultant, and is a Board Member of the International Association for Public Participation Southern Africa (IAP2SA). Nicolene's experience includes managing the stakeholder engagement components of large and complex environmental authorisation processes across many sectors, with particular experience in the power sector. Most notably on large linear power lines and distribution lines, as well as renewable energy projects. Nicolene is well versed with local regulatory requirements as well as international best practice principles for community consultation and stakeholder engagement, as well as international guidelines and performance standards. Nicolene is responsible for managing the Public Participation process required as part of the EIA for this project.

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

1.4.2. Details of the Independent Specialist Team

A number of independent specialist consultants have been appointed as part of the EIA project team in order to adequately identify and assess potential impacts associated with the project (refer to **Table 1.4**). The specialist consultants have provided input into this EIA Report as well as the EMPr (refer to **Appendix O**).

Table 1.4: Specialist Consultants which form part of the EIA project team

Specialist Study	Specialist Company	Specialist Name
Ecology	Rautenbach Biodiversity Consulting	Anita Rautenbach
Water Resources (including Wetland Offset Plan)	The Biodiversity Company	Andrew Husted
Geohydrology	Geo Hydraulic and Environmental Technology (Pty) Ltd	John Kalala Ngeleka
Soils & Agricultural Potential	The Biodiversity Company	Andrew Husted
Heritage	Heritage Contracts and Archaeological Consulting	Johan Van Der Walt
Air Quality	Airshed Planning Professionals (Pty) Ltd	Dr. Theresa Bird
Climate Change	Promethium Carbon	Robbie Louw
Visual	Environmental Planning and Design	Jon Marshall
Socio-economic	Urban Econ	Elena Broughton
Traffic	Techso	Stephen Fautley (Pr. Tech Eng. 200270171)
Risk Assessment	RISCOM (Pty) Ltd	Motlatsi Mabaso

CVs detailing the independent specialist consultants' expertise and relevant experience are provided in **Appendix A** to this EIA Report.

1.5. Structure of this EIA Report

This EIA Report has been prepared as part of the Scoping and EIA process being conducted in support of the application for EA for Eskom Richards Bay CCPP. This EIA Report has been prepared in accordance with the Plan of Study for EIA (PoSEIA), prepared as part of the Scoping Phase and accepted by DEA on 20 November 2018, and Appendix 3 of the 2014 EIA Regulations (GNR 326). It provides details of the nature and extent of the proposed project, as well as potential impacts associated with the construction, operation, and decommissioning, of the project. It describes the scope of assessment, the consultation process undertaken throughout the EIA process to date, and includes a draft EMPr which provides recommended management and mitigation measures with which to minimise impacts and enhance benefits associated with the project.

This EIA Report consists of the following chapters:

» **Chapter 1** provides background to the project and the EIA, a summary of the recommendations and conclusions from the Scoping Report, and the details of the Environmental Assessment Practitioner (EAP) conducting the EIA;
» **Chapter 2** provides a description of the project;
» **Chapter 3** provides includes for the feasible and reasonable alternatives considered for the project;
» **Chapter 4** outlines the strategic legal context for energy planning within South Africa at a national, regional and local level as relevant for the project;
» **Chapter 5** provides the need and desirability of the project;
» **Chapter 6** outlines the approach to undertaking the EIA process;
» **Chapter 7** describes the existing biophysical and socio-economic environment within and surrounding the project development footprint;
» **Chapter 8** provides an assessment of the potential issues and impacts associated with the Richards Bay CCPP and presents recommendations for mitigation of significant impacts;
» **Chapter 9** provides an assessment of cumulative impacts associated with the Richards Bay CCPP together with other similar developments in the area;
» **Chapter 10** presents the conclusions and recommendations based on the findings of the EIA; and
» **Chapter 11** provides a list of reference material used to compile the EIA Report.

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

This Environmental Impact Assessment (EIA) Report has been prepared in accordance with the requirements of the EIA Regulations published on the 08th of December 2014 (as amended on the 07th of April 2017), promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). An overview of the contents of the EIA Report, as prescribed by Appendix 3 of the 2014 EIA Regulations (GNR 326), and where the corresponding information can be found within the report, is provided in **Table 1.2** below.

Table 1.2: Summary of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations, as amended, (GNR 326) are provided in this EIA Report.

Requirement	Location in this EIA Report
Details of – The EAP who prepared the report. The expertise of the EAP, including a curriculum vitae.	Chapter 1 Appendix A
The location of the development footprint of the activity on the approved site as contemplated in the accepted Scoping Report, including – The 21 digit Surveyor General code of each cadastral land parcel. Where available, the physical address and farm name.	Chapter 1

Requirement	Location in this EIA Report
Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	
A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is – A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken. On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Chapter 2 Appendix B
A description of the scope of the proposed activity, including – All listed and specified activities triggered and being applied for. A description of the associated structures and infrastructure related to the development.	Chapter 2 Chapter 6
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.	Chapter 4 Chapter 6
A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted Scoping Report.	Chapter 5
A motivation for the preferred development footprint within the approved site as contemplated in the accepted Scoping Report.	Chapter 3 Chapter 8 Chapter 10
A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted Scoping Report, including – Details of the development footprint alternatives considered. Details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs. 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. The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – Can be reversed. May cause irreplaceable loss of resources Can be avoided, managed or mitigated. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks. Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects. The possible mitigation measures that could be applied and level of residual risk. If no alternative development footprints for the activity were investigated, the motivation for not considering such. A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted Scoping Report.	Chapter 2 Chapter 3 Chapter 6 Chapter 7 Chapter 8 Chapter 9 Chapter 10 Appendix C Appendix D – N Appendix – O
A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted Scoping Report through the life of the activity, including –	Chapter 6 Chapter 8 Chapter 9 Appendix D – N

Requirement	Location in this EIA Report
A description of all environmental issues and risks that were identified during the environmental impact assessment process. An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
An assessment of each identified potentially significant impact and risk, including – Cumulative impacts. The nature, significance and consequences of the impact and risk. The extent and duration of the impact and risk. The probability of the impact and risk occurring. The degree to which the impact and risk can be reversed. The degree to which the impact and risk may cause irreplaceable loss of resources. The degree to which the impact and risk can be mitigated.	Chapter 8 Chapter 9 Appendix D – N
Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Chapter 7 Chapter 8 Chapter 9 Appendix D – N Appendix O
An environmental impact statement which contains – A summary of the key findings of the environmental impact assessment. A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted Scoping Report indicating any areas that should be avoided, including buffers. A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Chapter 10
Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.	Chapter 8 Chapter 9 Chapter 10 Appendix D – N Appendix O
The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Chapter 10
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.	Chapter 8 Chapter 9 Chapter 10 Appendix D – N Appendix O
A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Chapter 6 Chapter 8 Chapter 9 Chapter 10 Appendix D – N Appendix O
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.	Chapter 10 Appendix D – N

Requirement	Location in this EIA Report
Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised.	N/A
An undertaking under oath or affirmation by the EAP in relation to – The correctness of the information provided in the reports. The inclusion of comments and inputs from stakeholders and I&APs. The inclusion of inputs and recommendations from the specialist reports where relevant. Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	Appendix A
Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	N/A
An indication of any deviation from the approved Scoping Report, including the plan of study, including – Any deviation from the methodology used in determining the significance of potential environmental impacts and risks. A motivation for the deviation.	N/A
Any specific information that may be required by the competent authority.	N/A
Any other matters required in terms of Section 24(4)(a) and (b) of the Act.	N/A
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an Environmental Impact Assessment Report the requirements as indicated in such notice will apply.	N/A

CHAPTER 2: PROJECT DESCRIPTION

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

This chapter of the EIA report includes the following information provided in **Table 2.1** below, as required in terms of the EIA Regulations (2014), as amended, Appendix 3: Content of Environmental Impact Assessment reports.

Table 2.1: Chapter 2 content requirements of Appendix 3 of the 2014 NEMA EIA Regulations, as amended, (GNR 326) are provided in this EIA Report.

Requirement	Relevant Section
3(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 plan of the Richards Bay CCPP is included within Section 2.2.
3(1)(d)(ii) a description of the scope of the proposed activity, including a description of the associated structures and infrastructure related to the development.	A description of the Richards Bay CCPP is included within Section 2.2.
3(h)(i) details of the development footprint considered.	The details of the development footprint are included in Section 2.2, Table 2.2.

2.2. Project Description

The development of the Richards Bay CCPP entails the construction and operation of a combined cycle power plant, with an installed generating capacity of up to 3000MW. As previously mentioned, the Richards Bay CCPP will be located on Portion 2 and Portion 4 of Erf 11376 situated in the Richards Bay IDZ Phase 1D, KwaZulu-Natal Province. The project site has been zoned for industrial use, which has been reserved specifically for gas to power development. The project aims to provide electricity from an alternative energy source for input into the national grid.

The process of the use of gas to power technology and the installation of the Combined Cycle Power Plant (CCPP) are explained (refer to **Section 2.2.1** below). Following the description of the process to be utilised as part of the development, the specific details and requirements relating to the Richards Bay CCPP are provided in tabular format (**Section 2.2.2**, **Table 2.2**).

2.2.1 Gas-to-Power Generation Technology

CCPP is one of the most efficient power generating facilities to convert either gas or diesel fuel to mechanical power or electricity. A CCPP uses a gas turbine generator to generate electricity. Waste heat from this initial process is used to make steam to generate additional electricity via a steam turbine. In other words, gas or diesel is burnt in a gas turbine producing both electrical power via a coupled generator and hot exhaust gases. The hot exhaust gas passes through a water-cooled heat exchanger to produce steam, which can be turned into electric power with a coupled steam turbine and generator. Refer to **Figure 2.1** below for an illustration of a typical CCPP.

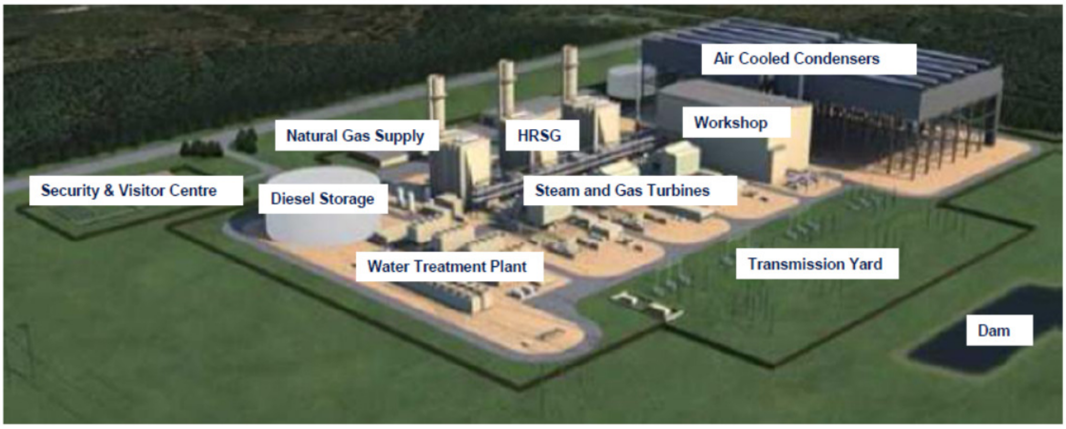

Figure 2.1: Aerial view of a typical Combined Cycle Power Plant CCPP)

The general operation of a CCPP is described below.

1. A gas turbine burns fuel, which will be either natural gas or diesel.
   » The gas turbine compresses air and mixes it with fuel which is combusted to produce high temperature and pressure 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 bypass stack associated with the CCPP will also provide operational flexibility that allows the gas turbine to operate in isolation of the rest of the plant.

2. A heat recovery system captures exhaust heat.
   » The exhaust waste heat generated from the gas turbine enters the Heat Recovery Steam Generator (HRSG).
   » The HRSG captures exhaust heat from the combustion gases to produce high temperature and pressure steam.

3. Delivery of additional electricity through the operation of a steam turbine.
   » Steam produced from the HRSG is delivered to the steam turbine that sends its energy to the generator drive shaft, where it is converted into additional electricity making the power plant energy efficient.

2.2.2 Project specifics of the Richards Bay CCPP

The Richards Bay CCPP involves the construction of a gas-fired power station which will provide mid-merit power supply to the electricity grid. The mid-merit power supply will be between a range of 20% to 70% of the total electricity supply produced by the Richards Bay CCPP. The power station will have an installed capacity of up to 3 000MW, to be operated on natural gas, with diesel as a back-up fuel. The natural gas is to be supplied by potential gas suppliers via a gas pipeline to the CCPP. The LNG terminal infrastructure at the port, or at any take-off point, and the gas supply pipeline to the boundary fence of the Richards Bay CCPP does not form part of the scope of this assessment as this project focuses only on the footprint activities inside Eskom's boundary fence.

The main infrastructure associated with the facility includes the following:

» Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
» HRSG to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
» Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
» Bypass stacks associated with each gas turbine.
» Dirty Water Retention Dams and Clean Water Dams.
» Storm water channels.
» Waste (general and hazardous) storage facilities.
» Exhaust stacks for the discharge of combustion gases into the atmosphere.
» A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
» Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (potable water is to be supplied by the Local Municipality).
» Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
» Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
» A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process.
» Diesel off-loading facility and storage tanks.
» Ancillary infrastructure including access roads, warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
» A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process.

Table 2.2 below provides the details of the Richards Bay CCPP, including the main infrastructure and services required for the development.

Table 2.2: Technical details of the Richards Bay CCPP development proposed in Richards Bay

Component	Description/ Dimensions
Location of the site	Portion 2 and Portion 4 of Erf 11376 located within the Richards Bay IDZ Phase 1D, KwaZulu-Natal.
Landowner	The affected properties are owned by the City of uMhlathuze Local Municipality.
Municipal Jurisdiction	King Cetshwayo District Municipality and the City of uMhlathuze Local Municipality.
Electricity Generating capacity	Up to 3000MW (installed).
Proposed technology	Combined Cycle Gas Turbines (CCGT) Power Plant with an anticipated configuration of 2:2:1 (Gas Turbine: HRSG: Steam Turbine).
Extent of preferred project site	71ha.
Extent of the Richards Bay CCPP development footprint (power plant only)	Up to 60ha.

Component	Description/ Dimensions
Extent of the associated infrastructure development footprint	~11ha.
Gas turbine	The footprint of each gas turbine, including auxiliary equipment, is expected to have an extent of 50m x 100m.
Stack dimensions	Exhaust and Bypass Stack heights will be a minimum of 40m (one exhaust stack per HRSG and one additional bypass stack for each gas turbine) and a diameter of ~7.2m.
Condenser Fans	Air cooled condenser fans will be ~40m in height.
Fuel and dangerous goods storage	» Storage tanks will be required for diesel to be used as a back-up fuel which will have capacity for an 8-hour operation. Two tanks of 5.2 million litre capacity will be required. Diesel will be transported via road. » Natural gas will not be stored on site. » Welded steel tanks will be constructed for diesel storage. The tanks will be bunded. » Four LPG tanks with a storage capacity of up to 6.5m^3 each will be required for the storage of dangerous goods. The total storage capacity required for dangerous goods is 26m^3. » The following dangerous goods will be stored on site: ∗ Cleaning agent for the gas turbine blade washing; ∗ New and used lubricating and hydraulic oils; ∗ Lubrication oils required for turbine rotating equipment and bearings; ∗ Hydraulic oil for the main machine set control valve systems; ∗ Jacking oil for the turbine bearings (this is a high-pressure lubrication oil); ∗ Seal oil for the generator; ∗ Chemicals for the water treatment plant.
Site access	» Direct access to the site is possible via the use of existing dirt roads surrounding the project site. » The new main access to the project site will be via the Western Arterial which leads from the John Ross Highway into the industrial area. » The new access roads to the Richards Bay CCPP will be approximately 3.7m in width per lane and will include two lanes, which will be tarred. » The perimeter security road will be gravel.
Laydown areas	» Approximately 5-10ha, in total, will be required for laydown areas. Of this, 8-9ha/80% of the total area allocated for laydown areas will be temporary and progressively used for construction. The remaining 1-2 ha/20% of the total area allocated for laydown areas, will be landscaped following construction.
Grid connection	» The CCPP will be connected to the national grid via an HV yard and a 400kV power line[7]. » The CCPP will have a maximum of 12 generator transformers.
Pipelines and water storage	» Internal water (potable water and industrial quality), air, diesel, gas and sewerage pipelines.

[2]A separate environmental permitting process for the development of the power line is being undertaken under a separate EIA Process

Component	Description/ Dimensions
	» All pipelines within the site will have a diameter of between 1.27cm to 60.96cm. » The natural gas pipeline throughput capacity is expected to be between 8900 and 9500 tons per day at maximum operation of the CCPP. » The gas pipeline from the station to the boundary will have a maximum diameter up to 60.96cm in diameter. » From the site boundary, natural gas will be transported via the main supply pipeline to the gas processing plant. From the processing plant the gas will be distributed to each individual gas turbine. » Water tanks and pipelines will be installed for water of industrial and potable water quality.
Associated infrastructure	» Internal roads and external road to connect to the local/provincial road. » Control and electrical buildings, including a central control room. » Warehousing and administrative buildings with a height between 5-10m. » Firefighting systems. » Storage facilities for fuel, gas, diesel and chemicals. » Emergency back-up generators.
Building sizes	» Access Building. » Guard hut. » Administration Building. » Rest Room. » Main Workshop. » Main Store. » Chemical and Oil Store. » Fuel Offloading Canopy. » Fuel Treatment and Forwarding Facility. » Fuel Sampling Room. » Fire Pumphouse. » Air Compressor Building. » MCC Room. » Station Control Building. » Turbine Hall. » Water Treatment Plant Lab. » Water Treatment Plant. » Hydrogen Plant Room.
Services required	» Waste disposal - all waste material generated from the development will be collected by a contractor and the waste will be disposed of at a licensed waste disposal facility off site. Eskom has confirmed capacity for the provision of waste disposal services with the Local Municipality. There will be storage for general and hazardous waste. » Sanitation – during construction and operation of the Richards Bay CCPP a connection to the municipal sewer pipeline will be established for sanitation purposes at the plant. It is expected that approximately 20m^3 of sewage will be discharged to this system per day during construction and operation. Eskom has received confirmation of capacity of the sewage system from the Local Municipality. Temporary chemical toilets will however also be used if and where required. » Water – Potable water is to be sourced from the uMhlathuze Municipality Water Works. The construction phase of the Richards Bay CCPP will require 37 290 m^3

Component	Description/ Dimensions
	of water for a period of 36-48 months. The average consumption will be approximately 800 - 1 000 m³/month. Water volumes of approximately 1 825 000m³ per annum are expected to be required for the operation of the plant. This amounts to between 2000 - 5000m³ provided by the municipality per day. Eskom has received confirmation of capacity from the Local Municipality to provide the required water. » Wastewater from the plant will be discharged to the municipal system. It is estimated that the boiler blowdown system will discharge ~1555m³ per day, the demineralised treatment plant effluent will discharge ~523.99m³ per day, condensate polishing plant effluent will discharge ~197m³ and ~370.6m³ of oily water prior to treatment will be discharged per day. Eskom has received confirmation of capacity from the municipal system with the Local Municipality. » Electricity: the electricity requirements for this facility are to be obtained from the municipality during the construction phase. Eskom has received confirmation of capacity for the provision of electricity by the Local Municipality. The RB CCPP will generate its own electricity from the facility during operation. Refer to **Appendix Q** for proof of consultation between Eskom and the service providers.
Groundwork Spoil heaps	Temporary groundwork spoil heaps will be required for the duration of the construction phase (~36-48 months). All groundwork temporary spoil heaps will be used for landscaping purposes following construction. Any excess material will be removed from site by a contractor and disposed of.
Water Storage Reservoir	Water storage facilities for both process water and fire-fighting purposes will be located on site. The Local Municipality will supply the potable water.
Water Treatment Plant (Figure 2.2)	» Water of industrial quality will be provided by the local municipality which will be treated for potable water purposes and for demineralised water for the CCPP. As a back-up the Local Municipality will also provide potable water for situations where industrial quality water is not available. » The industrial water supplied by the Municipality to be treated in the water treatment plant will not have heavy metals, dyes and constituents, as per the requirements of Eskom. » Waste water produced from the CCPP will be generated from the demineralised water treatment system, Boiler Blowdown Recovery System and the Condensate Polisher System. The wastewater will be neutralised at the Effluent Neutralisation System (NES) (i.e. water treatment plan) before discharge to the municipality. » Waste water containing oil will include waste water from ground- run-offs, and therefore the effluent is expected to contain grit and silt. An oil-water separator will be installed for the removal of the grit, silt and other foreign particulate matter prior to the water being put through the Primary Oil-Water Separator. The oil removed from this process will be stored in a tank and collected by a licensed sub-contractor to dispose of the oil off-site. A secondary oil-water separator will be required to refine the wastewater prior to discharging it to the local municipality sewage treatment plant. » Potable water from the pre-treatment system will be treated through the demineralised water treatment system. Ion Exchange will be used in the

Component	Description/ Dimensions
	process. The ion exchange treatment system will consist of three trains, each with a hydraulic capacity of 2 403m^3 per day. The system will include the following process units: i) strong acid cation vessel, CO_2 de-gasifier, weak base anion vessel, strong base anion vessel and a mixed bed vessel. The demineralised water produced can be sent to the power station directly or it can be stored in a demineralised water storage tanks. After some time, the vessels will become exhausted and will need to go through a process of regeneration. Regeneration of the resins will take place *in-situ* through the use of specific valves and internal distribution piping and nozzles.
Condensate Polishing Plant	» Condensate Polishing Plant (CPP) will treat the main condensate from the CCPP in order to achieve the feed water quality required for the steam-water cycle and will include pre-polishing filters and an ion exchange system. The CPP serves to prevent contaminants (ionic and corrosion) from entering the boiler and turbine, thereby increasing the unit's availability, reliability and performance. Each turbine unit at the plant will have an independent CPP. The capacity will be 791m^3 per hour per unitised CPP. Regeneration of both the cation and anion resins is required to be undertaken after a period of operation of the power plant due to resin exhaustion. This process is undertaken to minimise the possibility of intrusion of residual chemicals into the steam/water cycle. When resins become exhausted it will be removed from service at the unitised CPP facility and hydraulically transferred to the regeneration facility.
Water re-use /recycling	» The CCPP will recover boiler blowdown waste water and stormwater for re-use. » The demineralised water inlet at the water treatment plant will reduce the use of raw water from the municipality. However, the quenching water requirements are too high to justify re-use at the water treatment plant, unless quenching is undertaken via an air-cooled heat exchanger. » The recovery of the blowdown vessel flash steam can be cooled and re-used as part of the CCPP. » The use of the steam in the de-aerator for efficiency improvement purposes can also be implemented for water re-use.
Stormwater	» All stormwater will be collected separately from areas designated as clean and dirty areas. » Where stormwater is potentially contaminated, the dirty water will be transported via pipelines to a dirty water retention dam. » The dirty stormwater will be sent to the water treatment plant for processing prior to it being used in the power plant processes. » It is expected that the stormwater from clean areas will contain clean water. » Clean water will therefore be transported via pipelines, natural drainage (where possible) and stormwater channels to a clean water retention dam. » There is a possibility that the clean stormwater will be re-used directly by the plant.
Generation and Storage of waste	» Construction waste (e.g. spoil, packaging materials, rubble, plastics etc.). » General waste will be generated by operation and maintenance staff during the operation of the power station. » General waste and hazardous storage facilities are to be constructed to store wastes as required during both operation and construction.

Component	Description/ Dimensions
	» No solid waste will be generated through the power generation process; only liquid effluent from operations and other liquid wastes (such as oils) arising from maintenance activities will be generated. » An effluent neutralisation sump for the storage and neutralisation of regeneration waste from anion and cation resin regeneration will be required. » The expected volume of waste from the Condensate Polishing Plant (CPP) will be 197m^3 (for cation and anion of a single train). » The expected volume of demineralised waste will be 21.8m^3 per hour. » Temporary storage of the demineralised water treatment plant waste may be required. The temporary storage will be on site within the water treatment plant area. The expected storage volume for the storage is 1 569m^3 (21.8m^3 per hour, assuming a three-day storage capacity). » The expected volume of blowdown recovery waste is 102.8m^3 per hour. » The waste generated from the washing of the gas turbine blades will be stored in a closed sump, collected and disposed of at a licensed disposal facility by an appointed Contractor. » Resin regeneration waste will be sent to the effluent neutralisation sump and thereafter the municipal system.
Handling of waste on site	» Waste water to be discharged will be combined and disposed of via a pipeline into the municipal system.

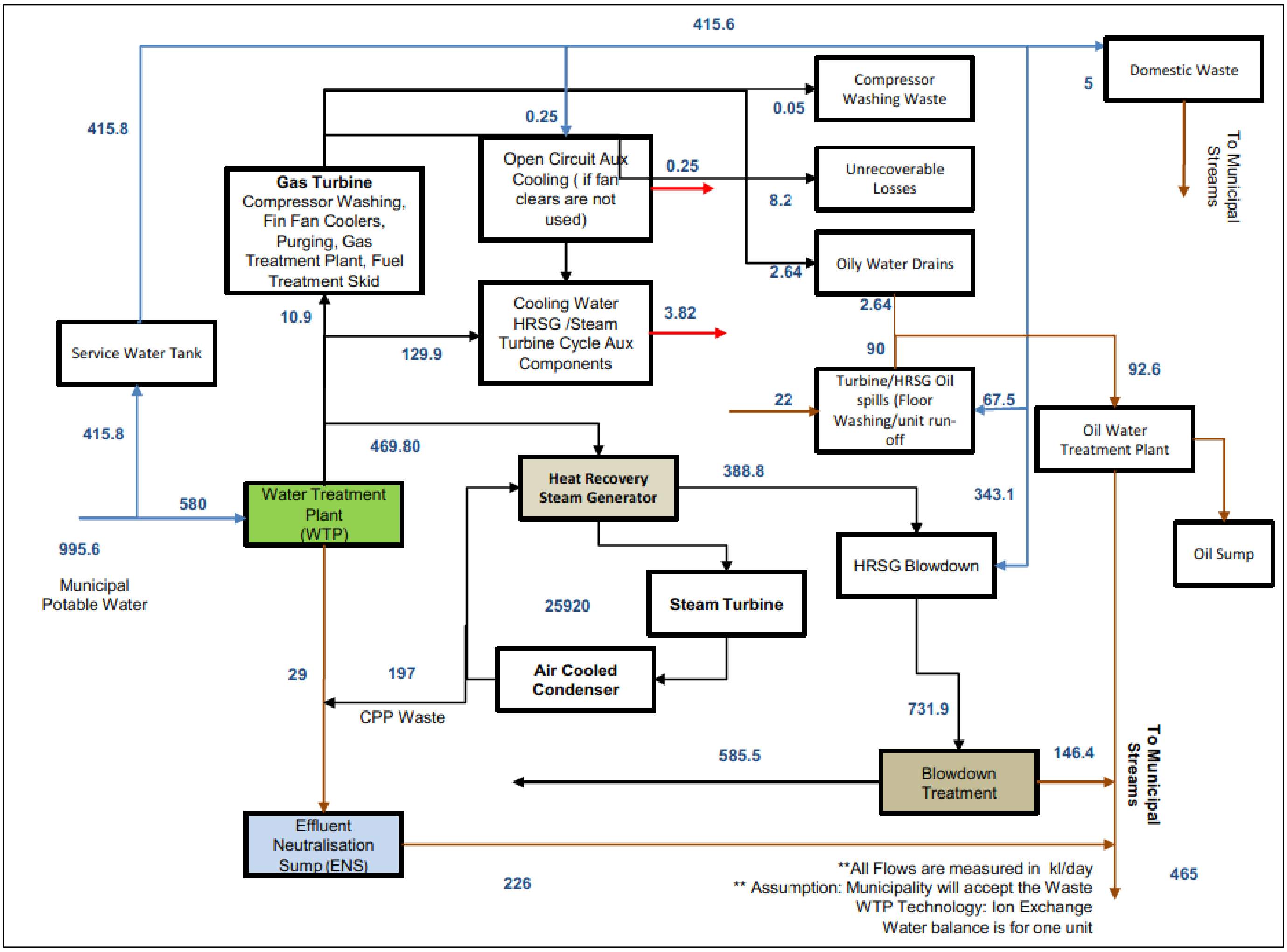

Figure 2.2: Schematic illustration of the Water Treatment Plant and water balance proposed as part of the Richards Bay CCPP

The estimated number of gas turbines for the proposed development is between 4 and 8 with an expected installed capacity of between 278 and 500MW each. There will be between 1 and 2 turbine halls depending on the final layout. Between 3 and 4 steam turbines with an expected capacity of between 150 and 250MW will be developed. Each gas and steam turbine will include its own generator, and as such there will be a total of up to 12 generators utilised. A conceptual process diagram of the operation of the RB CCPP is shown in **Figure 2.3** below.

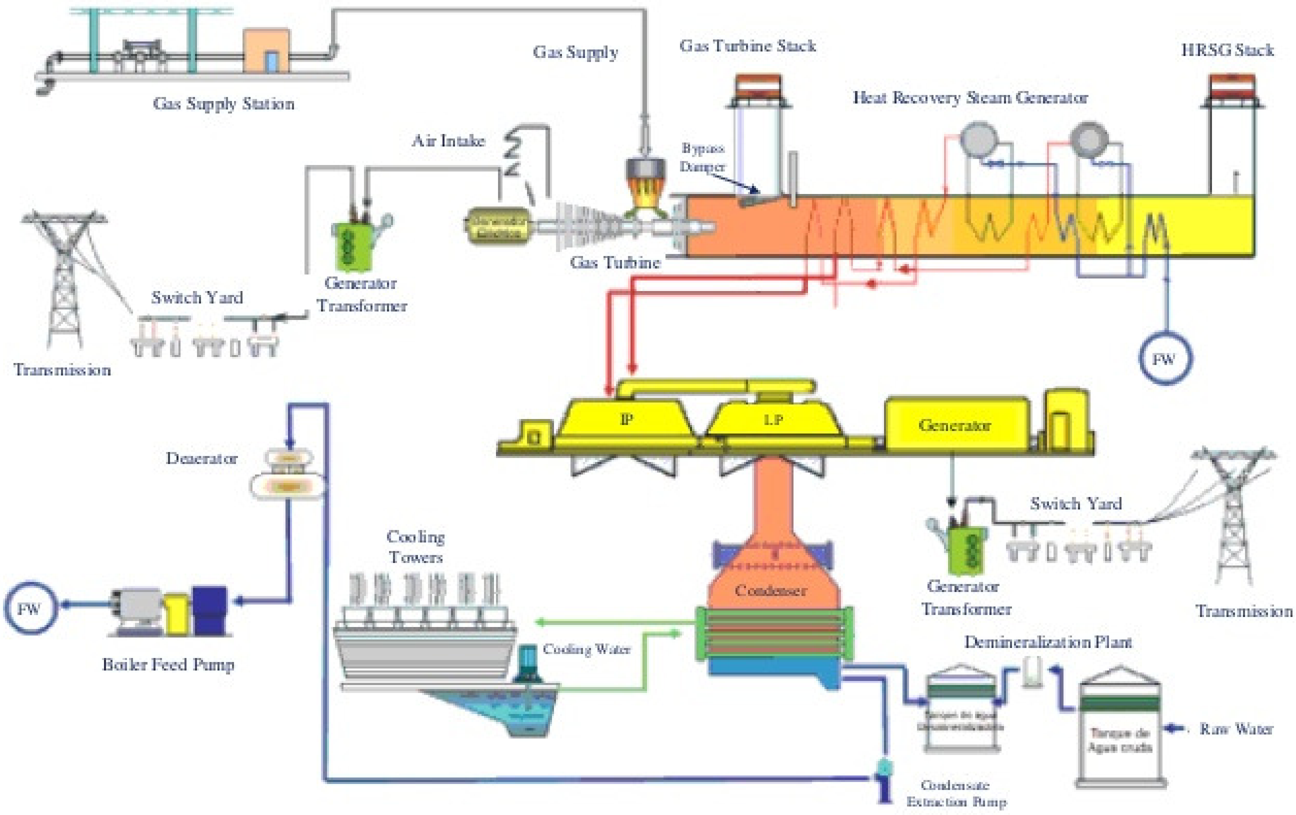

Figure 2.3: Schematic of a typical Combined Cycle Gas Turbine Power Plant (provided by Eskom)

2.3. Life-cycle Phases of the Richards Bay CCPP

2.3.1. Construction Phase

Construction of the Richards Bay CCPP is expected to take approximately 36 to 48 months. The construction activities involve the following:

- Prior to initiating construction, a number of surveys will be required including, but not limited to, geotechnical survey and site surveys to confirm the power station footprint.
- New access roads will need to be established to the site, specifically taking into consideration the use of abnormal vehicles. All internal access roads on the site and the main entrance road to the site will be tarred, with the exception of the perimeter security fence which will be gravel.
- Concrete batching will take place on site.
- Site preparation activities will include clearance of vegetation and excavations for foundations. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.
- Thereafter civil works will take place, which involves concrete works for structures such as foundations, the production unit (which houses the turbines, generator and Heat Recovery Steam Generator, stacks, substation and associated infrastructure indicated on the layout.
- Mechanical and electrical work will then follow.
- Ancillary infrastructure such as guard house, fence, admin building, workshops and a warehouse will be established.

» As construction is completed in an area, and as all construction equipment is removed from the site, the site will be landscaped following construction.

Employment opportunities to local community members will be available during the construction phase of the project. Approximately 4 300 employment positions will be available over the 36-48 months construction phase of which ~1% of positions will be highly skilled (i.e. supervisors and engineers) and 33% will be skilled and 66% unskilled labour (i.e. drivers and machine operators). Employees will not reside on the project site and will need to find their own accommodation in the Richards Bay area, if required.

Material to be used as part of the construction phase will be sourced from licenced borrow pits within the area or from the nearest suppliers to the site. The amount of material required will be between 60 000m^3 and 80 000m^3. All excess solid waste (soil material and rubble) generated from the development and not used for landscaping, will be collected by a contractor, and the waste will be disposed of at a licensed waste disposal facility off-site. However, excess solid waste will limited, and will be utilised by Eskom as far as possible.

With regards to sanitation, a connection to the municipal sewer pipeline will be established for sanitation purposes at the plant. It is expected that approximately 20m^3 of sewage will be discharged to this system per day during construction. Where required, temporary chemical sanitation toilets will also be used.

In terms of water supply, potable water is to be sourced from the uMhlathuze Municipality Water Works. The construction phase of the Richards Bay CCPP will require 800-1000 m^3/month of water for a period of 36-48 months.

2.3.2 Operation Phase

Prior to the operation of the power station, testing and trials will need to be undertaken before the commercial operation start date. The estimated timeframes for each power block to reach commercial operation date is shown in the Table 3.2 below.

Table 2.3: Estimated Commercial Operation Date (COD) for each Power Block

No.	Activity	Key Milestones (In Months)
1	Start with construction	0
2	COD of 1st Power Block	30
3	COD of 2nd Power Block	36
4	COD of 3rd Power Block	42
5	COD of 4th Power Block	48

The proposed facility will create approximately 90 permanent employment positions that will be retained for more than 25 years. The permanent employment positions will include highly skilled (35 positions, approximately 38%), skilled (40 positions, approximately 44%) and semi-skilled (15 positions, approximately 16%) positions. It is anticipated that there will be full time security, cleaning, maintenance and control room staff required at the site.

The gas turbine is one of the most efficient methods to convert gas fuels to electricity. The use of distillate liquid fuels, usually diesel, is also common as an alternate fuel. A combined cycle power plant or combined cycle gas turbine is a combination of gas fired turbines and steam turbines. The fuel is combusted in the gas turbine to generate electricity. The hot gas leaving the gas turbine passes to a heat recovery boiler, where it heats water to produce steam which passes to a steam turbine to generate additional electricity and then on to a condenser. A combined cycle power plant produces high power outputs at high thermal efficiencies (up to 55%) and with low emissions.

For combustion, fuel (natural gas) and air will be required. Water is required in the power generation process – it is converted to steam for energy conversion (from thermal energy to mechanical energy). For the Operations of the Power plant, the volumes of water required is between 2 000-5 000m³/day to be provided by the municipality. The output of the process is electricity. The power station will provide mid-merit power supply to the electricity grid. The mid-merit power supply will be between a range of 20% to 70% of the total electricity supply produced by the Richards Bay CCPP.

No solid waste will be generated through the power generation process, only liquid effluent will be generated and other liquid wastes (such as oils) arising from maintenance activities will be generated. It is expected that approximately 20m³ of sewage will be discharged to the municipal system per day. Waste water from the plant will be discharged to the municipal system. It is estimated that the boiler blowdown system will discharge ~1 555m³ per day, the de-mineralised treatment plant effluent will discharge ~523.99m³ per day, condensate polishing plant effluent will discharge ~197m³ and ~370.6m³ of oily water prior to treatment will be discharged per day. Any waste oils arising from maintenance activities will be removed from site and disposed of.

2.3.3. Decommissioning of a Gas-to Power Plant

The lifespan of the proposed Richards Bay CCPP will be more than 25 years. 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. The lifespan of the Richards Bay CCPP could be extended depending on the condition of the gas and steam turbines and the HRSG. An assessment will be undertaken prior to the end of the lifecycle of the plant to determine whether the plant should be decommissioned or whether the operation of the plant should continue.

It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA process would comprise disassembly, removal and disposal of the infrastructure. Decommissioning activities may involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of waste from the site and rehabilitation to the desired end-use, but the exact scope of the decommissioning programme would be determined closer to the time. Future use of the site after decommissioning of the Richards Bay CCPP could possibly form part of an alternative industry that would be able to utilise some of the existing infrastructure associated with the CCPP. This would however be dependent on the development plans of the area at the time.

It is expected that approximately 500 temporary employment opportunities will be made available during the decommissioning phase.

As part of the decommissioning phase Eskom will undertake the required permitting processes applicable at the time of decommissioning.

CHAPTER 3: PROJECT OVERVIEW

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

This chapter of the EIA report includes the following information required in terms of the EIA Regulations (2014), as amended, Appendix 3: Content of Environmental Impact Assessment reports (**Table 3.1**):

Table 3.1: Chapter 3 content requirements of Appendix 3 of the 2014 NEMA EIA Regulations, as amended, (GNR 326) are provided in this EIA Report.

Requirement	Relevant Section
3(h)(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such.	The screening and site selection assessment was undertaken to determine suitable site alternatives. The results of the screening assessments therefore previously informed the selection of the site for the Richards Bay CCPP. Therefore, no site alternatives have been assessed. The motivation for not considering alternatives is included in Section 3.2.
3(h)(x) a concluding statement indicating location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	A concluding statement for the proposed development footprint within the approved project site as contemplated in the accepted scoping report is included in Section 3.2.

3.2. Project Alternatives under consideration for the Richards Bay CCPP

In accordance with the requirements outlined in Appendix 3 of the of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), an EIA Report must contain a consideration of alternatives including site (i.e. development footprint), activity, and technology alternatives, as well as the "do-nothing" alternatives. The identification of alternatives is a key aspect of the success of the EIA process. In relation to a proposed activity, "Alternatives" means different ways of meeting the general purposes and requirements of the proposed 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:

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

In this instance, 'the project' refers to a 3000MW CCPP project proposed to be developed by Eskom for mid-merit power supply.

3.2.1. Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level, and as a result project-specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the Department of Energy's (DoE's) current National Integrated Resource Plan for Electricity 2010 – 2030 (IRP), and will continue to be addressed as part of future revisions thereto. The IRP (2010) considers natural gas to have significant potential to add to the energy mix. It is envisaged that the gas-derived electricity will be through open-cycle gas turbines (OCGT) and combined cycle gas turbines (CCGT), which should generate ~5.7GW and ~1.8GW, respectively. While the above-mentioned supply is the target for 2030, the IRP asserts that CCGT technologies and an LNG terminal needs to be built urgently so that the first CCGT capacity is available by 2020 to assist with electricity supply in the short term. The IRP recognises that gas-fired Combined Cycle Gas Turbines (CCGTs) present the most significant potential for developing the gas market in South Africa as it presents significant potential both for power generation, as well as direct thermal uses.

The update of the IRP of 2016 (not promulgated) calls for a higher allocation of energy generating capacities to Open Cycle Gas Turbine and Combined Cycle Gas Turbine facilities than the IRP 2010. Open Cycle Gas Turbines have been allocated ~13.3GW and Combined Cycle Gas Turbines have been allocated 21.9GW by the year 2050.

On 22 August 2018 the Draft IRP 2018 was released for comment. The latest update of the IRP includes estimates that 8.1GW of gas / diesel generated energy would be required by the end of 2030

The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of gas / diesel generated energy has been defined. Therefore fundamental alternatives to the proposed project are not considered within this EIA report.

3.2.2. 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, and/or
» The operational aspects of the activity.

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

Incrementally different alternatives which have been assessed as part of the EIA process are discussed in more detail below.

1.1.1.1 <u>3.2.2.1. Site Alternatives</u>

Richards Bay has been identified by Eskom as the preferred area for the development of a CCPP due to its location in relation to the supply take-off point at the Richards Bay Harbour, as well as the power requirements of the local area.

It must be noted that the uMhlatuze area consumes nearly 8% of all power generated in South Africa, yet the nearest coal-fired power station is more than 500km away. There is always a significant risk of transmission losses which could result in a lower security of supply to the area. By transitioning to availing locally-produced cleaner energy, such as natural gas, Richards Bay would significantly reduce these transmission losses and improve the security of supply to the area.

Eskom initially identified six (06) potential sites in the greater Richards Bay area for the development of the proposed CCPP. Following consideration of various technical and landowner issues, four (04) sites were taken forward into an environmental screening assessment and site selection study. The screening assessment and site selection study was undertaken in 2017. The sites assessed were known as Site 4A, Site 5, Site 6 and Site 7 (refer to **Figure 3.1**). The identified project sites are located at distances between approximately 100m and 12km from the east coast of South Africa, near Richards Bay. The sites are also located in close proximity to the Port of Richards Bay, which is located centrally to all four potential project sites. Accessibility to the sites is possible via various routes. However, the main route within the area is the national road, the N2. Regional roads, which include the R34 and the R619 which is linked to the N2, also provide access. 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 environmental screening and site selection assessment approach served as a site risk assessment tool from an environmental acceptability perspective – that is, a process to highlight or red-flag potential environmental issues of concern within each of the potential project sites, prior to initiating a full EIA process for the preferred project site. This study was informed by a site visit, specialist environmental screening studies and sensitivity mapping. The consideration of technical factors such as proximity to the electricity grid, access to water supplies, fuel supply, etc. was not included in the site assessment.

The specialist input into the screening and site selection process included the following:

» Terrestrial and aquatic (including wetlands, hydrology and flood line) ecology;
» Agricultural, land capability and soil considerations;
» Geo-hydrological and geo-technical considerations;
» Heritage and palaeontological resources;
» Socio-Economic considerations;
» Noise, traffic and visual aspects;
» Air quality considerations; and
» Marine aspects.

Table 3.1 provides a summary of the specialist study undertaken, and the rating awarded to each site in terms of the suitability of the development within each of the identified sites.

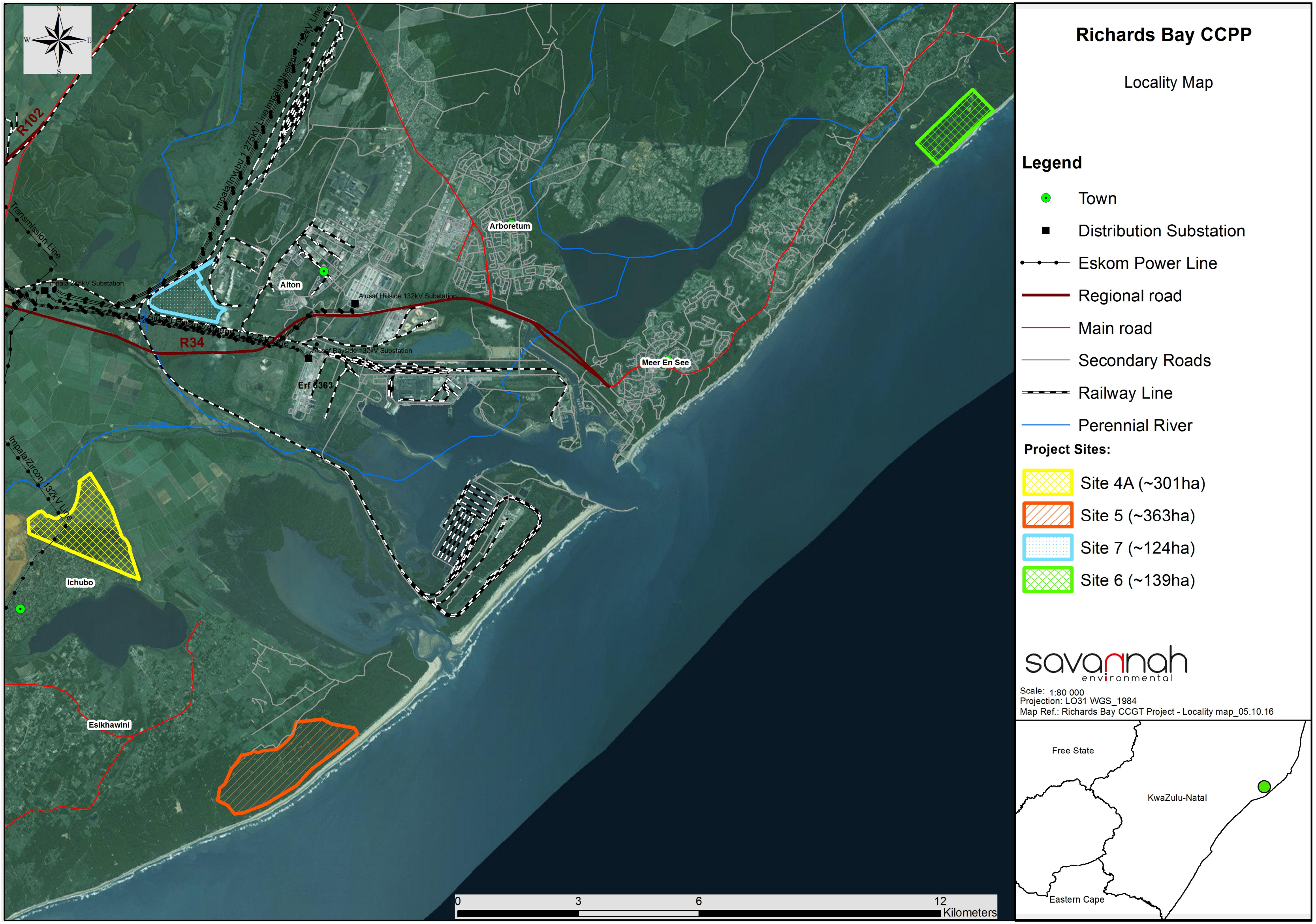

Figure 3.1: The four (04) potential sites near Richards Bay considered during the environmental screening study

Table 3.1: Summary of the site screening considerations and comparison of the four potential project sites.

Field of Study	Site 4a	Site 5	Site 6	Site 7
Terrestrial Ecology	Preferred	Not preferred	Acceptable	Acceptable
Wetland	Not preferred	Preferred	Preferred	Acceptable
Aquatic Ecology	Not preferred	Preferred	Preferred	Acceptable
Hydrological and Floodline	N/A	N/A	N/A	N/A
Geotechnical	Acceptable	Not preferred	Not preferred	Preferred
Ground Water	Acceptable	Acceptable	Preferred	Acceptable
Archaeology	Acceptable	Not preferred	Not preferred	Preferred
Palaeontology	Acceptable	Acceptable	Acceptable	Acceptable
Socio-Economic	Not preferred	Not preferred	Not preferred	Preferred
Noise	Not preferred	Acceptable	Acceptable	Preferred
Traffic	Acceptable	Not preferred	Not preferred	Preferred
Air Quality	Not preferred	Acceptable	Preferred	Not preferred
Visual	Acceptable	Acceptable	Not preferred	Preferred
Agricultural, Land Capability and Soils	Acceptable	Not preferred	Not preferred	Preferred
Marine	Preferred	Not preferred	Acceptable	Preferred

All identified, feasible alternatives were assessed in terms of social, biophysical, economic and technical factors. In order to achieve this, the 'funnel down' process was followed during site selection specifically in order to allow the environmental sensitivity investigation to inform the site selection process. Considering the findings of the screening assessment, the following conclusions were drawn:

» **Site 7** was considered to be the **most preferred** alternative considered within this Environmental Screening and Site Selection Study. No fatal flaws from an environmental perspective were identified at this stage in the process. Mitigation in terms of air quality through appropriate design of the facility were provisionally identified as being required, however.
» **Site 4a** was not preferred from an environmental perspective as the impacts on the aquatic ecology and wetlands were found to potentially present an impact of high significance if the sensitive areas identified could not be avoided. Appropriate mitigation to minimise impacts on sensitive social receptors, specifically regarding noise and air quality was identified to be required. No fatal flaws from an environmental perspective were however identified at this stage in the process.
» **Site 6** was not preferred from an environmental perspective, mainly due to the presence of potentially significant archaeological features and impacts on agricultural land, the loss of which were deemed to possible to acceptably mitigate. Appropriate mitigation to minimise impacts on social impacts, specifically in terms of visual impacts and access, were identified to be required. No fatal flaws from an environmental perspective were identified at this stage in the process.
» **Site 5** was not preferred from an environmental perspective, mainly due to the presence of potentially significant archaeological features and impacts on agricultural land, the loss of which were identified to not be able to be adequately mitigated. From a social perspective, specifically in terms of access (the recommendation was that this site not be considered further), this site was not preferred. Other environmental Issues in instances could be addressed through mitigation and appropriate design however. No fatal flaws from an environmental perspective were identified at this stage in the process.

It was therefore concluded that Site 7 is the preferred site from an environmental perspective. This site is considered to be feasible from a technical perspective due to its location in relation to the Port of Richards Bay (where the fuel supply is expected to be available), access to the grid, extent of the property, i.e. 71ha, and access from the surrounding area. It was therefore concluded that Site 7 be taken forward for detailed investigation through the EIA process.

Site 7 is located within the IDZ Phase 1D and includes Portion 2 and Portion 4 of Erf 11376 (refer to **Figure 3.2**). These properties have been allocated to Eskom by the landowner (the uMhlatuze Local Municipality) and the IDZ. This site is therefore referred to as the preferred project site throughout this EIA Report.

It must be noted that only two properties of Phase 1D of the IDZ is included as the project site. The most western property of Phase 1D has been declared as a biodiversity offset area by the uMhlathuze Local Municipality and Ezemvelo KwaZulu-Natal Wildlife within which no development is allowed to take place due to sensitive environmental features which consist of a mosaic of the Kwambonambi Grassland and coastal wetland systems (**Appendix Q2**)[8]. This biodiversity offset is considered to be relevant to the development of the Richards Bay CCPP, as the biodiversity offset area is on Portion 1 of Erf 11376 located directly adjacent (west) of the preferred project site.

[8] The biodiversity offset was implemented as part of the development of Pulp United within the site; however the development of Pulp United is no longer valid and will not be taking place in Phase 1D of the IDZ.

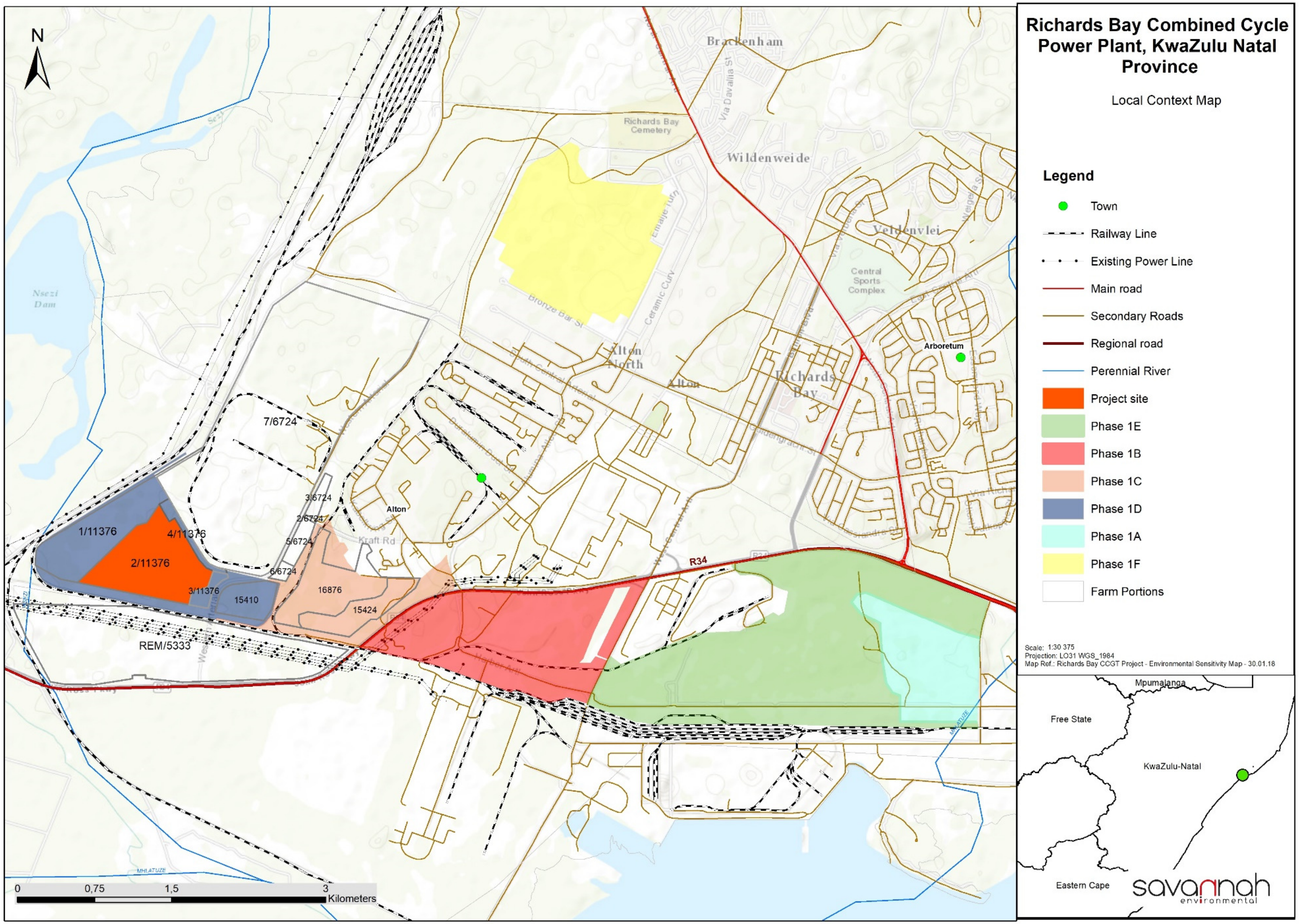

Figure 3.2: Phase 1D of the Richards Bay Industrial Development Zone (uMhlathuze Local Municipality).

1.1.1.2 3.2.2.2. Technology Alternatives

i) Power Generation Technology

The development of the CCPP has been identified by Eskom as the most feasible technology alternative for the generation of electricity within the Richards Bay area. The use of this technology has been included in the IRP, 2010, and has been considered as a necessity to be developed within South Africa by 2030 to meet the electricity supply demands and to ensure the significant inclusion of natural gas as an energy resource within the national grid, therefore promoting a diversified energy mix. Eskom is also considering this particular technology alternative in an effort to reduce its own carbon footprint per unit of electricity produced, as power plants using natural gas emit low amounts of carbon when compared with equivalent coal-fired power plants whilst using lower water quantities, thereby supporting Government's commitment to reduce carbon emissions and water usage. Finally, the specific site is also earmarked for the proposed development of gas-to-power within Phase 1D the Richards Bay IDZ (IDZ, 2018). As such, no power generation technology alternatives are being considered for this development within the Richards Bay area.

ii) Cooling Technology

Combined Cycle Gas Turbine (CCGT) Power Plants are designed to use water for cooling at the back-end of the thermal cycle. There are different types of cooling technologies available (discussed below for comparative purposes).

Dry Cooling
Dry cooling by air cooled condensers (ACC) consists of large sections of finned air-cooled heat exchangers (with mechanical draft), and the exhaust steam passes through the heat exchangers forming condensate. This arrangement uses no cooling water, and therefore requires no makeup for evaporation losses. ACC cooling can reduce the total make-up water demand considerably, leaving only the process consumption and service water as major users, but is limited by its sensitivity to ambient temperature.

Once-through cooling system
A once-through cooling system uses water which is circulated through pipes to absorb heat from the steam in the system, known as condensers, and then discharges the water with a higher temperature to a local storage area (i.e. like a dam, ocean etc.). The implementation of the system however results in disruptions to the local environment.

Dry cooled technology is the cooling technology that is preferred for the development of the Richards Bay CCPP, due to its consistency with the Department of Water and Sanitation requirements, which require a reduction in use of water, as well as Eskom's environmental objectives of reducing the environmental footprint. Additionally, the location of the site which will not be able to house the extensive piping required for once-through cooling.

1.1.1.3 3.2.2.3. Layout Alternatives

It is proposed that the Richards Bay CCPP will occupy the entire site in order for the project to be feasible. In addition, the RB CCPP is configured for a single layout and therefore cannot be reconfigured. Layout alternatives are therefore not applicable for the type of development and components proposed for the Richards Bay CCPP within the identified site. Therefore, no layout alternatives are considered in this EIA report.

1.1.1.4 3.2.2.4. Operation Alternatives

The proposed Richards Bay CCPP is operation specific and therefore this type of alternative not applicable to the proposed development. Therefore, operation alternatives are not considered in this EIA report. The Richards CCPP will be designed and constructed to operate via all operating modes e.g. peaking, mid-merit or baseload. Mid-merit was the chosen as the operating mode due to the high fuel cost and will provide the best returns.

1.1.1.5 3.2.2.5. The ‘Do-Nothing’ Alternative

The ‘do-nothing’ alternative is the option of not constructing the Richards Bay CCPP on Portion 2 and Portion 4 of Erf 11376. The ‘do-nothing’ alternative would mean that the status quo of the site would not be affected by the power plant, including existing impacts and the current baseline environment. This alternative is assessed in Chapter 8 of this EIA Report.

CHAPTER 4: POLICY AND LEGISLATIVE CONTEXT

This chapter provides insight into the policy and legislative context within which the Richards Bay CCPP is planned, and documents the manner in which the development of the project responds to the relevant policy and legislative context applicable to energy development in the country.

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

This chapter of the EIA report includes the following information provided in **Table 4.1** below, as required in terms of the EIA Regulations (2014), as amended, Appendix 3: Content of Environmental Impact Assessment reports.

Table 4.1: Chapter 4 content requirements of Appendix 3 of the 2014 NEMA EIA Regulations, as amended, (GNR 326) are provided in this EIA Report.

Requirement	Relevant Section
3(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 at a national, provincial and local level associated with the development of the Richards Bay CCPP has been considered throughout this chapter. A description of how the project responds to the identified policy and legislative context is also included.

4.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy, and is informed by ongoing strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that supports the development of renewable energy production projects is illustrated in **Figure 0.1**. These policies are discussed in more detail in the relevant subsections, along with provincial and local policies or plans that have relevance to the development of the project.

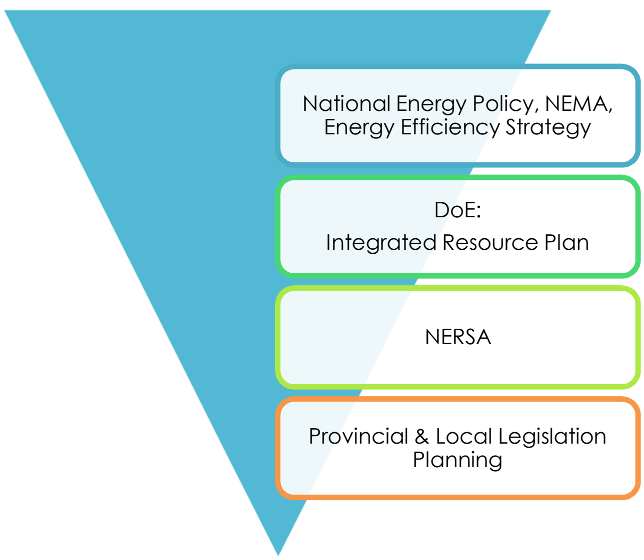

Figure 0.1: Hierarchy of Electricity Policy and Planning Documentation

4.3 Regulation Hierarchy

The regulatory hierarchy for energy generation projects of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As energy development is a multi-sectoral issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process for the Richards Bay CCPP.

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

» **Department of Energy (DoE):** DoE is responsible for policy relating to all energy forms, and is responsible for compiling and approving the Integrated Resource Plan (IRP) for Electricity.
» **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for renewable energy projects to generate electricity.
» **Department of Environmental Affairs (DEA):** DEA is responsible for environmental policy and is the Competent Authority in terms of NEMA and the 2014 EIA Regulations (GNR 326). The DEA is the Competent Authority for this project (as per GNR 779 of 01 July 2016), and is charged with regulating decisions on Environmental Impact Assessment (EIA) applications, and for thIs project.
» **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):** SANRAL is responsible for the regulation and maintenance of all national roads and routes.
» **Department of Water and Sanitation (DWS):** DWS is responsible for effective and efficient water resources management to ensure sustainable economic and social development. DWS is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WULs) and / or registration of General Authorisations (GAs).
» **Department of Agriculture, Forestry and Fisheries (DAFF):** DAFF is the custodian of South Africa's agricultural, forestry, and fishery resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector. DAFF is also responsible for the issuing of permits for the disturbance or destruction of protected tree species.
» **Department of Mineral Resources (DMR):** Approval from the DMR will be required to use land surface contrary to the objects of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. In terms of the MPRDA approval from the Minister of Mineral Resources is required for proposed activities that might sterilise a mineral resource that may occur on site.
» **Department of Rural Development and Land Reform (DRDLR):** DRDLR is dedicated to the social and economic development of rural South Africa, and is responsible for providing a framework for rural development.

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

» **Provincial Government of KwaZulu-Natal – KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA):** This Department is a commenting authority for this project.
» **Regional Office of KwaZulu-Natal – Department of Water and Sanitation (DWS):** The KwaZulu-Natal Regional Office for DWS is responsible for effective and efficient water resources management to ensure sustainable economic and social development. DWS is also responsible for evaluating and issuing

licenses pertaining to water use (i.e. Water Use Licenses (WULs) and / or registration of General Authorisations (GAs) at a Provincial level.

» **Amafa / Heritage KwaZulu Natali:** This department identifies, conserves and manages heritage resources throughout the KwaZulu-Natal Province.
» **Ezemvelo KZN Wildlife:** Ezemvelo KZN Wildlife is the provincial agency mandated to carry out biodiversity conservation and associated activities in the province of KwaZulu-Natal.

At the **Local Level,** the local and 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 is the **City of uMhlathuze Local Municipality** which forms part of the **King Cetshwayo District Municipality**.

4.4 National Policy and Planning Context

4.4.1 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 renewable 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 carriers, adequate investment in, 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. This Act provides the legal framework which supports the development of power generation facilities, such as the Richards Bay CCPP project.

It can be concluded that the development of the Richards Bay CCPP will assist in fulfilling the objectives of the Act. This can be achieved in terms of diversifying the energy supply and resources utilised in the country, availing sustainable energy at affordable prices and supporting economic growth, employment creation and ultimately poverty alleviation. Therefore, the development of the Richards Bay CCPP is in-line with the National Energy Act (2008).

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

The South African Energy Policy, published in December 1998 by the Department of Minerals and Energy (DME) identifies five key objectives, namely:

» Increasing access to affordable energy services;
» Improving energy sector governance;
» Stimulating economic development;
» Managing energy-related environmental impacts; and
» 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.

This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is "*based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential*." In addition, the National Energy Policy states that "*Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future*".

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology), more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore concerned with addressing the following challenges:

» Ensuring that economically feasible technologies and applications are implemented.
» Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options.
» Addressing constraints on the development of the renewable industry.

The development of the Richards Bay CCPP meet with the objectives of the Act and will assist in the fulfilment of each to some extent.

4.4.3 White Paper on the Renewable Energy Policy, 2003

The White Paper on Renewable Energy Policy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The White Paper on Renewable Energy Policy recognises the significance of the medium and long-term potential of renewable energy. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The position of the White Paper on Renewable Energy is based on the integrated resource planning criterion of:

"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."

The White Paper on Renewable Energy sets out the Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.

South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However, South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that include:

» Ensuring that equitable resources are invested in renewable technologies.
» Directing public resources for implementation of renewable energy technologies.
» Introducing suitable fiscal incentives for renewable energy.
» Creating an investment climate for the development of renewable energy sector.

The objectives of the White Paper are considered in six focal areas, namely:

i) Financial instruments.
ii) Legal instruments.
iii) Technology development.
iv) Awareness raising.
v) Capacity building and education.
vi) Market based instruments and regulatory instruments.

The policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing Greenhouse Gas (GHG) emissions and the promotion of renewable energy sources.

4.4.4 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.

4.4.5 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 on-going continuous process. It is reviewed periodically to take into account changes in the macro-economic 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.

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

The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. 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 initial iteration of the IRP, led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation, which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.2GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro and gas.

The IRP 2010 developed by the Department of Energy states a need for a diversified energy mix to meet the requirements of the country in terms of economic and social growth. The IRP (2010) considers natural gas to have significant potential to add to the energy mix. It is envisaged that the gas-derived electricity will be through open-cycle gas turbines (OCGT) and combined cycle gas turbines (CCGT), which should generate ~5.7GW and ~1.8GW, respectively. While the above-mentioned supply is the target for 2030, the IRP asserts that CCGT technologies and an LNG terminal needs to be built urgently so that the first CCGT capacity is available by 2020 to assist with electricity supply in the short term. The IRP recognises that gas-fired CCGTs present the most significant potential for developing the gas market in South Africa as it presents significant potential both for power generation, as well as direct thermal uses.

The update of the IRP of 2016 (not promulgated) calls for a higher allocation of energy generating capacities to Open Cycle Gas Turbine and Combined Cycle Gas Turbine facilities than the IRP 2010. Open Cycle Gas Turbines have been allocated ~13.3GW and Combined Cycle Gas Turbines have been allocated 21.9GW by the year 2050.

In August 2018, the Draft IRP 2018[9] was released for comment. The Draft IRP 2018 is based on least-cost supply and demand balance and takes into account security of supply and the environment (i.e. with regards to minimising negative emissions and water usage). According to the Draft IRP 2018, key input assumptions that changed from the promulgated IRP 2010 – 2030 (2011) include, amongst others, technology costs, electricity demand projection, fuel costs and Eskom's existing fleet performance and additional commissioned capacity. For the period ending 2030, the Draft IRP 2018 proposes a number of policy adjustments to ensure a practical plan that will be flexible to accommodate new, innovative technologies that are not currently cost competitive, the minimisation of the impact of decommissioning of coal power plants, and the changing demand profile. The recommended updated Plan is as depicted in **Figure 0.2**.

9 The Draft IRP was made available for comment and review in 2018. This Draft IRP has not yet been promulgated

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)
Embedded Generation Capacity (Generation for own use allocation)

Figure 0.2: Proposed Updated plan for the Period Ending 2030 (Source: Draft IRP 2018)

The latest update of the IRP includes estimates[10] that 8.1GW of gas / diesel generated energy would be required by the end of 2030. This plan is yet to be finalised and promulgated. However, in response to the need for a supply of clean and modern forms of electricity at an affordable price, Eskom is proposing the construction of the Richards Bay CCPP.

4.4.7 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. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth.

10 These figures reflect the new additional capacities within the Proposed Updated Plan for the period ending 2030.

To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.

4.4.8 The National Development Plan (NDP) 2030

The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. The NDP aims to achieve this by drawing on the energies of its people, growing and inclusive economy, building capabilities, enhancing the capacity of the state and promoting leaderships and partnerships throughout society.

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.

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.

4.4.9 Climate Change Bill, 2018

On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. 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.

The Richards Bay CCPP project is a renewable energy generation facility. The project would therefore contribute as an alternative energy generation facility to coal-based energy generation facilities thereby, assisting providing a diversified energy source in response to climate change, as well as in the long-term management, generation and release of reduced emissions in comparison to coal based facilities during its operation.

4.4.10 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.

As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and using the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government.

The development of Richards Bay CCPP is aligned with the Renewable Energy Flagship Programme identified under South Africa's NCCRP, and could therefore be argued to be aligned with the country's approach to addressing climate change.

4.4.11 Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 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 of the energy SIPs supports the development of the gas energy facility:

» SIP 9: Electricity generation to support socio-economic development: SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. Richards Bay CCPP is a therefore a potential SIP 9 Project.

4.4.12 New Growth Path Framework (NGPF), 2011

The vision of the New Growth Path Framework (NGPF) is to ensure that jobs and sustainable employment are at the centre of economic policy (Department of Economic Development, 2011). The key problem issues in the country are mass unemployment, poverty, and inequality. The lack of access to energy is identified as a major concern for the growth of the economy. Therefore, increased access to energy would have a profound effect on curbing poverty and unemployment. 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 (Department of Economic Development, 2011).

The construction and operation of the Richards Bay CCPP will aid in the creation of sustainable employment and will alleviate the socio-economic challenges faced in terms of the lack of access to energy. Therefore, the development is considered to be in line with the NGPF.

4.4.13 Industrial Policy Action Plan (IPAP), 2016 / 2017 – 2018 / 2019

The Industrial Policy Action Plan (IPAP) 2016/2017 – 2018/2019 represents a significant step forward in scaling up the country's efforts to promote long-term industrialisation and industrial diversification. It has been recognised that the Southern African region is fast transforming into an oil and gas jurisdiction led by major on and offshore gas finds in Mozambique, Tanzania, Botswana and Namibia. From a South African perspective, the scale of the natural gas find in neighbouring Mozambique (estimated at between 200-250tcf) is of particular significance. Accordingly, the plan states that a key industrial growth path is gas-based industrialisation (Department of Trade and Industry, 2016).

In this quest, the development of the long-term strategic framework to leverage the opportunities presented by regional oil and gas resources was created. The core purpose of this intervention is to put in place the necessary institutional infrastructure to implement the long-term strategic programme and maximise the multiplier effects of recently discovered and potentially forthcoming Southern African natural gas resources (Department of Trade and Industry, 2016).

As the industrial growth for the country has been identified as being gas-based, the development of the Richards Bay CCPP, proposed to be fuelled by natural gas, will assist in achieving the goals of the IPAP.

4.4.14 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 includes job creation (during construction and operation), industrial development, the potential to use 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 include limited domestic supply, no immediate gas demand as yet, lack of gas infrastructure (no LNG import terminal yet) and 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. However, the proposed development itself contributes towards gas infrastructure and, therefore, helps alleviate one of the challenges facing the industry. The 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 Richards Bay CCPP could acquire local gas cheaply if the infrastructure to obtain it is developed. However, as identified in the GUMP, the lack of 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.

4.5 Provincial Policy and Planning Context

The following provincial policies are considered to be relevant to the development of the Richards Bay CCPP.

4.5.1. KwaZulu-Natal Provincial Growth and Development Plan (PGDP) (2016)

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 be realised. This energy is anticipated through gas and diesel turbines which were expected to be on-line in 2016 (Provincial Planning Commission, 2016).

Through the development of the Richards Bay CCPP, the priority for the use of alternative energy resources will be met as the development will make use of natural gas as the primary resource.

4.5.2 KwaZulu-Natal Provincial Growth and Development Plan (PGDP) 2035 (Draft 2016/2017)

The vision of the KwaZulu-Natal Provincial Growth and Development Plan (PGDP) is to have maximized the Province's position as a gateway to South and Southern Africa, as well as the maximisation of human and natural resources in order to create a safe, healthy and sustainable living environment by 2035. Poverty, inequality, unemployment and disease should be issues of the past, with basic services available to all, and that domestic and foreign investors are attracted to the Province through its world class infrastructure and available skilled labour force.

To realise the vision for the Province, as set out in the PGDP, a strategic framework has been identified including 7 long-term goals with 31 objectives having been established. The goals include:

» **Inclusive Economic Growth** which relates to economic and entrepreneurial development, as well as innovation and job creation programmes.
» **Human Resource Development** which relates to improved education and skills development.

- **Human and Community Development** which relates to the eradication of poverty and improvement of social welfare and the enhancement of sustainable livelihoods and human settlements.
- **Infrastructure Development** which relates to the development of airports, roads and rail networks, as well as ensuring access to affordable, reliable, sustainable and modern energy for all.
- **Environmental Sustainability** which relates to enhancing the resilience of ecosystem services and responding to climate change.
- **Governance and Policy** which relates to strengthening policy, building government capacity, the eradication of fraud and corruption and the promotion of participative and accountable governance.
- **Spatial Equity** which relates to enhancing the resilience of new and existing cities and towns and ensuring integrated land management, as well as equitable access to goods and services and attracting social and financial investment.

The Richards Bay CCPP will result in the creation of job opportunities, human resources development, and strategic infrastructure for social and economic growth which will contribute towards reducing poverty and inequality in KZN. The Richards Bay CCPP will also contribute to reducing global GHG emissions which will assist with the goal of reaching environmental sustainability. This development will therefore assist the province in achieving the goals of the PGDP to some extent.

4.5.3 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, facilitating 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 4.3 indicates that Richards Bay (and therefore the Richards Bay CCPP project site) 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 Richards Bay CCPP is to be developed has a high demand for selected goods and services, including electricity. The area is already highly industrialised and hosts an IDZ, which continuously seeks new investments in ICT, agro-businesses, and metals beneficiation. Therefore, the Richards Bay CCPP is to be located in a potentially high economic growth region.

The development of the Richards Bay CCPP will drive economic growth, infrastructural transformation and development. The area for development is seen as a favourable area for investment and development. Therefore, it is considered that the Richards Bay CCPP is in-line with the KwaZulu-Natal Provincial Spatial Economic Development Strategy.

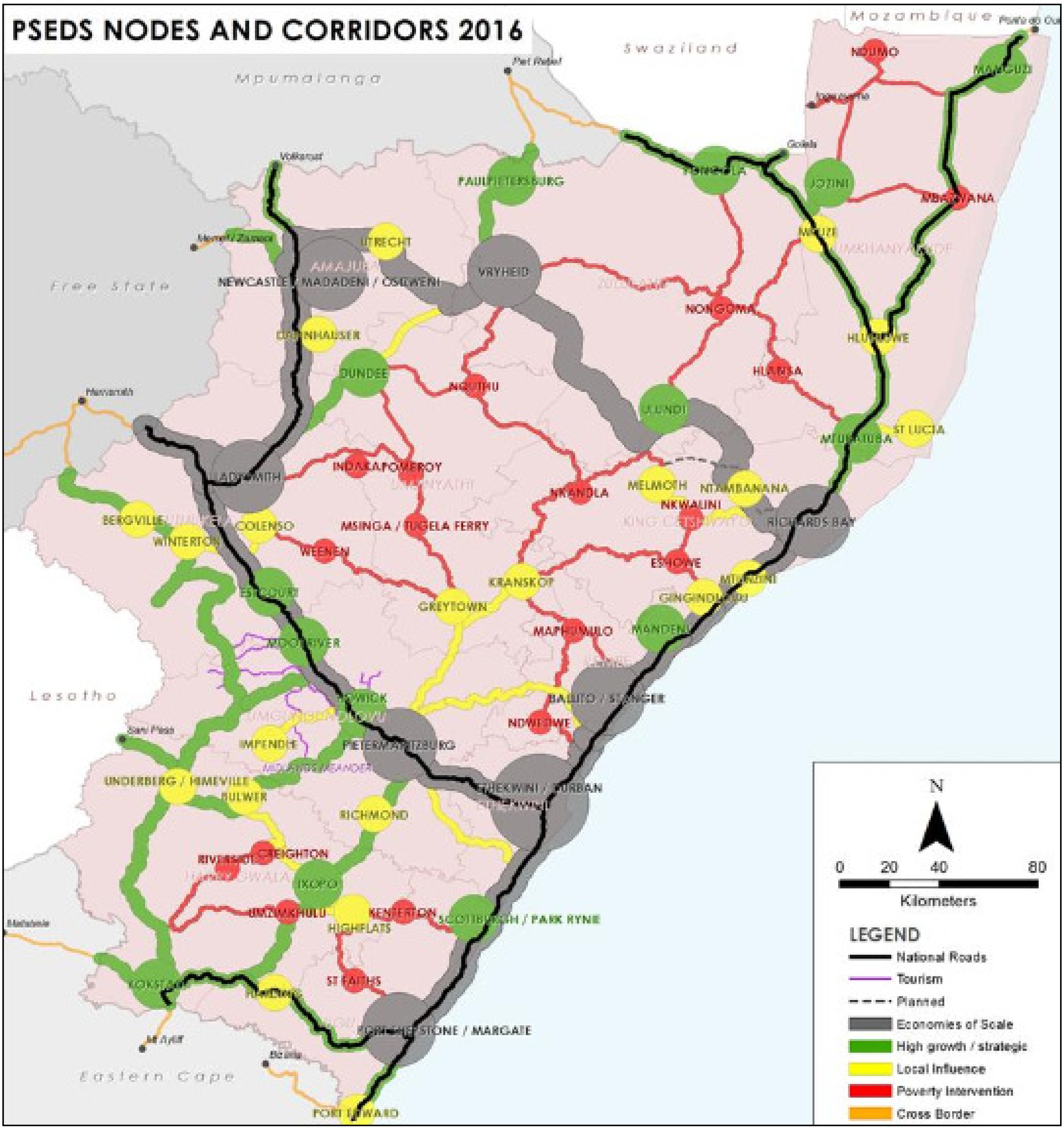

Figure 4.3: KZN Spatial Economic and Development Strategy nodes and corridors

4.5.4 KwaZulu-Natal Department of Economic Development and Tourism Strategic Plan 2013/14- 2017/18

The strategic focus for the KwaZulu-Natal Department of Economic Development and Tourism (KZN DEDT) during the 2013/14 – 2017/18 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 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.

As per the listed objectives above, which relate to the development of the Richards Bay CCPP, it can be concluded that the project is in-line with the KZN DEDT Strategic Plan, specifically with regards to the investigation and development of viable alternative energy generation options.

4.5.5 KwaZulu-Natal Provincial Spatial Development Framework (PSDF), 2011

The KwaZulu-Natal Provincial Spatial Development Framework (PSDF) has identified four main spatial variables informing the provincial spatial development framework. These variable 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 project site of the Richards Bay CCPP is located within an Economic Support Area. The proposed development will therefore contribute towards economic value, economic support and economic growth within the Richards Bay area.

4.5.6 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 the Policy and Regulatory Alignment Working Group, the Adaptation and Mitigation Working Group, and the 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% access to energy in the KwaZulu-Natal 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 Richards Bay CCPP will assist in achieving the implementation of energy efficient projects. The use of natural gas in the development of the Richards Bay CCPP offers reduced emissions when compared to the use of coal for electricity generation.

4.6 Local Policy and Planning Context

The strategic policies at the district and local level[11] have similar objectives for the respective areas, namely to accelerate economic growth, create jobs, uplift communities and alleviate poverty. As detailed below, the development of the Richards Bay CCPP is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

4.6.1. uThungulu District Municipality Integrated Development Plan (IDP), 2016/17

The vision for the uThungulu District Municipality, as contained in their Integrated Development Plan (IDP) 2016/17, is to be "an economically viable district with effective infrastructure that supports job creation through economic growth, rural development and promoting of our heritage" (uThungulu DM, 2016; 12). As indicated in the Vision, one of the goals is infrastructure development and service delivery. In addition, the plan further states that a combined strategy between the District Municipality and Eskom is urgently required to form an integrated and sustainable electricity service delivery within the district.

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 (RB IDZ) is identified as a catalytic project (uThungulu DM, 2016). The objective is to promote economic growth in the District and improve the socio-economic conditions of the residents. The

[11] The uThungulu District Municipality was renamed King Cetshwayo District Municipality in July 2016.

Richards Bay CCPP will be located in the IDZ Phase 1D (Provincial Planning Commission, 2016), and is therefore considered to contribute to the achievement of the IDP's goals relating to economic growth and social upliftment through employment creation and skills development.

4.6.2 uThungulu District Growth and Development Plan, 2015

The uThungulu 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 Richards Bay CCPP will therefore assist with this programme through the use of natural gas as an alternative energy source.

4.6.3 uMhlathuze Municipality Integrated Development Plan (IDP), 2016

The objective of the IDP is to promote economic growth in the District and improve the socio-economic conditions of residents (uMhlathuze LM, 2016). 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.

The development of the Richards Bay CCPP will assist with the 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.

4.6.4 Richards Bay Industrial Development Zone (RBIDZ), 2016

The purpose of the RB IDZ is to utilise the competitive advantage of the Richards Bay area to attract sustainable investments that stimulate economic growth, job creation, and beneficiation of resources and the empowerment of people. Amongst other industrial efforts, the RBIDZ has assumed a role in stewarding the establishment of an energy production hub (Richards Bay IDZ SOC, 2016). In addition, energy is one of the economic comparative advantages and there are key opportunity areas for gas-to-power facilities, such as the project site (Phase 1D), which form part of the IDZ. There are on-going collaborations with the Department of Energy to ensure that the province of KwaZulu-Natal contributes significantly to the diversification of the energy mix and the supply of clean and affordable electricity. Furthermore, these efforts will produce diversified energy generation capacity.

Through the development of the Richards Bay CCPP within the preferred project site (IDZ – Phase 1D), the establishment of energy production projects within the IDZ will be realised.

4.7 International Policy and Planning Context

At an international level, there are a number of planning policies, frameworks and industry standards that developers are obliged to meet, or at least consider, for energy generation projects of this nature. These are included below.

4.7.1 United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)

Climate change is one of the major global challenges of the 21st century that require global response. The adverse impacts of climate change include persistent drought and extreme weather events, rising sea levels, coastal erosion and ocean acidification, further threatening food security, water, energy and health, and more broadly efforts to eradicate poverty and achieving sustainable development. Combating climate change would require substantial and sustained reductions in GHG emissions, which together with adaptation, can limit climate change risks. The convention responsible for dealing with climate change is the United Nations Framework Convention on Climate Change (UNFCCC).

The UNFCCC was adopted in 1992 and entered into force in 1994. It provides the overall global policy framework for addressing the climate change issue and marks the first international political response to climate change. The UNFCCC sets out a framework for action aimed at stabilising atmospheric concentrations of GHGs to avoid dangerous anthropogenic interference with the climate system.

The UNFCCC has established a variety of arrangements to govern, coordinate and provide for the oversight of arrangements described in the documentation. The oversight bodies take decisions, provide regular guidance, and keep the arrangements under regular review in order to enhance and ensure their effectiveness and efficiency. The Conference of Parties (COP), established by Article 7 of the Convention, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments, and takes decisions to promote the effective implementation of the Convention.

COP 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement was open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017, and thereafter open for accession.

The Paris Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change.
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low GHG emissions development, in a manner that does not threaten food production.
(c) Making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development.

In order to achieve the long-term temperature goal set out in Article 2 of the Agreement, Parties aim to reach global peaking of GHG emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of

GHGs in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.

The Paris Agreement requires all Parties to put forward their best efforts through "Nationally Determined Contributions" (NDCs) and to strengthen these efforts in the years ahead. This includes requirements that all Parties report regularly on their emissions and on their implementation efforts. In 2018, Parties will take stock of the collective efforts in relation to progress towards the goal set in the Paris Agreement and to inform the preparation of NDCs. There will also be a global stocktake every 5 years to assess the collective progress towards achieving the purpose of the Agreement and to inform further individual actions by Parties.

In working towards this goal, advanced economies have already included renewables in their energy mix and have planned to increase their use in order to meet their mitigation goals: Japan aims to derive 22 – 24% of its electricity production from renewable sources by 2030 and the European Union plans for them to reach 27% of its final energy consumption. Developing countries are also playing their part, including South Africa which has included a goal of 17.8GW of renewables by 2030 within the IRP.

South Africa signed the Agreement in April 2016, and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement came into force internationally on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary.

COP 23 was held in Bonn, Germany from 06 to 17 November 2017, and is the second COP to be held since COP 21. One of the key outcomes of COP 23 was the launch of the "Powering Past Coal Alliance", led by the UK and Canada. More than 20 countries joined the alliance, including Denmark, Finland, Italy, New Zealand, Ethiopia, Mexico, and the Marshall Islands; as well as the United States (US) states of Washington and Oregon. The alliance notes that analysis shows that coal phase-out is needed by no later than 2030 in the OECD and EU28, and by no later than 2050 in the rest of the world to meet the Paris Agreement. However, it does not commit signatories to any particular phase-out date. It also does not commit the signatories to ending the financing of unabated coal-fired power stations, but rather just restricting it.

4.7.2 The Equator Principles III (June, 2013)

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.

Based on the above-mentioned criteria, RB CCPP can be anticipated to be categorised as a Category B project.

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. Such an assessment may include the following where applicable:

» An assessment of the baseline environmental and social conditions.
» Consideration of feasible environmentally and socially preferable alternatives.
» Requirements under host country laws and regulations, applicable international treaties and agreements.
» Protection and conservation of biodiversity (including endangered species and sensitive ecosystems in modified, natural and Critical Habitats) and identification of legally protected areas.
» Sustainable management and use of renewable natural resources (including sustainable resource management through appropriate independent certification systems).
» Use and management of dangerous substances.
» Major hazards assessment and management.
» Efficient production, delivery and use of energy.
» Pollution prevention and waste minimisation, pollution controls (liquid effluents and air emissions), and solid and chemical waste management.
» Viability of project operations in view of reasonably foreseeable changing weather patterns / climatic conditions, together with adaptation opportunities.
» Cumulative impacts of existing projects, the proposed project, and anticipated future projects.
» Respect of human rights by acting with due diligence to prevent, mitigate and manage adverse human rights impacts.
» Labour issues (including the four core labour standards), and occupational health and safety.
» Consultation and participation of affected parties in the design, review and implementation of the project.
» Socio-economic impacts.
» Impacts on affected communities, and disadvantaged or vulnerable groups.

- » Gender and disproportionate gender impacts.
- » Land acquisition and involuntary resettlement.
- » Impacts on indigenous peoples, and their unique cultural systems and values.
- » Protection of cultural property and heritage.
- » Protection of community health, safety and security (including risks, impacts and management of Project's use of security personnel).
- » Fire prevention and life safety.

Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed project. In terms of the Eps, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines.

The RB CCPP project 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 NEMA, which is South Africa's national legislation providing for the authorisation of certain listed activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed, where required.

4.7.3 IFC's Performance Standards on Environmental and Social Sustainability (January 2012)

The IFC's Performance Standards on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. The overall objectives of the IFC Performance Standards are:

- » To fight poverty.
- » To do no harm to people or the environment.
- » To fight climate change by promoting low carbon development.
- » To respect human rights;
- » To Promote gender equity;
- » To provide information prior to project development, free of charge and free of external manipulation;
- » To collaborate with the project developer to achieve the PS;
- » To provide advisory services; and
- » To notify countries of any Trans boundary impacts as a result of a project.

The Performance Standards comprise 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).

Performance Standard 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. Performance Standard 1 is the overarching standard to which all the other standards relate. Performance Standard 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, Performance Standard 2 through 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS, consistent with Performance Standard 1.

Given the nature of the RB CCPP project, it is anticipated at this stage of the EIA process that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.

4.8 Conclusion

The findings of the review of the relevant policies and documents pertaining to the energy sector indicate that the Richards Bay CCPP is supported at a national, provincial, and local level as it illustrates demonstrable alignment with the policies, plans, acts, and frameworks, and that the proposed development will contribute towards the various targets, aims and objectives.

CHAPTER 6: ASSESSMENT OF IMPACTS: GAS TO POWER PLANT AND ASSOCIATED INFRASTRUCTURE

An EIA process refers to that process undertaken in accordance with the requirements of the relevant EIA Regulations (i.e. the 2014 EIA Regulations (GNR 326), as amended), which involves the identification and assessment of direct, indirect, and cumulative, environmental impacts associated with a proposed project or activity. The EIA process culminates in the preparation and submission of a Final EIA Report (including an EMPr) to the Competent Authority (CA) for decision-making.

The EIA process is illustrated in **Figure 0.1**.

Figure 0.1: The Phases of an EIA Process

The development of RB CCPP requires EA in accordance with the requirements of Section 24 of NEMA and the 2014 EIA Regulations (GNR 326). The applicant (Eskom SOC Holdings Ltd) appointed Savannah Environmental (Pty) Ltd, as the independent environmental consultant responsible for undertaking the EIA process required in support of the application for EA for the RB CCPP project.

This Chapter provides a brief overview of NEMA and the 2014 EIA Regulations (GNR 326), as amended and application thereof to the RB CCPP project.

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

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Content of Environmental Impact Assessment Reports as per **Table 6.1** below.

Table 6.1: Chapter 6 content requirements of Appendix 3 of the 2014 NEMA EIA Regulations, as amended, (GNR 326) are provided in this EIA Report.

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed activities triggered and being applied for.	The listed activities triggered due to the development of the Richards Bay CCPP is included in Section 6.2.1, Table 6.2.

Requirement	Relevant Section
3(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 for the Richards Bay CCPP is included in Sections 6.3. Supporting documentation is included in **Appendix C**.
3(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 comments received during the scoping phase, including how each was addressed, is included in Section 6.3. A summary of the issues raised during the EIA Report 30-day review period will be included in the final EIA Report as **Appendix C** – Comments and Responses Report.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	The methodology for the assessment of the impacts has been included in Section 6.3.
3(p) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	A description of the assumptions and limitations associated with the assessment of the Richards Bay CCPP is included in Section 6.4.

6.2 Relevant Legislative Permitting Requirements

The legislative permitting requirements applicable to RB CCPP as identified at this stage in the process are described in more detail under the respective subheadings.

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". Listed Activities are activities identified in terms of Section 24 of NEMA which are likely to have a detrimental effect on the environment, and which may not commence without 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 Section 24(1) 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. Due to the fact that RB CCPP is a power generation project and therefore relates to the IRP 2010 – 2030, and the fact that Eskom is a State-owned Company, the National DEA has been determined as the Competent Authority in terms of GNR 779 of 01 July 2016. The Provincial KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) is a Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations, published under NEMA, ensures that developers 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.

The EIA process conducted for RB CCPP is being undertaken in accordance with Section 24 (5) of NEMA. Section 24 (5) of NEMA pertains to EAs, 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.

Table 6.2 contains all the listed activities identified in terms of the 2014 EIA Regulations (GNR 326), Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324) which may be triggered by the proposed development of the RB CCPP, and which EA has been applied for.

Table 6.2: Listed activities triggered by the Richards Bay CCPP

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
GN 327, 08 December 2014 (as amended on 07 April 2017)	9(i)(ii)	The development of infrastructure exceeding 1000 meters in length for the bulk transportation of water or storm water (i) with an internal diameter of 0.36 meters or more; or (ii) with a peak throughput of 120 litres per second or more ***The development of the Richards Bay CCPP will require the construction of a water pipeline exceeding 1000 meters in length. The pipeline will have an internal diameter of up to 0.61 meters and will have a peak throughput exceeding 120 litres per second.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	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. ***Wetlands occur within the project site which will be affected by the development of the Richards Bay CCPP. The development will be located within these wetlands, as well as within 32 meters of these wetlands.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal, or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse. ***The development of the Richards Bay CCPP will require the infilling or depositing of material and the excavation, removal or moving of soils of more than 10 cubic meters from the wetlands located within the project site.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic meters but less than 15 000 cubic meters. ***A water treatment plant will be developed as part of the Richards Bay CCPP for the treatment of the process water to be used in the power plant operations. The daily throughput capacity will be ~2 000m³.***

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
GN 325, 08 December 2014 (as amended 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 Richards Bay CCPP will have an installed generating capacity of up to 3 000MW and will use natural gas as a fuel resource (and diesel as a back-up), both of which are non-renewable resources.***
GN 325, 08 December 2014 (as amended 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 500 cubic meters. ***Storage containers will be required for the development of the Richards Bay CCPP to store dangerous goods such as lubricant oils and diesel. Two (2) tanks of 5.2 million litre (5 200m³) capacity each will be required for the storage of the back-up diesel. Additionally, four (4) LPG tanks with a storage capacity of up to 6.5m³ each will be required for the storage of other dangerous goods (cleaning agents, lubricating and hydraulic oils, jacking oils, seal oil, chemicals for the water treatment plant). The total storage capacity required for other dangerous goods is 26m³.***
GN 325, 08 December 2014 (as amended 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. ***An Air Emissions Licence is required to be obtained for the development of the Richards Bay CCPP in terms of the NEM: Air Quality Act. A Water Use License will also be required for the development of the RB CCPP in terms of the National Water Act, 1998 (Act No. 36 of 1998).***
GN 325, 08 December 2014 (as amended on 07 April 2017)	7	The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods (i) in gas form, outside an industrial complex, using pipelines, exceeding 1 000 metres in length, with a throughput capacity of more than 700 tons per day. ***The development of the Richards Bay CCPP requires the construction of a gas pipeline of more than 1000 meters in length for the transportation of natural gas from the gas supply pipeline to the project site. The daily throughput capacity will be between 8 900 and 9 500 tons per day.***
GN 325, 08 December 2014 (as amended on 07 April 2017)	15	The clearance of an area of 20 hectares or more of indigenous vegetation.

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
		The development of the Richards Bay CCPP will require the entire extent of the project site, of which over 20 hectares or more of indigenous vegetation, will be cleared.
GN 325, 08 December 2014 (as amended on 07 April 2017)	25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of 15 000 cubic meters or more. ***A Condensate Polishing Plant will also be required to treat the main condensate from the Richards Bay CCPP. The daily throughput capacity will be more than 15 000m³.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	2	The development of reservoirs, excluding dams, with a capacity of more than 250m³. (d) KwaZulu-Natal in (viii) Critical Biodiversity Areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Richards Bay CCPP will require clean and dirty water retention dams that will exceed 250m³ within a Critical Biodiversity Area (CBA) as per the KwaZulu-Natal Biodiversity Sector Plan, 2014.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	4(d)(viii)	The development of a road wider than 4 meters with a reserve less than 13.5 meters (d) KwaZulu-Natal in (viii) Critical Biodiversity Areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Richards Bay CCPP will require the development of internal road wider than 4 meters. The new proposed access roads will be ~7.4m wide. The project site is located within a Critical Biodiversity Area (CBA) as per the KwaZulu-Natal Biodiversity Sector Plan, 2014.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	12(d)(iv)(v)	The clearance of an area of 300 square meters or more of indigenous vegetation: (d) KwaZulu-Natal 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; and (v) within Critical Biodiversity Areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Richards Bay CCPP will require the clearance of an area of 300 square metres or more of indigenous vegetation. The project site is located within a Critical Biodiversity Area (CBA) as per the KwaZulu-Natal Biodiversity Sector Plan,***

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
		2014 and is located within a critically endangered ecosystem due to the presence of the Kwambonambi Hygrophilous Grassland.
GN 324, 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(c)(d)(vii)	The development of (ii) infrastructure or structures with a physical footprint of 10 square meters or more where such development occurs: (a) within a watercourse; or (c) within 32 meters of a watercourse, measured from the edge of a watercourse. (d) KwaZulu-Natal in (vii) in Critical Biodiversity Areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***Wetlands occur within the project site which will be lost as a result of the development of the Richards Bay CCPP. The development will be located within these wetlands, as well as within 32 meters of these wetlands. The project site is also located within a Critical Biodiversity Area (CBA) as per the KwaZulu-Natal Biodiversity Sector Plan, 2014.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	18(d)(viii)	The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometre (d) KwaZulu-Natal: (viii) Critical Biodiversity Areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The existing dirt road network surrounding the project site will be widened by more than 4 meters. The new proposed access roads will be ~7.4m wide. The project site is also located within a Critical Biodiversity Area (CBA) as per the KwaZulu-Natal Biodiversity Sector Plan, 2014.***

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 DWS). 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 6.3 contains Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a GA, or in the form of a WUL. The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 6.3: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA	Section 21 (b)	Storing water.

Notice No.	Activity No.	Description of Water Use
(No. 36 of 1998)		***The Richards Bay CCPP will require the storage of more than 2 000m³.***
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse. ***The Richards Bay CCPP will result in significant residual impact to the wetlands on the site, which will result in the loss of all the wetland systems on the property resulting in impeding and diverting the flow of water in a watercourse (wetlands in this instance).***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course and characteristics of a watercourse. ***The Richards Bay CCPP will result in significant residual impact to the wetlands on the site, which will result in the loss of the wetland systems on the property resulting in altering the bed, banks, course and characteristics of a watercourse (wetlands in this instance).***
NWA (No. 36 of 1998)	Section 21 (h)	Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process. ***The Richards Bay CCPP will require the disposing of dirty water into a dirty water dam which will result in disposing of water which contains waste from the power generation process.***
NWA (No. 36 of 1998)	Section 21 (j)	j) Removing, discharging and disposing of water found underground if it is necessary for the continuation of an activity or for the safety of people. ***The Richards Bay CCPP will require the removal of water for the wetlands on the project site in order to construct the facility.***

It must be noted that the above water uses have been identified based on the available information at the time of compiling this report. The water uses will be confirmed with the Department of Water and Sanitation upon submission of the application for a Water Use License prior to construction, once final designs are available.

6.2.3 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.

Section 38: Heritage Resources Management

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 proposed development, 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 (GNR 668).

6.3 Overview of the Scoping and EIA Process being undertaken for the project.

On the basis of the above listed activities, a Scoping and EIA Process has been undertaken for the Richards Bay CCPP. This process comprised two phases as follows:

» **The Scoping Phase** included the identification and description of potential impacts associated with the proposed project through a desktop study considering existing available information, and consultation with affected parties and key stakeholders. This phase considered the broader project site in order to identify and delineate any environmental fatal flaws, "no-go", or sensitive areas which should be avoided. Following a public review of the Scoping Report, the Scoping Phase culminated in the preparation and submission of a Final Scoping Report and Plan of Study for EIA to the competent authority for acceptance. The Final Scoping Report and Plan of Study for EIA for the Richards Bay CCPP was submitted to DEA on 06 October 2017, and acceptance was received on 20 November 2017, therefore marking the start of the EIA Phase.

» **The EIA Phase** includes a detailed assessment of potentially significant positive and negative direct, indirect, and cumulative impacts identified during the Scoping Phase. The EIA Phase considers a proposed development footprint within the identified project site and includes detailed specialist investigations, field work, and public consultation. Following a public review of the EIA Report, the EIA Phase culminates in the preparation and submission of a Final EIA Report and Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the Competent Authority for review and decision-making. Given that the original application lapsed in March 2018, this EIA report will be submitted in line with Regulation 21(2)(a) of the EIA Regulations (2014), since the findings of the scoping report remain valid and the environmental context has not changed. The same activities referred to above for a typical EIA Phase process will apply.

6.3.1 Scoping Phase

Identification of I&APs was undertaken by Savannah Environmental through existing contacts and databases, recording responses to site notices and newspaper advertisements, as well as through the process of networking from the commencement of the EIA process. The key stakeholder groups identified included authorities, local and district municipalities, public stakeholders, state-owned companies and non-governmental organisations. A Scoping Report was released to I&APs for public review from 21 August 2017 – 20 September 2017 for a 30-day comment period. Following the review period, a final Scoping Report was submitted to DEA in October 2017. This together with the Plan of Study for the EIA was accepted by the DEA, as the competent authority, in November 2017. In terms of this acceptance, an EIA is required to be undertaken for the Richards Bay CCPP.

The Scoping Study provided I&APs with the opportunity to receive information regarding the project, to participate in the process, and raise any issues of potential concern. The Scoping Report detailed the nature and extent of the project, identifying potential issues associated with the CCPP, and defined the extent of studies required within the EIA Phase. This was achieved through an evaluation of the project, involving the project proponent, review of existing information, and a consultation process with key stakeholders that included both relevant government authorities and I&APs.

A summary of the environmental related issues raised, and response given, in the Scoping Phase, is included in **Table 6.4**. A detailed Comments and Responses Report as is included in **Appendix C8**.

Table 6.4: Summary of environmental related comments received during the Scoping Phase

Issue	Response
General	
Your EIA process notice forms part of our approval from the South African Civil Aviation Authority (SACAA) with regard to CCPP project refers. There is a SACAA process whereby permission is applied for with regards to obstacles which could pose an aviation hazard. More information can be obtained at http://www.caa.co.za. Click on information for industry 'Obstacles' on the LHS. Forms, Part 139-27 and submit on the form itself. • Kindly provide a .kml (Google Earth) file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid. • Also indicate the highest structure of the project & the Overhead electric power transmission line. • Note that there may be other wind farms and PV farms in the area. Unique names are preferable. • Please always use the proposed PV farm name in the Subject box when corresponding via email with this office and indicate the name & address which should appear on the CAA approval/decline letter. • There is an assessment fee of R820 per application. • For billing purposes: company name VAT nr. and postal details.	SACAA's requirements have been submitted to the applicant. The applicant will apply for the SACAA approvals once the CCPP designs are finalised. SACAA will be consulted in November 2017 to determine the process to follow.

Issue	Response
Kindly ensure that all the above data is forwarded. Incomplete data causes unnecessary delays.	
The South African National Roads Agency SOC Ltd (SANRAL) hereby notifies you that all Scoping Environmental Impact Assessment Reports submitted to this office for comments shall conform to the following requirements: 1) All reports must be submitted as a hard copy via courier or normal mail. 2) Submissions must be A4 – DIN size (210x297mm) and be bound on the left side. 3) Cover letter fully describing the purpose of the submission. 4) Executive Summary including a description of the proposed development or activity. 5) Clearly annotated Locality Map – A3-Din size (297x420mm) folded to A4 size. 6) Clearly annotated Development/Site Layout plan – A3 Din size (297x420mm) folded to A4 size. 7) Associated Town Planning Proposal 8) Listed Activities. 9) Road infrastructure provision and the associated Traffic Impact Assessment 10) Comments from other relevant Transport Authorities e.g. Provincial Departments of Transport, Municipality etc. 11) Storm water management All ancillary information must be included on a Compact Disc (CD) for further reference. 12) All submissions to be addressed to: The Regional Manager – Eastern Region 58 Van Eck Place Mkondeni Pietermaritzburg 3201 Attention: Statutory Control Department 13) Every effort must be taken by the applicant to ensure that only relevant and concise information is included to prevent unnecessarily large or voluminous submissions. Your cooperation in this regard will be appreciated and you are to note that any submission in an electronic (soft copy) format or a submission that does not conform to the above standard requirements will not be processed from hereon. Furthermore, SANRAL reserves the right to request any additional information it deems relevant in its consideration of any submission in this regard.	SANRAL's requirements with regards to the submission of Scoping and Environmental Impact Assessment Reports are noted. A Scoping Report was submitted to SANRAL on 21 August 2017. It must be noted that a Traffic Impact Assessment will be undertaken during the EIA Phase of the project.
Traffic	

Issue	Response
From the drawing supplied it is not clear if you will be near a National Route our comments are set out below in the event that it does traverse or run parallel to a National Route. Any powerline and associated infrastructure that crosses or runs parallel to the National Road or placed within SANRAL's (The South African National Roads Agency SOC Ltd) building restriction area which is 60 metres from the Road Reserve Boundary needs SANRAL's approval.	» The routes which are located within close proximity to the project site include the Regional road (R34) located approximately 900m south of the project site and the National road (N2) located approximately 4.5km to the west of the project site. » The project site and the associated infrastructure does not traverse the National road, therefore approval from SANRAL will not be required in this regard. It should be noted that the grid infrastructure to connect the CCPP to the national grid, or any other linear infrastructure associated with the project, will be assessed under a separate application for environmental authorisation. »
How will the impacts on traffic be managed if diesel or gas is required to be trucked in.	A Traffic Impact Assessment will be undertaken in the EIA phase of this project, and will also address issues related to transportation of the fuel. Traffic impacts will be assessed and appropriate management measures proposed and presented in the Traffic Impact Assessment and in the EIA Report. Gas will not be trucked in but will be supplied by a gas supplier via its pipeline to the Eskom connection point at the boundary fence of the plant. Only diesel (used as back-up) will be trucked in.
What modes of transport will be moving in and out of the proposed power plant?	A gas pipeline will be used to supply gas to the power plant as the primary fuel. Fuel tankers will be used occasionally should diesel be required to operate the facility as a back-up (this is all during operation of the power plant). During construction there will be construction vehicles moving in and out of the site on a regular basis
Has a Traffic Impact Assessment been undertaken?	A Traffic Study was undertaken as part of the Environmental Screening and Site Selection Study and a Traffic Impact Assessment will be conducted during the EIA phase.
Visual	
Is the proposed site the same erven that Pulp United undertook an EIA on?	The project is proposed on Portion 2 and Portion 4 of Erf 11376, the same site that was considered for the Pulp United plant.
Mondi's primary concern is the potential impact the power plant or power plant processes would have on the quality of our product. Only potable water is utilised within our process to ensure the brightness and whiteness of our product. The proposed power plant will face Mondi's warehouse and this is a concern for us.	Mondi's concern regarding the potential impacts to their product considering the location of the warehouse in relation to the proposed power plant site is noted. Eskom and the air quality specialist will consider this concern in their layout design, and the most optimal layout will be provided in the Draft EIA.
?What will the power plant's visual impact be? The power plant's proximity to the John Ross Highway must be considered.	Afzelia Environmental Consultants have been appointed to undertake a Detailed Visual Impact Assessment. The Scoping report provides detail on the visual receptors in the area that would be impacted by the development. At this stage, the visual impact is considered to be medium-low subject to a detailed assessment being undertaken in the EIA phase.

Issue	Response
This power plant will be a Major Hazardous Installation (MHI). The location of the power plant in close proximity to the John Ross Highway, a critical arterial to the Richards Bay Port, must be considered.	A MHI assessment is being conducted and will form part of the EIA report. The potential impact of the facility on the John Ross Highway will be considered in the MHI assessment.
I am not supportive that Phase 1D is being considered as the site for the development of the proposed power plant due to the potential visual impacts and that it will be a MHI. This project will have a negative impact on the proposed Richards Bay Port expansion. More appropriate sites should be considered, for example, sites within Phase 2 of the IDZ might be better suited for the development of a power station.	Afzelia Environmental Consultants have been appointed to undertake a Detailed Visual Impact Assessment. The Scoping report provides detail on the visual receptors in the area that could be impacted by the development. At this stage, the visual impact is considered to be medium-low subject to a detailed assessment being undertaken in the EIA phase. Eskom identified six potential sites within the greater Richards Bay area for the development of the proposed power plant. Four sites were taken forward into an environmental screening study. The process followed in determining which sites were most preferred is outlined in Chapter 3 of the Scoping report. Phase 1D is considered to be the most preferred alternative for consideration in the environmental screening and site selection study. The area surrounding the project site is inclusive of open fields, industrial activities, and pockets of commercial activities. The proposed development is, therefore, compatible with the surrounding land uses. No fatal flaws from an environmental perspective were identified. Mitigation in terms of air quality through appropriate design of the facility will however be required.
That specific location concerns me. A much better site would be next to the Athene Transmission Station in Empangeni because of its proximity to the Sasol pipeline. The power station can also connect to the Athene Transmission Station. This site would make more sense as there would be limited visual and air quality impacts.	As Savannah Environmental indicated in the presentation, Eskom commissioned a Site Screening and Selection Study that was undertaken by Savannah Environmental to identify the most preferred site for the power plant. The Site Screening and Selection Study details the methodology used and the factors considered in selecting this site as the most preferred alternative. The Scoping report provides further details in this regard.
Soils and Agriculture	
1.1. The proposed development has limited impact on reducing available agricultural lands within the Province as it is within an area that is already been under local municipality control. 1.2. Even though the proposed development is foreseen as the project that will highly have impact on surface and ground water and impact on soil and land capability. 1.3. The proposed project is within the well-developed site, which is an area that is permanently transformed so there are no foreseen agricultural activities that will be impacted upon by the proposed development. 1.4. Generally, it is important that the available land is enough for all proposed operations to avoid possible negligence of important parts that	COMMENTS ON PROPOSAL: 1. It is noted that the development of the proposed CCPP will have limited impact on the agricultural land of the Province. The agricultural potential of the project site has also been identified by the Soils and Agricultural Potential Scoping Study (**Appendix H** of the Scoping Report) as Class III land, which is considered to pose moderate limitations to agriculture with some erosion hazard, and would require special conservation practice and tillage methods for agricultural production. 2. The proposed development has an impact on surface and ground water and soil and land capability, however the significance of the impacts on surface and ground water and soils and land capability will be considered, assessed and

Issue	Response
might lead to greater degradation of natural resources within the area. 1.5. Proper maintenance is essential as to meet discharge standards of water treatment plant 1.6. Environmental management plan for such projects is important. The office notes that this is still the beginning of the whole process. 1.7. There should be a correct allocation of pipes in terms of distances from the rivers. 1.8. Wetlands also need to be observed and delineated as to avoid possible pollution. 2. RECOMMENDATIONS 2.1. A detailed report that is still to be submitted to this office, it is important that the following areas be addressed as to have a sound project view: 2.1.1. Type of dam and method that will be used for construction of a dam for the proposed water treatment plant. 2.1.2. Types and construction methods of underground tanks for fuel tanks. 2.1.3. Clarity where the gas will be sourced and its disposal plan. 2.1.4. Water Use License Application is lodged and addressed as per National Water Act, 1998 (Act No 36 of 1988) for the proposed development. 2.1.5. Proper mitigation measures are implemented and adhered to. 2.1.6. Proposed development and associated infrastructure is not affecting our Natural Resources which is ground water, surface water and soils. 2.1.7. Conservation of Agricultural Resources Act 43 of 1983 should be taken into consideration with application to Paragraph 6 and 18 Subsection 1. 2.1.8. Re-vegetating and rehabilitating plan of the areas that will be affected by the construction phase. 2.1.9. Proper storm water management plan is also adhered to as to prevent possible soil erosion. 2.1.10. The office request that detailed information and a report is sent to us with information that will clearly indicate: • Depth of ground water on site • Distance from project site to the coast 3. CONCLUSION	quantified during the EIA Phase. It is noted that the proposed project is within the well-developed site that has been permanently transformed. The project site will be subjected to further detailed assessments during the EIA phase in order to confirm that agricultural potential of the site will not be impacted upon. 3. The footprint of the project site is approximately 71 ha, which is considered to be sufficient to accommodate the CCPP with a development footprint of ~60ha. Layout design and planning will be undertaken by the developer will consider the environmental sensitivities and constraints in order to avoid or minimise impacts on sensitive environmental features. It must however be noted that a biodiversity offset area is located directly adjacent to the project site for the conservation of the vegetation and coastal wetland system present within the project site and the surrounding area. 4. Maintenance and operational requirements to ensure that the development will not have a detrimental impact on the environment will be included as part of the Environmental Management Programme within the EIA phase. This will ensure the proper operation and maintenance of the water treatment plant. 5. As part of the EIA Phase an Environmental Management Programme will be compiled to include all the appropriate and required mitigation measures to ensure that the construction, operation and decommissioning of the Richards Bay CCPP is undertaken such that it will not lead to detrimental impacts on the environment. 6. It is noted that information regarding the pipelines to be constructed as part of the project needs and the location thereof needs to be made available. However, the gas pipeline associated with this development will be undertaken as part of a separate application for environmental authorisation. 7. Impacts on wetlands within the project site will be investigated in detail by a qualified specialist during the EIA phase. The outcome of the assessment of impacts on wetlands will be included in a Wetland and Aquatic Ecology Impact Assessment Report as well as in the environmental impact assessment report (EIAr). RECOMMENDATIONS » A detailed EIA Report will be submitted to the KwaZulu-Natal Department of Agriculture and Rural

Issue	Response
Please be advised that the Provincial Department of Agriculture and Rural Development: Land Use Regulatory Component's is in support of the project but the approval is on basis of submission of a detailed report with a detailed environmental management programme.	Development in due course. The requirements stated by the Department will be considered during the compilation of the EIA Report and EMPr. CONCLUSION » It is noted that the KwaZulu-Natal Department of Agriculture and Rural Development supports the development of the Richards Bay CCPP within the proposed project site. A detailed EIA Report will be submitted to the Department for their consideration and comment.
Water Consumption and Availability	
What are the water consumption volumes requirements for the proposed power plant?	The project will require approximately 37 290 m^3 for the construction period of 36 months. Approximately 1 825 000m^3 will be required annually during the operational phase.
From a cumulative impact the industry in Richards Bay has made noteworthy efforts to reduce the need and demand on the water that is left. New industry must be on board in making efforts to reduce water demand.	Eskom is certainly aware of the scarce water resource South Africa is facing and is always investigating innovative ways to save water. Currently there is a public participation project with the Richards Bay Municipality with regards to water supply and Eskom is well represented in this regard.
This area is a severely water-stressed area. Recent rains have caused the dam levels to rise slightly. In August 2016 dam levels were at 17% and many of the industries in Richards Bay were facing closure due to no water being available. How much water will this power plant require and where will the water be sourced from?	Water is planned to be sourced from the uMhlathuze Local Municipality. The Municipality has informed Eskom that they are investigating the option of using effluent from other industries in the Empangeni area. Such effluent will be treated and then used to supply the power station.
We are aware that the Municipality is undertaking a technical advisory on the potential recycling of effluent. However, this process has not been concluded. Do the water volumes provided by the Municipality meet the water consumption requirements of the power station? The report must include a comparison of what the minimum and maximum water requirements are when using ACC technology when compared to water-cooled technology. A balance of the water consumption needs must be provided in terms of what the municipality can provide and where the shortfall will be sourced from.	Eskom is currently preparing the power station's basic design and that will tie in with the Municipality's plan. Eskom will provide the Municipality with the first opportunity to supply water and then look to other water providers if the power station's water requirement needs cannot be met. Eskom sits on a working group which is investigating the possibility of recycling water from industries in Richards Bay and Empangeni. Eskom is considering the best practice figures internationally and we cannot provide accurate water consumption figures at this stage. Accurate figures will be provided during the EIA Phase. Eskom has identified and acknowledged that water scarcity is a major risk to this project. The water requirements specifications have been provided in this EIA report (see Chapter 2).
Are there any plans to construct a desalination plant? Will water recycling plants be considered to provide the water for the power plant?	The working group is investigating the development of a desalination plant which could provide water in the future. Eskom aims to conclude the basic design of the CCPP project by the end of 2017. The water use consumption figures will be detailed in the EIA report. A

Issue	Response
	Water Use License Application will be submitted by Savannah Environmental during the EIA phase.
Was access to sea water cooling one of the criteria for this development?	Access to sea water cooling would have been a criterion if the project site was located along the coast.
What are the water consumption requirements for the power plant? There is no water available for this project at this stage.	The project will require approximately 37 290 m^3 for the construction period of 36 months. Approximately 1 825 000m^3 will be required annually during the operation phase. The water consumption requirements have since changed slightly and have been provided in this EIA process (see Chapter 2). Two cooling technology alternatives are being considered for the project namely dry cooling and once-through cooling. KC: Eskom is aware of the water constraints in the region and Eskom has representation in working group that has been established to investigate various water supply options for the region. Options being considered include the utilisation of treated effluent from other industries in the area, a desalination plant and a water treatment plant on the site. The resultant water supply source has since been provided in this EIA process (see Chapter 2).
Will rain water be harvested at the proposed power plant?	Onsite rainwater harvesting will be implemented. Eskom's policy is to have a zero discharge so all rain water is harvested. This water could be used for domestic use and in the cooling process.
The project will require approximately 37 290 m^3 for the construction period of 36 months. Approximately 1 825 000m^3 will be required annually during the operational phase.	The project will require approximately 37 290 m^3 for the construction period of 36 months. Approximately 1 825 000m^3 will be required annually during the operational phase. The water consumption requirements has since changed slightly and have been provided in this EIA process (see Chapter 2).
Treatment and Disposal of Waste	
What type of process will be used for effluent treatment?	Eskom is considering installing a reverse osmosis treatment plant. Eskom's transmission department will be initiating the EIA for the transmission lines which will commence once a consultant has been appointed (envisaged to be in the fourth quarter of 2017) and confirmation of this will be finalised as the engineering designs progress from concept to basic designs.
Would the effluent be treated so that you could feed the treated water back into the plant or are you planning on disposing effluent via the marine outlet?	It is likely that effluent would be discharged via the sea outlet.
Is effluent discharge going to go into uMlathuze Effluent Pipeline and out to sea?	Effluent will be discharged to sea via the uMhlathuze Effluent Pipeline.
Air Quality	
Eskom must note that Mondi has an impact on air quality from a nuisance point of view. Odour is inherent in our process and although stringent odour abetment processes are adhered to, the power plant site will be impacted by nuisance air quality impacts. Mondi do not wish to find themselves in a situation where complaints	This will be investigated by the air quality specialist study, which is part of the current EIA process. Following the installation of the plant, appropriate monitoring will be undertaken by Eskom, as Mondi is also expected to continue its monitoring processes.

Issue	Response
are lodged against them regarding this nuisance impact. Eskom will need to decide whether it is acceptable to deal with this air quality impact.	
Eskom will need to consider the air quality impacts from any other processes that could have an impact on air quality in the region to avoid impacts to our process and quality of the end product.	The impact assessment for air quality will include the following: » The compilation of a baseline emissions inventory for existing facilities within Richards Bay based on measured emissions in the RBCAA inventory; » The establishment of an emissions inventory by referring to NMES and emission factors for combustion processes, fuel storage and fugitive dust (construction); » Atmospheric dispersion simulations using the US EPA CALPro suite (CALMET and CALPUFF); and A human health risk and nuisance impact screening assessment based on dispersion simulation results.
Richards Bay is reported to have the second worst air quality in South Africa, second only to Secunda, due to the high concentration of heavy industry. There are numerous industries contributing to air emissions in Richards Bay including Mondi (who have taken steps to reduce their own emissions), a cement factory, a smelter, a fertilizer manufacturing plant, a chrome smelter and two titanium smelters all contributing to the second worst air quality in the Country. Surely a regional air emissions study has to be completed rather than a site specific one due to the excessive impact of these industries in Richards Bay. What is your proposed methodology for assessing air emissions on a cumulative scale. The wind does blow in both directions and if the wind does blow in a certain direction it will blow the emissions over sugar cane and forestry lands as well as a few rural communities. However, if the wind blows in the opposite direction it will take the emissions over highly concentrated residential areas.	The appointed air quality specialist, AirShed Planning Professionals, is in contact with the Richards Bay Clean Air Association and their data is being considered in the air quality assessment. The EIA will assess cumulative impacts as well as localised impacts. The air quality impacts of all industries within a 30 – 50km radius of the proposed site will be assessed. The assessment of cumulative impacts is a requirement of the EIA Regulations, 2014 (as amended), and the EIA Report will include a chapter on cumulative impacts.
The Scoping report does not make reference to sulphur dioxide. Sulphur dioxide emissions are a key concern in Richards Bay as many industries contribute to sulphur dioxide emissions.	The Scoping report identifies sulphur dioxide as a source of air pollution within the region. A detailed Air Quality Impact Assessment will be provided in the EIA Report.
In terms of the air quality would it be possible for you to present the impact on residential areas in Richards Bay?	Air quality impacts to residential areas in Richards Bay will be detailed in the Air Quality Impact Assessment which will be undertaken in the EIA phase.
Does the Air Quality Impact Assessment investigate air quality impacts on the facility operating on gas or the facility operating on diesel?	The Air Quality Impact Assessment considers air quality impacts with the facility operating on gas as the primary fuel and diesel as a backup.
The term "back-up" needs to be clearly defined in the Scoping and EIA reports.	The term "back-up" will be quantified and clarified in the report. Diesel will not be used to operate the plant for 16 hours a day for 5 days a week (only natural gas will be used for this purpose). Diesel will only be utilised in

Issue	Response
	extreme worst-case scenarios. The quantities of diesel will be small.
The Scoping report does not make reference to abatement technologies that will be used in case the plant is required to operate on diesel.	The requirement for emissions for diesel is that they should be within the air emission limits. NO_x and SO_x emissions would need to fall within these limits.
Socio-economic Impacts	
How many people will be based on the site during the construction and operation phases?	Approximately 800 – 1000 people will be on site during the construction phase and 80 – 100 people during the operation phase.

6.3.2 EIA Phase

The EIA Phase aims to achieve the following:

» Provide a comprehensive assessment of the social and biophysical environments affected by the Richards Bay CCPP.
» Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the project.
» Comparatively assess any potential alternatives put forward as part of the project.
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
» Undertake a fully inclusive public participation process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA Report addresses potential direct, indirect, and cumulative impacts (both positive and negative) associated with all phases of the project including design, 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 Richards Bay CCPP.

6.3.2.1 Tasks completed during the EIA Phase

The EIA Phase for the Richards Bay CCPP will be undertaken in accordance with the EIA Regulations, 2014, as amended in April 2017, in terms of NEMA. Key tasks undertaken within the EIA phase will include:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Undertaking a public participation process throughout the EIA process in accordance with Chapter 6 of Government Notice R326 of the EIA Regulations, 2014 (as amended) in order to identify any additional issues and concerns associated with the Richards Bay CCPP.
» Preparation of a Comments and Response Report including all comments received from I&APs and Organs of State as part of the EIA Process.
» Undertaking of independent specialist studies in accordance with Appendix 6 of Government Notice R326 of the EIA Regulations, 2014, as amended.
» Preparation of an EIA Report in accordance with Appendix 3 of Government Notice R326 of the EIA Regulations, 2014, as amended.

These tasks are discussed in detail below.

6.3.2.2 Authority Consultation

In terms of Government Notice 779 of 01 July 2016, the DEA is the competent authority for all applications relating to the Integrated Resource Plan 2010 or any updates thereto. The DEA is also the competent authority for all applications of State-Owned Companies or parastatals. As the project is located within the KwaZulu-Natal Province, the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) is the commenting authority for the development of the Richards Bay CCPP. Consultation with the regulating authorities (i.e. DEA and KZN EDTEA) has continued throughout the EIA process. On-going consultation undertaken in the Scoping Phase included the following:

» Submission of the application for authorisation to DEA.
» Placement of site notices announcing the EIA (Scoping Phase) process at visible points along the boundary of the project site, in accordance with the requirements of the EIA Regulations.
» Submission of the Scoping Report for review by the competent and commenting authority from 21 August 2017 – 20 September 2017.
» Submission of the final Scoping Report for the Richards Bay CCPP submitted in October 2017 to DEA and accepted in November 2017.

On-going consultation to be undertaken in the EIA Phase will include the following:

» Consultation with DEA throughout the EIA process.
» The EIA Report will be made available to the DEA and EDTEA for a 30-day public review period from 24 March 2019 to 26 April 2019.
» Notification and consultation with Organs of State (refer to **Table 6.5**) that may have jurisdiction over the project, including:
  * Provincial Departments;
  * Parastatals and Non-Governmental Organisations;
  * Local Municipality and District Municipality; and
  * Conservation authorities.
» Submission of a final EIA Report to DEA following the 30-day public review period of the EIA Report and the receipt of the comments from the DEA on the Report. The final EIA Report will include all comments and issues raised by I&APs, and the responses of the EAP and the project development team; and
» If required, an opportunity for DEA and KZN EDTEA representatives to visit and inspect the proposed project site.

A record of all authority consultation in the EIA process is included within **Appendix C**.

6.3.2.3 Public Involvement and Consultation

The aim of the public participation process is primarily to ensure that:

» Information containing all relevant facts in respect of the project is made available to potential stakeholders and I&APs.
» Participation by potential I&APs is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the project.
» Comments received from stakeholders and I&APs are recorded and incorporated into the EIA process.

In compliance with the requirements of Chapter 6 of the EIA Regulations, 2014, the following summarises the key public participation activities that will be undertaken:

» **Advertisements and Notifications**
  * Advertisements announcing the availability of the EIA Report and inviting comment thereon as well as publicising the dates of the public meetings have been placed in The Mercury Newspaper and Zululand Observer which are widely distributed within the vicinity of the project site, as well as in The Sunday Times and The Rapport which are national newspapers. Advertisements were placed in The Mercury and Zululand Observer on 21 March 2019 for both, and adverts were placed on 22 March 2019 in The Rapport and on 24 March 2019 in The Sunday Times. The tear sheets of the newspaper adverts will be contained in Appendix C2 of the final EIA Report.
  * Letters notifying registered I&APs of the availability of the Richards Bay CCPP EIA Report for review will be distributed to registered I&APs via email and registered post. Copies of the EIA Report will be couriered to Organs of State Departments. A hard copy of the EIA Report will be placed at the Richards Bay Public Library, 03 Krugerrand Grove, Richards Bay for members of the public to view. The evidence of the distribution of the EIA Report will be included in **Appendices C4** and **C5** of the final EIA Report.

» **Consultation and Meetings**
  In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the development of the Richards Bay CCPP, various opportunities for stakeholders and I&APs to be involved in the EIA Phase of the process have been provided, as follows:

  * **Key Stakeholder Workshop and Focus Group Meetings:** The EIA Report is planned to be presented to the Richards Bay IDZ, as well as to any other relevant Key Stakeholders (including Organs of State and Non-Governmental Organisations/ Key Stakeholders – see **Table 6.5** below) who may have jurisdiction over the project. The meetings that are planned to be held are listed in **Table 6.6** below. Comments and issues raised by the Key Stakeholders will be recorded as part of the process.
  * **Public Meetings:** Two public meetings, one morning session (27 March 2019) and one evening session (26 March 2019), will be held in the study area during the 30-day review period of the EIA Report. The aim of these public meetings is to provide I&APs with a summary of the findings of the EIA Report, to invite comment on the proposed project and EIA Report, and to further discuss possible issues of specific concern that need to be considered within the final EIA Report. The public meetings will be advertised in The Mercury and the Zululand Observer on 21 March 2019, as well as in The Rapport on 22 March 2019 and in The Sunday Times on 24 March 2019. Registered I&APs have been notified of the public meeting in writing. Minutes of the meetings will be recorded as part of the process.
  * **One-on-one Consultation Meetings:** One-on-one consultation meetings discussing the findings of the EIA report will be presented, will be held with directly affected and surrounding landowners (where required). Minutes of the meetings will be recorded as part of the process.
  * **Telephonic Consultation Sessions**: Telephonic consultation will be held with I&APs, including Organs of State Departments and key stakeholders to capture issues, comments and concerns regarding the project and to follow-up on the submission of comments related to the EIA Report.
  * Written, faxed or e-mail correspondence.

Table 6.5: Organs of State

Organs of State
National Government Departments
Department of Agriculture, Forestry and Fisheries (DAFF).
Department of Energy (DoE).
Department of Environmental Affairs (DEA): » Climate Change Directorate; » Air Quality Directorate; » Biodiversity and Conservation Directorate.
Department of Mineral Resources (DMR).
Department of Public Works (DPW).
Department of Rural Development and Land Reform (DRDLR).
Department of Water and Sanitation (DWS).
Government Bodies and State-Owned Companies
National Energy Regulator of South Africa (NERSA).
Sentech.
South African Civil Aviation Authority (SACAA).
South African National Roads Agency Limited (SANRAL).
Telkom SA Ltd.
Trade and Investment KwaZulu-Natal.
Umhlathuze Water.
Provincial Government Departments
Amafa / Heritage KwaZulu-Natal.
Ezemvelo KZN Wildlife.
KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA).
KwaZulu-Natal Department of Transport.
Local Government Departments
King Cetshwayo District Municipality.
City of uMhlathuze Local Municipality.
Non-Governmental Organisations/ Key Stakeholders
BirdLife South Africa.
Wildlife and Environment Society of South Africa (WESSA).
Endangered Wildlife Trust (EWT).
Richards Bay Clean Air Association.
Richards Bay Industrial Development Zone (IDZ).
QS200 Quantity Surveyors.
Landowners
Affected landowners: » City of uMhlathuze Local Municipality.
Neighbouring landowners: » City of uMhlathuze Local Municipality; » Mondi; » Transnet Ltd.

Table 6.6: Consultation to be undertaken with I&APs in the Richards Bay CCPP EIA Process

	Activity	Date
EIA Phase	Distribution of letters announcing the availability of the EIA Report for review for a 30-day comment period, and the dates and venues of the Public Meetings and Key Stakeholder Workshop. These letters have been distributed to organs of state departments, ward councillors, landowners within the study area, neighbouring landowners and key stakeholder groups, as applicable.	18 March 2019
	The availability of the EIA Report and the date of the Public Meeting will be advertised in the Mercury and Zululand Observer newspapers, as well as The Rapport and Sunday Times.	Mercury and Zululand Observer - 21 March 2019; The Rapport – 22 March 2019; and The Sunday Times - 24 March 2019.
	30-day review period of the EIA Report for public comment.	24 March 2019 to 26 April 2019

	Public Participation meetings to be held during the 30-day comment period:
	
	Key Stakeholder Workshop to be held at Richards Bay IDZ
	» Richards Bay Industrial Development Zone (RBIDZ);
	» City of Mhlathuze Local Municipality;
	» King Cetshwayo District Municipality;
	» Department of Water and Sanitation;
	» KwaZulu-Natal Department of Environmental Affairs;
	» Ezemvelo Wildlife;
	» Adjacent Landowners;
	    * Mondi;
	    * Transnet.
	
	Public Meetings
	» Public Meeting 1 – Morning Session (Empangeni Public Library);
	» Public Meeting 2 – Evening Session (Premier Hotel The Richards).
		26 March 2019 (Morning Key Stakeholder Workshop and Evening Public Meeting); and
		27 March 2019 (Morning Public Meeting).

Records of all consultation undertaken will be included in **Appendix C** of the final EIA Report.

- **Project Database**
  All relevant stakeholder and I&AP information has been recorded within a database of I&APs (refer to **Appendix C**). While I&APs were encouraged to register their interest in the project from the onset of the process, the identification and registration of I&APs has and will be on-going for the duration of the EIA phase of the process.

- **Identification and Recording of Issues and Concerns**

Issues and comments raised by I&APs over the duration of the EIA process will be synthesised into a Comments and Responses Report. The Comments and Responses Report will include detailed responses from members of the EIA project team and/or Eskom. This will be included in **Appendix C** of the final EIA Report.

6.3.2.4 Assessment of Issues Identified through the Scoping Process

As detailed in the accepted Plan of Study for EIA, the following issues were identified through the Scoping Study as not requiring further investigation within the EIA, and no further or detailed assessments were therefore required:

» Impacts on noise – due to high ambient sound levels in the vicinity of the site and the absence of any potential noise-sensitive receptors within the area of potential influence of the power plant there is a low risk for the occurrence of noise impacts during the construction and operation phases. This is supported by a high confidence in the findings by the specialist. Therefore, the findings of the scoping Noise Assessment are considered to be sufficient and no further Environmental Noise Impact Assessment is required for the EIA Phase.
» Impacts on palaeontology – due to the absence of fossil outcrops within the project site, and the low significance of the impact on the palaeontological resources, no further study is required. Therefore, the findings of the Palaeontological Assessment are considered to be sufficient and no further Environmental Palaeontology Impact Assessment is required for the EIA Phase.

Issues which require investigation within the EIA Phase as identified through the Scoping Study, as well as the specialists involved in the assessment of these impacts are indicated in **Table 6.7** below.

Table 6.7: Specialist consultants appointed to evaluate the potential impacts associated with the Richards Bay CCPP project

Specialist	Area of Expertise	Refer Appendix
Anita Rautenbach of Rautenbach Biodiversity Consulting	Terrestrial Ecology	Appendix D
Andrew Husted of The Biodiversity Company	Wetland and Aquatic Ecology (including Wetland Offset)	Appendix E
Wayne Jackson of The Biodiversity Company	Soils and Agricultural Potential	Appendix F
John Kalala Ngeleka of Geo Hydraulic and Environmental Technology (Pty) Ltd	Geo-Hydrology	Appendix G
Jaco van der Walt of Heritage Contracts and Archaeological Assessments	Archaeology (including Palaeontology)	Appendix H
Theresa Bird of Airshed Planning Professionals	Air Quality	Appendix I
Sam Goodbrand of Promethium Carbon	Climate Change	Appendix J
Jon Marshall of Afzelia Environmental Consultants	Visual	Appendix K
Elena Broughton of Urban Econ Development Economists	Socio-Economic	Appendix L
Stephen Fautley of Techso	Traffic	Appendix M
Michael Oberholzer of RISCOM	Major Hazardous Installation	Appendix N

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the Richards Bay CCPP. 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).

As per the requirements of the EIA Regulations (2014), as amended, specialist studies are required to assess the cumulative impacts. The role of the cumulative assessment is to test if such impacts are relevant to the project in the proposed location (i.e. whether the addition of the project in the area will increase the impact). This section should address whether the construction and operation? of the Richards Bay CCPP together with all the projects proposed or existing in the area will result in:

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

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

6.4 Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within this EIA Phase:

» All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
» It is assumed that the development site identified by the developer represents a technically suitable site for the establishment of Richards Bay CCPP.
» It is assumed that the development of the Richards Bay CCPP will not commence prior to the authorisation of the power line and gas pipeline routes associated with the development. Separate EIA processes are being undertaken for the linear infrastructure mentioned above.
» Studies assume that any potential impacts on the environment associated with the Richards Bay CCPP will be avoided, mitigated, or offset.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer to the specialist studies in **Appendices D – N** for specialist study specific limitations.

6.5 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);
» International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines) (refer to Chapter 4 for more details).

Several other Acts, standards or guidelines have also informed the project process as well as the scope of issues addressed and assessed in this EIA Report. A review of legislative requirements applicable to the proposed project is provided in **Table 6.8.**

Table 6.8: Review of the relevant environmental policies, legislation, guidelines and standards applicable to the Richards Bay CCPP

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	National Legislation		
National Environmental Management Act (Act No 107 of 1998)	» Environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment. » NEMA EIA Regulations (GN 324 – 327 of December 2014, as amended in April 2017). » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority (S24 – Environmental Authorisations). » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment. » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30). » Appeals against decisions made by authorities (S43).	» National Department of Environmental Affairs (DEA). » KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA).	In terms of the EIA Regulations, 2014 (as amended) - GN R325, GN R326 and GN R327 - a scoping and EIA process is required to be undertaken for the development of the Richards Bay CCPP. The Scoping report was accepted by DEA in November 2017. This EIA Report will be submitted to the competent and commenting authorities (i.e. DEA and EDTEA) in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	» In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. » In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	» National Department of Environmental Affairs (as the regulator of NEMA).	While no permitting or licensing requirements arise directly, this section warrants application during the EIA phase and will continue to apply throughout the life cycle of the project.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992). » In terms of Section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. » Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exist in the Free State, Western Cape and Gauteng provinces.	» City of uMhlathuze Local Municipality.	The operation of the Richards Bay CCPP is expected to increase the noise level in the vicinity of the development. No potential noise-sensitive receptors are located close to the project site. It is therefore unlikely that the project will result in a noise impact. No further studies or permits in this regard are therefore required.
National Heritage Resources Act (Act No 25 of 1999) START	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers/ any person who intends to undertake a development to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).	» South African Heritage Resources Agency (SAHRA) » Amafa / Heritage KwaZulu-Natali	An Archaeological Impact Assessment (**Appendix G**) has been undertaken and concluded that the development of the Richards Bay CCPP will have an impact of low significance of low significance on archaeological heritage resources. A single undiagnostic potsherd was the only cultural find observed on the project site and is considered to be insignificant. In terms of Section 35 of the NHRA no significant archaeological sites were identified. No further mitigation prior to construction is recommended in terms of Section 35 of the NHRA and Section 36 of the KZN Heritage Act for the proposed development to proceed.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			In terms of the built environment of the area (Section 34 of the NHRA and Section 33 of the KZN Heritage Act) no standing structures older than 60 years occur within the study area. In terms of Section 36 of the NHRA and Section 34 and 35 of the KZN Heritage Act no burial sites were recorded. The project site is located in an industrial area away from main tourist routes and the Richards Bay CCPP will not impact negatively on significant heritage viewscapes. A Palaeontological Scoping Study was undertaken as part of the Scoping Phase. The study concluded that due to the lack of fossil outcrops within the project site and the low significance of the impact on the palaeontological resources no further study is required. Therefore, the findings of the Palaeontological Assessment (**Appendix J** of the Scoping Report) are considered to be sufficient and no further Environmental Palaeontological Impact Assessment is required for the EIA Phase.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53).	» National Department of Environmental Affairs (DEA). » KwaZulu-Natal Department of	Through the undertaking of the Ecological Impact Assessment (**Appendix D**), which included the undertaking of a field survey, no species of conservation concern in terms of

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	» A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), 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 (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species (GN 37885).	Economic Development, Tourism and Environmental Affairs (EDTEA).	NEMBA were identified. However, there is a medium to high probability of occurrence of *Crinum moorei Hook.f*. Should any individuals of the species be located within the development footprint of the CCPP, a permit from DEA or EDTEA would be required the removal or relocation.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5). » Classification of categories of weeds and invader plants (Regulation 15 of GN R1048) and restrictions in terms of where these species may occur. » Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048). » Control measures for the protection of land and the utilisation and protection of vleis, marshes, water	» Department of Agriculture, Forestry and Fisheries (DAFF).	An Ecological Impact Assessment has been undertaken and is included in **Appendix D**. Measures for the control of invasive vegetation has been included in **Appendix C** of the EMPr (**Appendix O**).

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	sponges and water courses (Regulations 4, 5 and 7 of GN R1048)		
National Forests Act (Act No 84 of 1998)	» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. 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 license granted by the Minister'. » GN 908 of 21 November 2014 provides a list of protected tree species.	» Department of Agriculture, Forestry and Fisheries (DAFF). » KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA).	A permit or license is required for the destruction of protected tree species and/or indigenous tree species within a natural forest. Whilst the Richards Bay CCPP project site is not located within a "natural forest", the following species were recorded within the Richards Bay CCPP project site and development footprint as per the Ecological Impact Assessment (**Appendix D**): » *Sclerocarya birrea.* » *Ficus trichopoda.* A permit is therefore required from DAFF.
National Environmental Management: Air Quality Act (Act No 39 of 2004).	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas". » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. » The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. » Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan. » Government Gazette 33064 of 31 March 2010 provides a list of activities which require an Air Emissions License and provides the thresholds that need to be complied with.	» King Cetshwayo District Municipality.	An Air Emissions License is required to be obtained from the Local Municipality for the Richards Bay CCPP in terms of the NEM: Air Quality Act. Combustion installations used primarily for steam raising or electricity generation are Listed Activities (Category 1) in terms of Section 21 of the NEM: Air Quality Act. Facilities with a design capacity equal to or greater than 50 MW and using liquid fuels are Sub-category 1.2 Listed Activities, while those using gaseous fuels are Sub-category 1.4 Listed Activities. The storage and handling of petroleum products at facilities with a combined storage capacity of 1 000 m^3

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	» Part 3 of GN R 964 of 2012 includes the minimum emissions standards.		is a Listed Activity (Category 2, sub-category 2.4) (Government Notice 893, Government Gazette 37054 of 22 November 2016). Special arrangements apply for Sub-category 2.4 Listed Activities depending on the vapour pressure of products being stored. The Richards Bay CCPP is proposing to store diesel on site to cater for emergency situations wherein the diesel can operate the plant continuously for an eight (8) hour period. Two storage tanks will be constructed on site with a capacity of 52 000m^3 per tank. Special conditions for this Sub-category refer to the design of the storage tank, Leak Detection and Repair and vapour recovery for road and rail offloading facilities.
National Water Act (Act No 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of the project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring. » National Government is the public trustee of the Nation's water resources (S3). » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal	» Department of Water and Sanitation (DWS)	The development of the Richards Bay CCPP within the project site will require water use licensing for the development of the project. The RB CCPP requires that the entire footprint of the site is developed which will result in significant residual impacts to the wetlands delineated on site, and will require a wetland offset for the wetlands to be lost. The water resource assessment and associated wetland offset report can be found in **Appendix E**.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	watering, fire-fighting and recreational use, as set out in Schedule 1. » Duty of Care to prevent and remedy the effects of pollution to water resources (S19). » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20). » Definition of water use (S21). » Requirements for registration of water use (S26 and S34). » Definition of offences in terms of the Act (S151). » GA 509 of 2016 provides the requirements for impeding or diverting the flow of water in a watercourse (section 21(c)) or altering the bed, banks, course or characteristics of a watercourse (section 21(i)).		The water uses that are anticipated at this stage to be licensed as part of the WUL include the following: b) storing water; c) Impeding or diverting the flow of water in a watercourse; i) Altering the bed, banks, course and characteristics of a watercourse; h) Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process; and j) Removing, discharging and disposing of water found underground if it is necessary for the continuation of an activity or for the safety of people. Note that all water uses will be confirmed with the Department of Water and Sanitation prior to construction when applying for the water use license.
National Environmental Management: Waste Act (Act No 59 of 2008)	» 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. » In terms of the regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities in support of an application for Waste Management Licenses. » The storage of waste must be undertaken in terms of the relevant norms and standards.	» National Department of Environmental Affairs (DEA) – Hazardous Waste » KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA).	The development of the Richards Bay CCPP does not include activities that require a Waste Management License. However, the measures recommended for the management of waste (Objective 12 and 13) within the EMPr (**Appendix O**) will be applicable throughout the life-cycle of the plant.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
The Hazardous Substances Act No. 15 of 1973	» This Act was promulgated to provide for the control of substances which may cause injury or ill-health to, or death of, humans by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature. » The Hazardous Substances Act also provides for matters concerning the division of such substances or products into groups in relation to the degree of danger, the prohibition and control of the importation, manufacture, sale, use, operation, application and disposal of such substances and products.	» Department of Health. » City of uMhlathuze Local Municipality.	It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be utilised on the Richards Bay CCPP site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health and/or City of uMhlathuze Local Municipality.
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	» The Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002) sets out the requirements with which applicants for prospecting rights, mining rights and mining permits must comply in Sections 16, 22 and 27 of the MPRDA. » A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act.	» Department of Mineral Resources (DMR).	Should material not be sourced commercially and a borrow pit(s) is considered necessary, the Contractor must source and apply for the relevant permit/s from the DMR.
Major Hazardous Installation Regulations	» The regulations make the employer responsible for the health and safety of his employees as well as the public in or in the vicinity of the workspace where the installation has taken place.	» City of uMhlathuze Local Municipality.	The development of the Richards Bay CCPP (during both the construction and operation phases) need to be undertaken in a manner which ensures that the employees involved in the development as well as the public located in the surrounding areas of the site are not affected by the project in terms of their health and safety. A quantitative risk assessment (QRA – see **Appendix N**) was undertaken to determine the impacts onto surrounding properties and

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			communities as part of an environmental impact assessment (EIA). This risk assessment included the consequences of fires and explosions as well as toxic releases at the Eskom facility near Richards Bay. A number of well-known sources of incident data were consulted and applied to determine the likelihood of an incident to occur. A number of incident scenarios were simulated, taking into account the prevailing meteorological conditions. The following conclusions were made: » The following installations were considered for analysis in the QRA: Chlorine; Natural gas; Diesel; Hydrogen; LPG; and Ammonia. » Consequences for the installations were analysed and assessed, with several worst-case scenarios having the potential to affect individuals located off-site. The largest of these was toxic vapour dispersion from the catastrophic rupture of a chlorine drum stored onsite. » The likelihood of failure of these installations were assessed and the combination of consequence and

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			likelihood being used to calculate the overall individual and societal risk. » Overall individual and societal risk were found to be broadly acceptable. Societal risk was found to be negligible and therefore also broadly acceptable. At this stage of the project however, the detailed engineering designs were not yet available and not enough information was available to complete a formal Major Hazard Installation (MHI) risk assessment. A formal MHI risk assessment will therefore be required prior to construction.
Provincial Legislation			
KwaZulu-Natal Conservation Management Amendment Act, 1999	» The KZN Conservation Management Amendment Act, 1997 (No 5 of 1999) provides for the establishment of the KZN Conservation and prescribes its powers, duties and functions which include: ∗ Direct Nature conservation management; and ∗ Direct Protected areas management.	» KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA). » Ezemvelo KZN Wildlife (EKZNW).	The Ecological Impact Assessment (**Appendix D**) confirmed the presence of *Ficus trichopoda* plant species which is protected under the KZN Conservation Management Amendment Act. Therefore, a permit for the destruction, removal or relocation of the species. Additionally, the following protected plant species has a medium to high probability of occurrence: » *Crinum macowanii* » *Crinum moorei* » *Crinum stuhlmannii* » *Boophone disticha*

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			» *Scadoxus membranaceus* » *Scadoxus multiflorus* » *Brachystelma sandersonii* » *Aloe ecklonis* » *Aloe marlothii* » *Kniphofia laxiflora* » *Kniphofia littoralis* » *Ledebouria ovalitolia* » *Barringtonia racemose* » *Eulophia speciose* The Ecological Impact Assessment also identified the Thomas's House Bat (*Scotoecus albofuscus*) as a species that is expected to be an occasional visitor to the area which is listed as protected.
KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014.	» The KZN Environmental, Biodiversity and Protected Areas Management Bill (2014) provides for the establishment, functions and powers of Ezemvelo KZN Wildlife the protection and conservation of indigenous species, ecological communities, habitats and ecosystems, the management of the impact of certain activities on the environment, the sustainable use of indigenous biological resources and the declaration and management of protected areas. » Schedules 3, 7 and 8 of includes the lists of protected fauna and flora species.	» KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA). » Ezemvelo KZN Wildlife (EKZNW).	The Ecological Impact Assessment (**Appendix D**) has confirmed the following plant species within the project site which are protected: » *Sclerocarya birrea* » *Hyphaene coriacea* » *Trichilia emetica* » *Ficus trichopoda* » All species from the Family ASPARAGACEAE » All species from the Family ASPHODELACEAE » All species from the Family ORCHIDACEAE

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			There is also a medium to high probability that the following plant species may occur: » *Crinum macowanii* » *Crinum moorei* » *Crinum stuhlmannii* » *Cyrtanthus contractus* » *Boophone disticha* » *Protorhus longifolia* » *Brachystelma sandersonii* » *Ilex mitis* » *Asparagus falcatus* » *Asparagus densiflorus* » *Kniphofia leucocephala* » *Kniphofia littoralis* » *Trachyandra asperata* » *Trachyandra saltii* » *Senecio ngoyanus* » *Senecio erubescen* » *Commiphora woodii* » *Elaeodendron croceum* » *Monsonia praemorsa* » *Hypoxis hemerocallidae* » *Barringtonia racemose* » *Ekebergia capensis* » *Eulophia speciose* The Ecological Impact Assessment also identified fauna species including the Near Threatened *C. mariquensi*. The species is restricted to wetlands and waterlogged areas and therefore have a patchy area of occupancy. The

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
			Chlorocebus pygerythrus and *Nycteris hispida* fauna species is also protected.
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.	» Ezemvelo KZN Wildlife (EKZNW).	The development of the Richards Bay CCPP needs to consider the future conservation planning of the area in order to ensure that no conflict in future land-use will take place.
EKWNW Norms and Standards on Biodiversity Offset for KwaZulu-Natal.	» The Provincial Norms and Standards on Biodiversity Offset for KwaZulu-Natal have been developed by Ezemvelo KZN Wildlife (Ezemvelo) (2009, 2013). The document provides details on how Ezemvelo, as the provincial biodiversity authority, requires offsets to be investigated and what information must be provided in an Offset Report.	» Ezemvelo KZN Wildlife (Ezemvelo). » City of uMhlathuze Local Municipality.	A biodiversity offset has been established and entered into between Ezemvelo KZN Wildlife and the City of uMhlathuze Local Municipality for the project site proposed for the development of the Richards Bay CCPP. The offset area, located directly adjacent to the west of the project site on Erf 1 of 11376, may not be disturbed. The biodiversity offset requirement was put in place for the loss the Kwambonambi Grassland present within the project site. This biodiversity offset needs to be adhered to by the Richards Bay CCPP project in order to ensure that there is no nett loss of biodiversity.
Guideline Documents / Standards / Plans			
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA No. 107 of 1998	» Prediction of impact that noise emanating from a proposed development would have on occupants of surrounding land by determining the rating level. » Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103.	» City of uMhlathuze Local Municipality.	The operation of the Richards Bay CCPP is expected to increase the noise level in the vicinity of the development, however no potential noise-sensitive receptors are located close to the project site. It is therefore unlikely that the project will result in a noise impact. No further studies or permits in this regard are therefore required.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
South African Bureau of Standards (SABS).	» Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from a Power Station. They are: * SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'. * SANS 10210:2004. 'Calculating and predicting road traffic noise'. * SANS 10328:2008. 'Methods for environmental noise impact assessments'. * SANS 10357:2004. 'The calculation of sound propagation by the Concave method'. » The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful per se.	» City of uMhlathuze Local Municipality.	The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful.
SANS 69 - South African National Standard - Framework for setting and implementing national ambient air quality standards, SANS 1929 - South African National Standard - Ambient Air Quality - Limits for common pollutants.	» The South African Bureau of Standards (SABS), through a technical committee, developed ambient air quality limits based on international best practice for particulate matter less than 10 µm in aerodynamic diameter (PM10), dust fallout, sulphur dioxide, nitrogen dioxide, ozone, carbon monoxide, lead and benzene. » These ambient limits were derived from international best practice and what was regarded to be achievable in the South African context, taking both the natural environment and socio-economic status into account. The SANS limits informed the newly promulgated SA Standards.	» City of uMhlathuze Local Municipality.	The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful.

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
IFC Air Emissions and Ambient Air Quality. Environmental, Health and Safety Guidelines. Washington DC, International Finance Corporation.	» The World Bank group through the IFC has emission guidelines for power plants. These guidelines are applicable to new facilities. Please note that the emission values are normalised to 6% excess oxygen, while the South African standards are normalised to 10% excess oxygen.	» City of uMhlathuze Local Municipality.	The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful.
The Equator Principles (June 2003).	» The Equator Principles (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Equator Principles Financial Institutions (EPFIs) commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures that implement the EPs. » The Equator Principles were developed by private sector banks. The banks choose to model the Equator Principles on the environmental standards of the World Bank and the social policies of the International Finance Corporation (IFC).	» City of uMhlathuze Local Municipality.	The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful.
Wetland Offsets: A best Practice Guideline for South Africa	» This guideline serves as a practical tool to aid in the consistent application of wetland offsets in South Africa. The guideline is primarily aimed at wetland offsets required as part of water use authorisation processes (e.g. in an application for a Water Use Licence under the National Water Act) where compensatory actions are required to achieve water resource management and biodiversity conservation objectives. The guideline is equally relevant for use in environmental impact assessment (EIA) processes (e.g. as part of the environmental authorisation process in terms of the National Environmental Management Act or in an application for a mining licence or development of an Environmental	» Department of Water and Sanitation.	The RB CCPP requires that the entire footprint of the site is developed which will result in significant residual impacts to the flat wetlands delineated on site, and will require a wetland offset for the wetlands to be lost in terms of the guidelines. The water resource assessment and associated wetland offset report can be found in **Appendix E**. Possible offset options that have been proposed which include: » Option 1 – This option relates to offsetting the loss of the wetlands on the project site with the

Legislation / Policy / Guideline	Applicable Sections	Relevant Authority	Compliance Requirements
	Management Programme under the Mineral and Petroleum Resources Development Act). » Wetland offsets are enduring measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse impacts on wetlands. They are implemented to address any anticipated significant residual impacts arising from development projects after appropriate avoidance, minimisation and rehabilitation measures have been taken into account. The goals of wetland offsets are to achieve 'No Net Loss' and preferably a net gain with respect to the full spectrum of functions and values provided by wetlands.		wetlands within the biodiversity offset area which were determined to be an acceptable candidate to contribute to the overall wetland offset. However, the findings from the offset calculation suggest that the identified wetlands, located in the biodiversity offset area, will not be adequate to meet the minimum requirements for the all components of the wetland offset targets; » Option 2 – The plan entails three areas earmarked by KZN Ezemvelo for inclusion in their stewardship programme. As a result of the proposed stewardship, 1924 ha of wetland would be available to offset the expectant loss of wetlands through the development of the Richards Bay CCPP. This offset option would result in a net-gain of 361.4 ha of wetland in terms of functionality and 1910.1 ha of wetland in terms of the ecosystem conservation and was recommended as the preferred offset option. The wetland offset options will need to be evaluated by the Department of Water and Sanitation when assessing the water use license application.

CHAPTER 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This Chapter provides a description of the environment that may be affected by the Richards Bay CCPP project. The information is provided in order to assist the reader in understanding the receiving environment within which the proposed project is, and features of the biophysical, social, and economic environment that could be directly or indirectly affected by, or alternatively could impact on, the proposed development. This information has been sourced from existing available information and the on-site specialist investigations conducted as part of the EIA, and aims to provide the context within which this EIA is being conducted. Detailed descriptions provided by the independent specialists are included within the specialist reports contained in **Appendices D to N** of this EIA Report.

7.1. Regional Setting: Description of the Broader Study Area

The KwaZulu-Natal Province is one of the country's most popular tourist destinations and was founded in 1994 when Zulu Bantustan of KwaZulu merged with the Natal Province. It is South Africa's third smallest province with an area of over 94 000km². The province houses the second largest population with over 10 million inhabitants, which was nearly 20% of the country's total population in 2012 (Brand South Africa, 2012). The Province is surrounded by Mozambique in the far north east, Swaziland in the north east and Lesotho along the south west boundary. Domestically, it shares borders with Mpumalanga to the north, Free State to the west, and the Eastern Cape along the south west. KwaZulu-Natal comprises of eleven District Municipalities (DM), one of which is the King Cetshwayo DM within which the proposed project is located. The remaining ten district municipalities are the Amajuba DM, the Zululand DM, the uMkhanyakude DM, the eThekwini Metropolitan Municipality, the uMzinyathi DM, the uThukela DM, the uMgungundlovu DM, the iLembe DM, Ugu DM, and the Harry Gwala DM.

The King Cetshwayo DM is a Category C municipality. A category C municipality refers to district municipalities which are the main divisions of the national provinces. Category C municipalities are further divided into Category B, or local municipalities. This denotes that the King Cetshwayo DM municipality has a municipal executive and legislative authority in an area that includes more than one local municipality (Africa S. o., 1996). The district is sub-divided into five local municipalities (LM) namely, the City of uMhlathuze Municipality, the uMlalazi LM, the Mthonjaneni LM, the Nkandla LM, and the uMfolozi LM (Local Government Handbook, undated) (refer to **Figure 7.1**). The project site is located within the City of uMhlatzue Municipality.

Figure 7.1: King Cetshwayo District Municipality's Local Municipalities, and key Towns (source: www.municipalities.co.za)

The City of uMhlathuze Municipality was merged with part of Ntombanana Local Municipality on the 3rd of August 2016. The City of uMhlathuze Municipality is a Category B municipality, which means it shares municipal executive and legislative authority with a category C municipality within whose area it falls (Africa S. o., 1996). It is the smallest local municipality of the five municipalities in the King Cetshwayo District Municipality. The main economic sector in the municipality is manufacturing, which makes up 45.9%. Lastly, the municipality housed a population of over 360 000 in 2011 (Local Government Handbook, undated).

The City of uMhlathuze Municipality was formed through the consolidation of the towns of Empangeni and Richards Bay. The other towns in the municipality are Ngwelezana and Felixton, about 28km from the proposed project area. The proposed development is located in Richards Bay. Richards Bay is considered as the industrial and tourism hub of the municipality. In addition, it is the centre of operations for South Africa's aluminium industry. The Coal Terminal is instrumental in securing the country's position as the second largest exporter of steam coal in the world. Furthermore, Richards Bay Minerals is the largest sand-mining and mineral processing operation in the world.

The next closest town is Empangeni which received its name from Mpange Trees. It is located 15km from Richards Bay. The expansion of Empangeni town was triggered from the sugar mill construction. Many of the residents of Empangeni are employed in Richards Bay (Brand South Africa, 2012).

The project area is located over 150km north of Durban and can be accessed via the N2. The rich abundance of birdlife that extends over a number of habitats has made tourism in Richards Bay become one of the area's premier attractions (South Africa, undated). Additionally, key tourism areas include Thulasihleka Pan, the Isimangaliso World Heritage Site, Onyoge Forest, Dlinza Forest and Nseleni Nature Reserves.

Mining activity in and near Richards Bay include ilmenite, rutite and zircon from deposits in forested coastal sand dunes which has been taking place since the mid-1970s. The Senior Town Planner of the City of uMlathuze Municipality argues that more efforts can be directed to branding the tourism in the municipality.

The RB CCPP is proposed to be located within two portions of the RB IDZ Phase 1D. Phase 1D comprises Portion 1 of Erf 11376 (which is conserved land where development is prohibited as it has been earmarked as a "biodiversity offset area" by the municipality), Portion 2 and Portion 4 of Erf 11376 (which are the directly impacted properties for the proposed CCPP), Portion 3 of Erf 11376 is located east of these erfs, and Erf 15410. Portions 2 and 4 of Erf 11376 which will comprise the project site, measure 65 ha and 6 ha, respectively. Collectively, the proposed development area will occupy the entire extent of the project site, which is 71 ha.

A map illustrating the regional, local setting and site within the context of the RB IDZ for the RB CCPP project site is shown in **Figure 7.2**, **Figure 7.3** and **Figure 7.4**.

Photographs of the RB CCPP project site are provided in **Table 7.1**. These photographs provide a visual reference of the project site and the environment which may be affected by the proposed development.

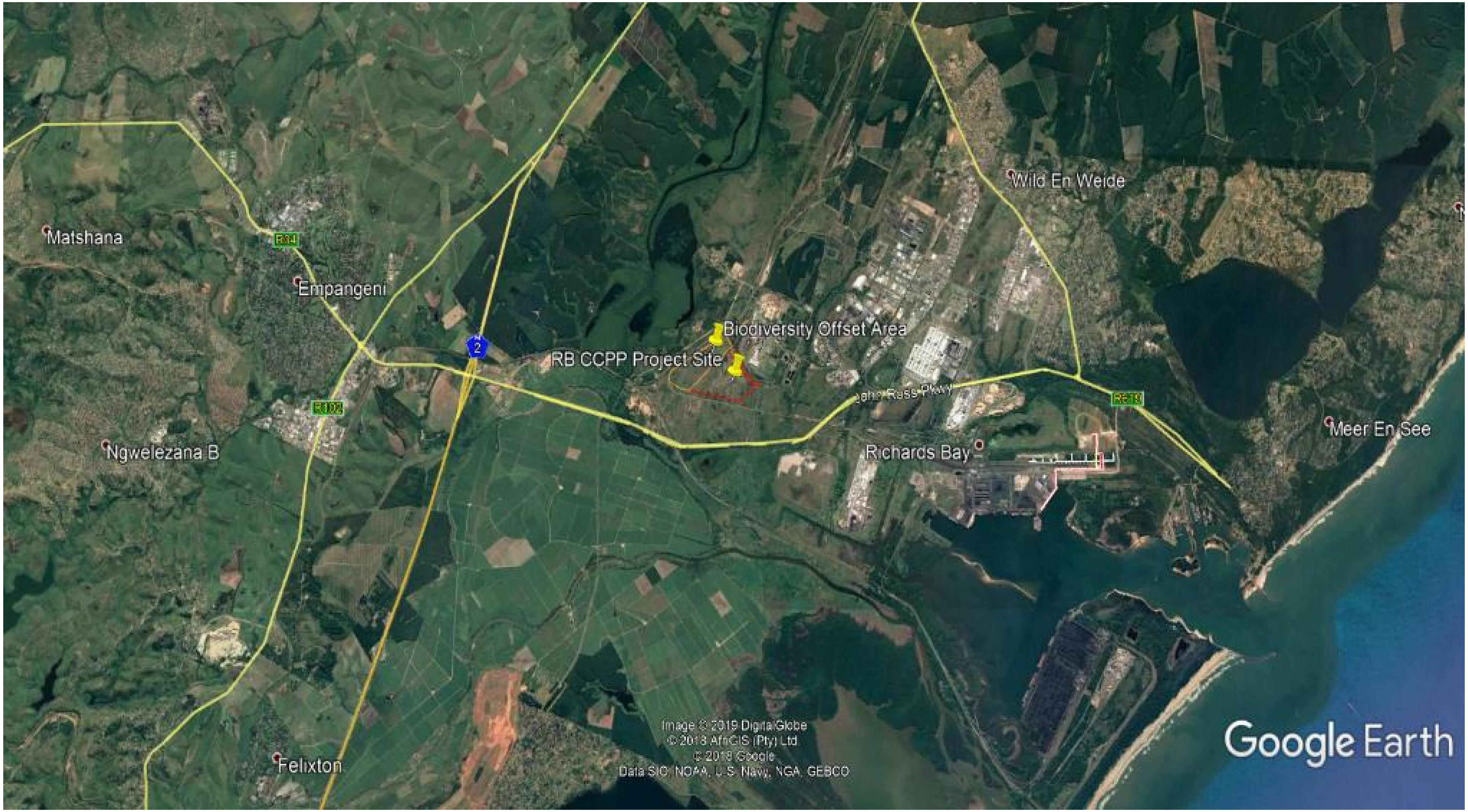

Figure 7.2: Regional Setting of the RB CCPP Project Site (Biodiversity Offset Area – Orange Polygon; Project Site – Red Polygon).

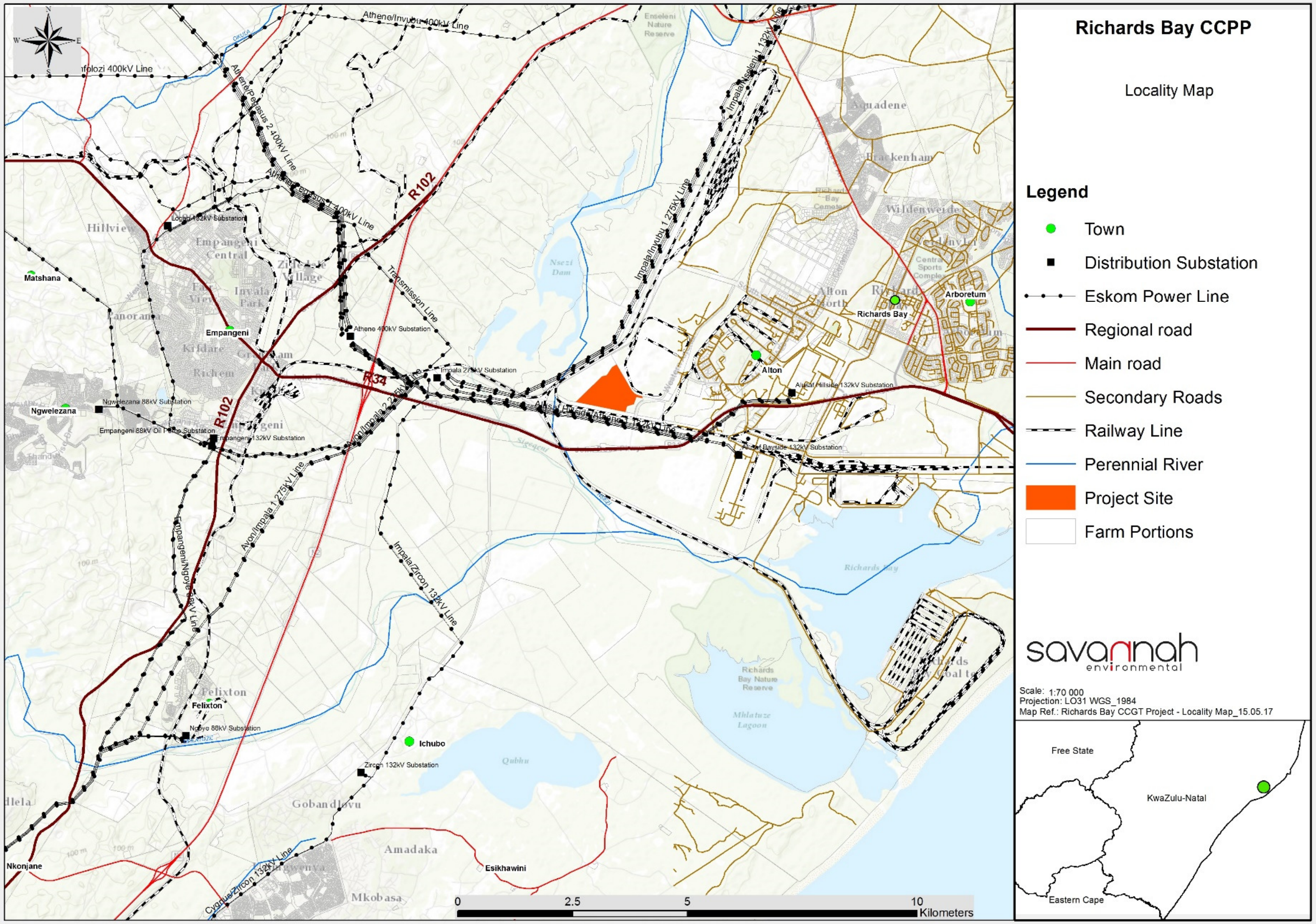

Figure 7.3: Locality Map of the RB CCPP Project Site

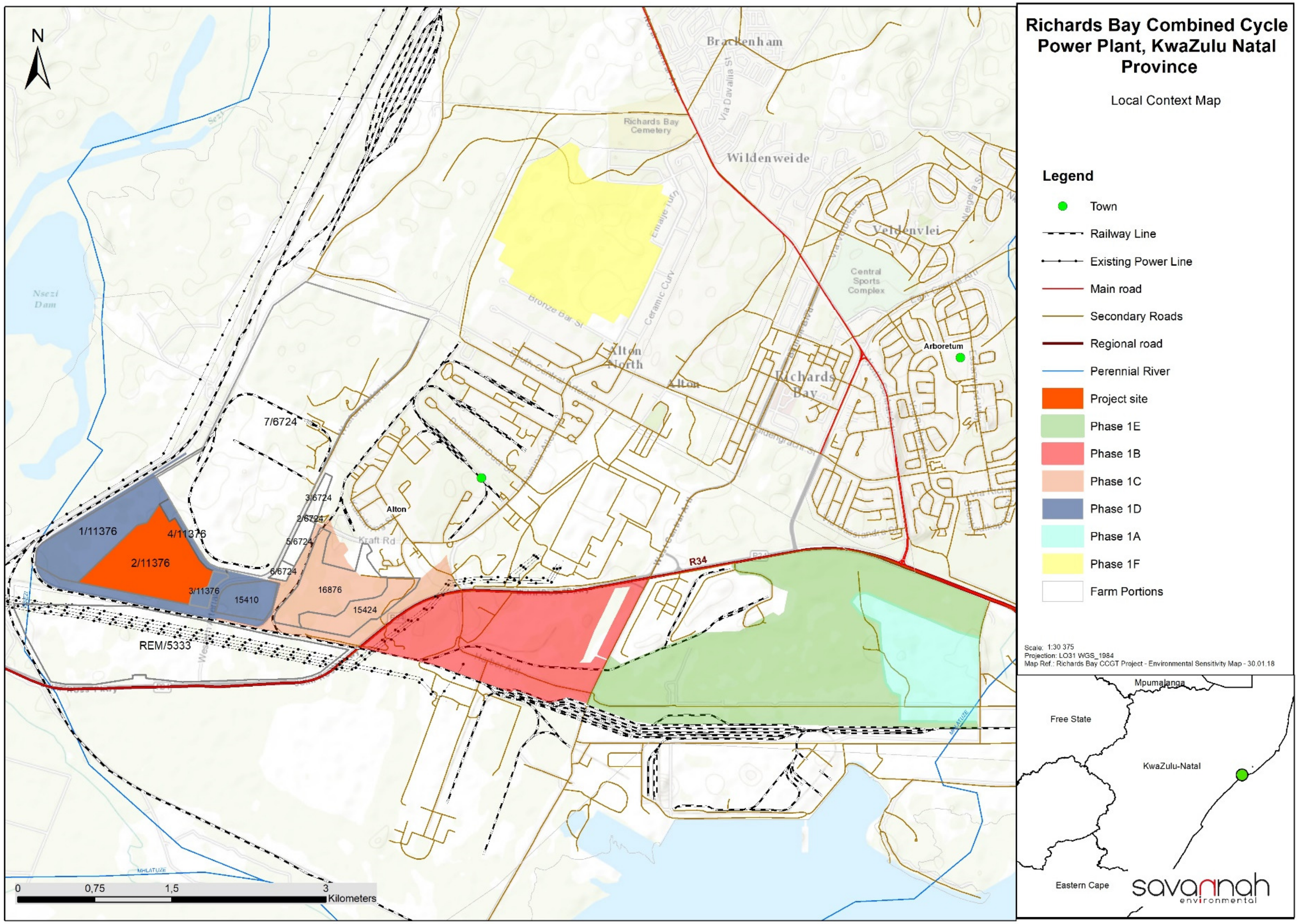

Figure 7.4: RB CCPP Project Site in context of the RB IDZ

Table 7.1: Photographs of the RB CCPP project site

	
Grassland within the study area	Flat wetland in the RB CCPP project site
	
Photo facing north east towards Mondi from the project site	Photo facing south west towards the existing 400kV power lines south of the project site

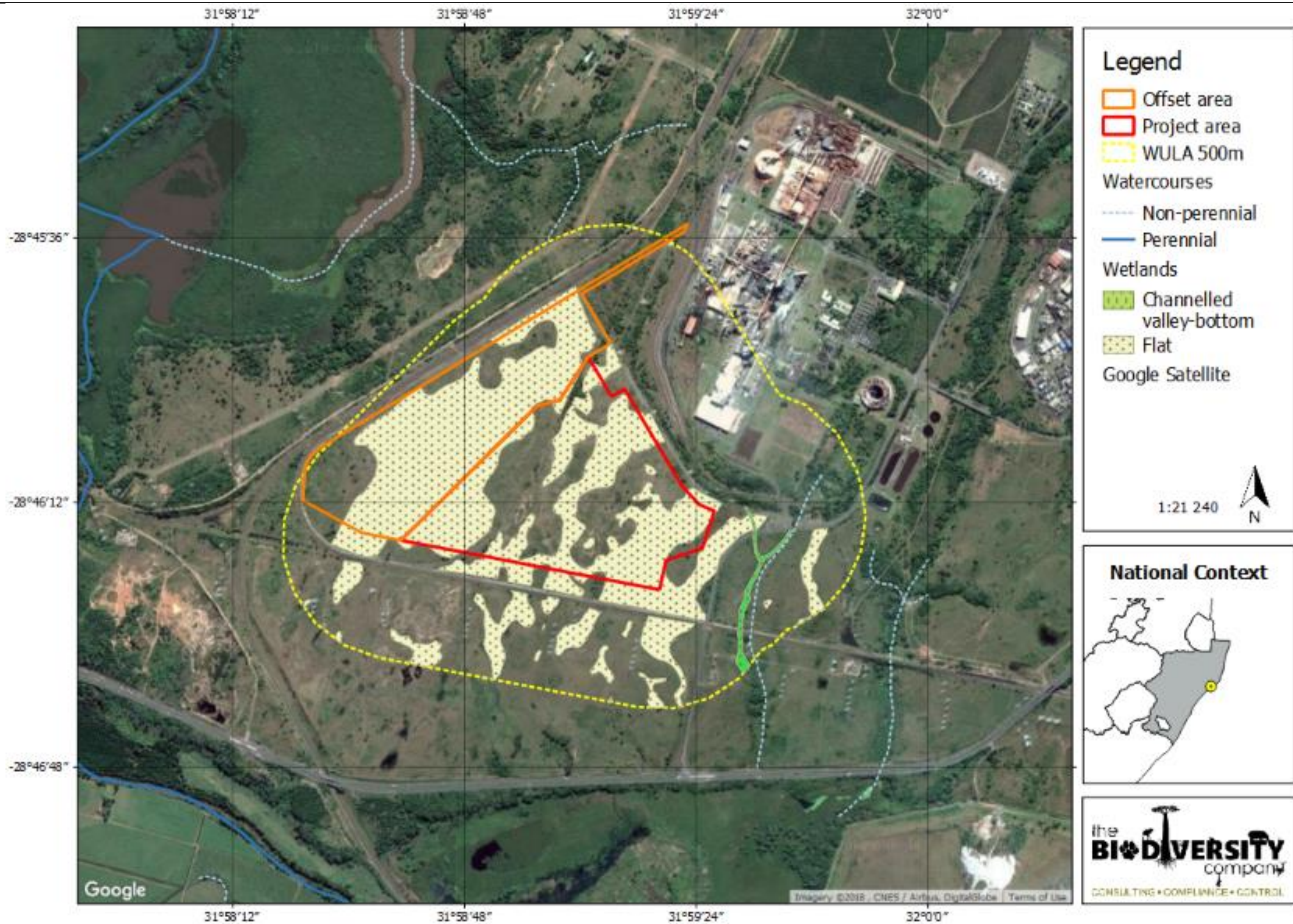

Figure 7.22: The delineated wetlands for the study

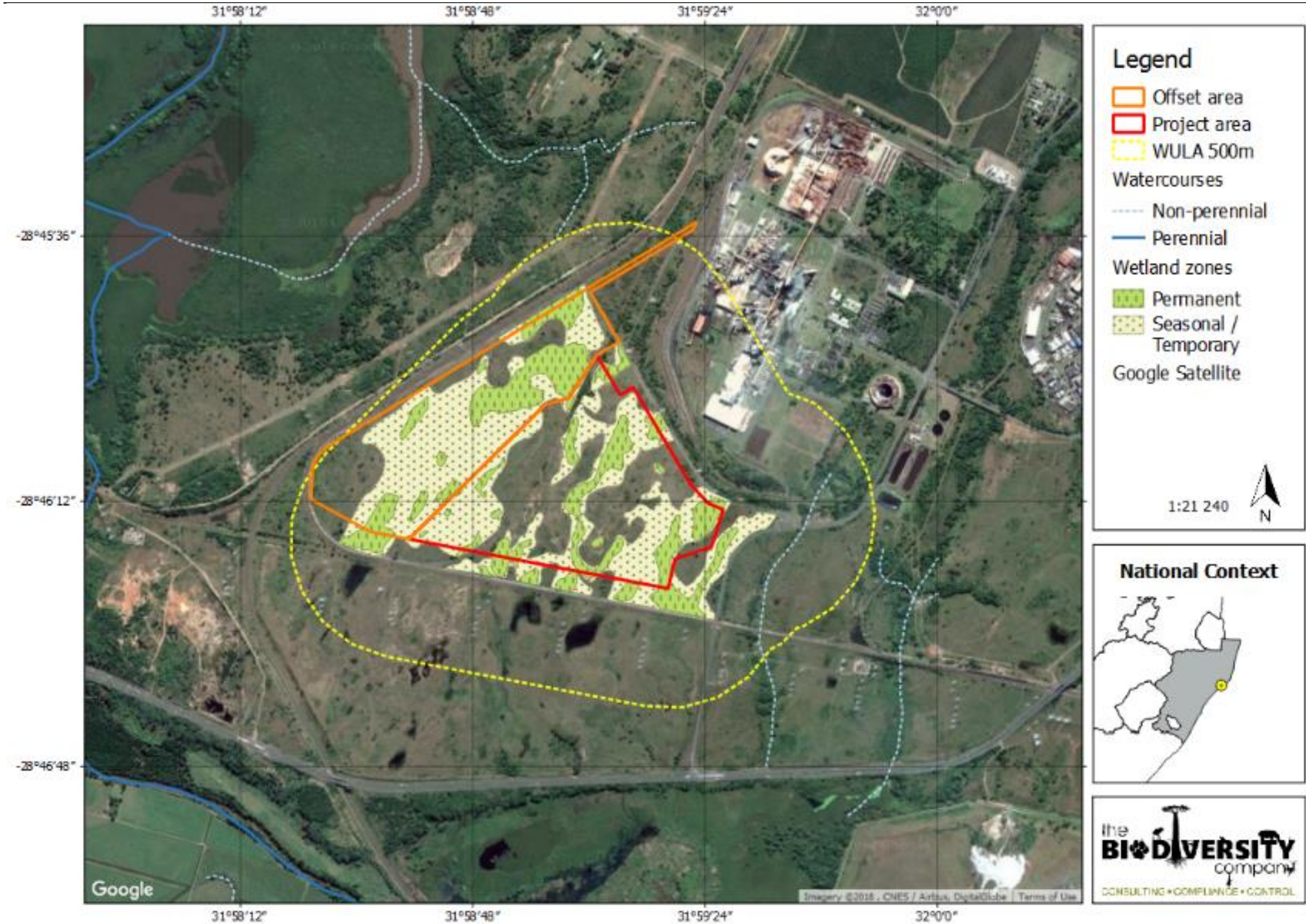

Figure 7.23: The delineated wetlands zones of saturation for the study

7.2. Climatic Conditions

» The area is characterised by a warm to hot and humid subtropical climate, with warm moist winters. Average daily maximum temperatures range from 29° C in January to 23° C in July, and extremes can reach more than 40° C in summer. The average annual rainfall is 1 228 mm with most (~80 %) of the rainfall in summer (October to March).

»

Extreme rainfall and thundershowers have occurred on several occasions in the Zululand Region, resulting in extensive flooding with loss of life, property and infrastructure. An increasing trend in the frequency of cyclonic activity has been observed, which needs to be considered in future planning of the region. Annual climatic data has been summarised in the graph presented in **Figure 7.5**.

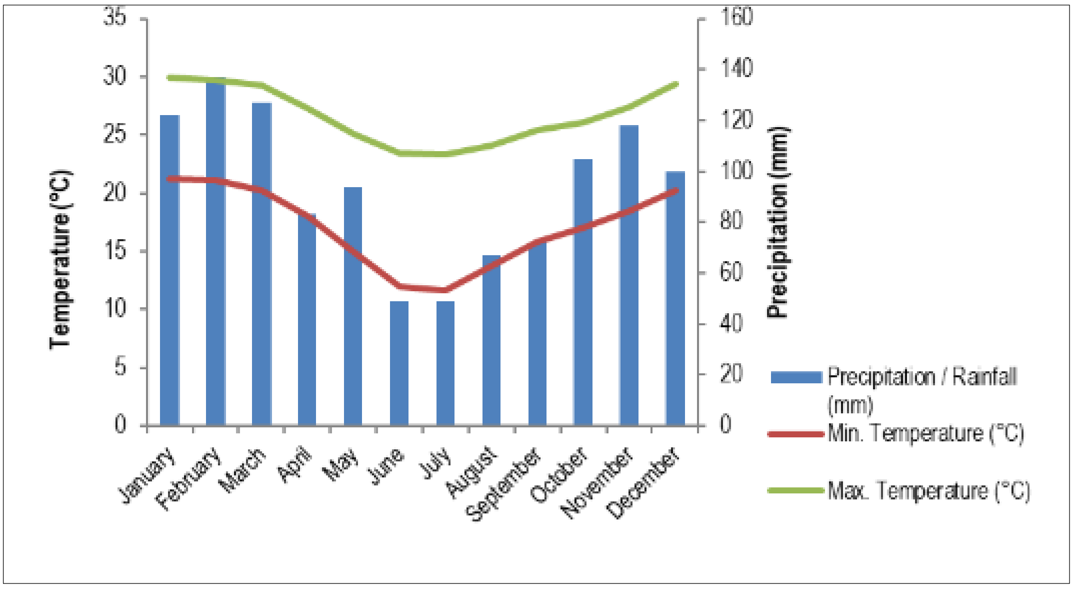

Figure 7.5: Average minimum and maximum temperatures and monthly rainfall for Richards Bay (adapted from http://en/climate-data.org).

The predominant wind direction at the Richards Bay Airport (North East of the project site) is from the north (**Figure 7.6**). North easterly and south-westerly winds are also fairly common. There is a slight dominance of northerly night-time winds. High speed winds (greater than 10 m/s) are more likely to originate from the south and south-west during the day. Calm conditions (when wind speeds are less than 1 m/s) occur approximately on 5% of the time, more commonly at night.

The seasonal variation in the wind field shows a northerly dominance in all seasons, most frequently (more than 20% of the time) in autumn (**Figure 7.7**). North-easterlies are more dominant in spring. Southerly and south-westerly winds are more frequent in spring. Calm conditions are more frequent in summer and least common in spring. Highest wind speeds are likely in spring.

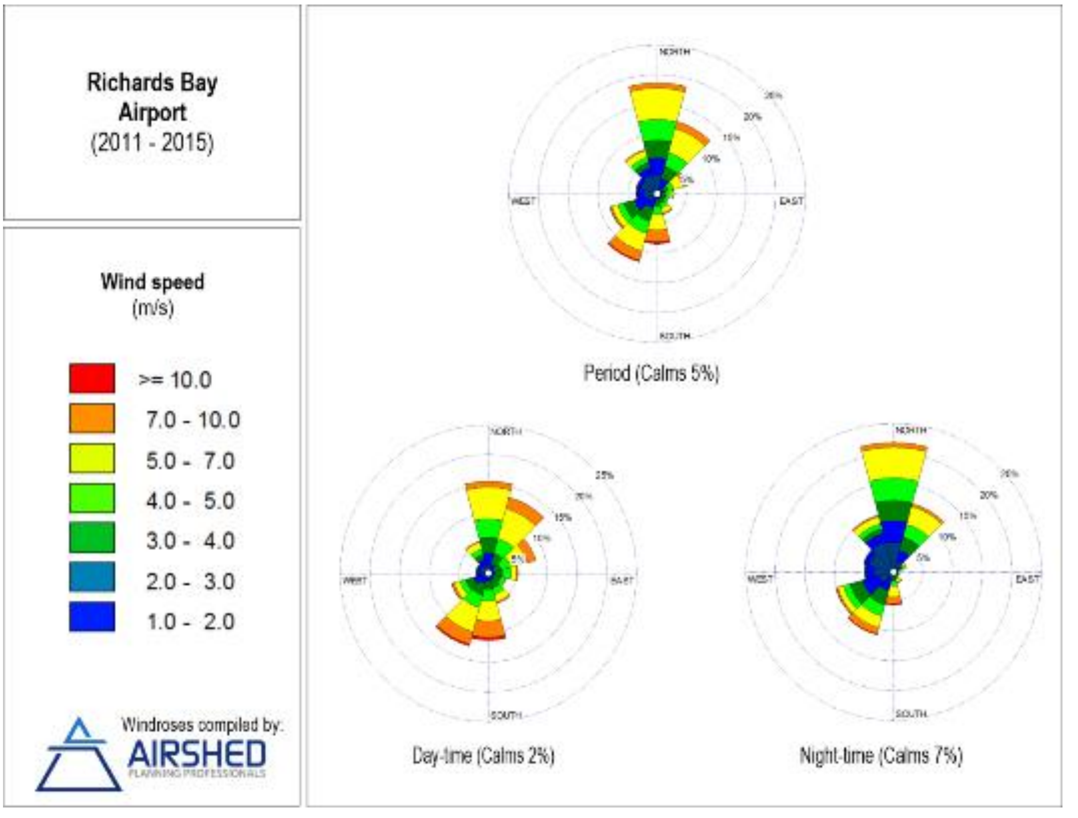

Figure 7.6: Diurnal wind-field for the Richards Bay Airport (measured data 2013 - 2015)

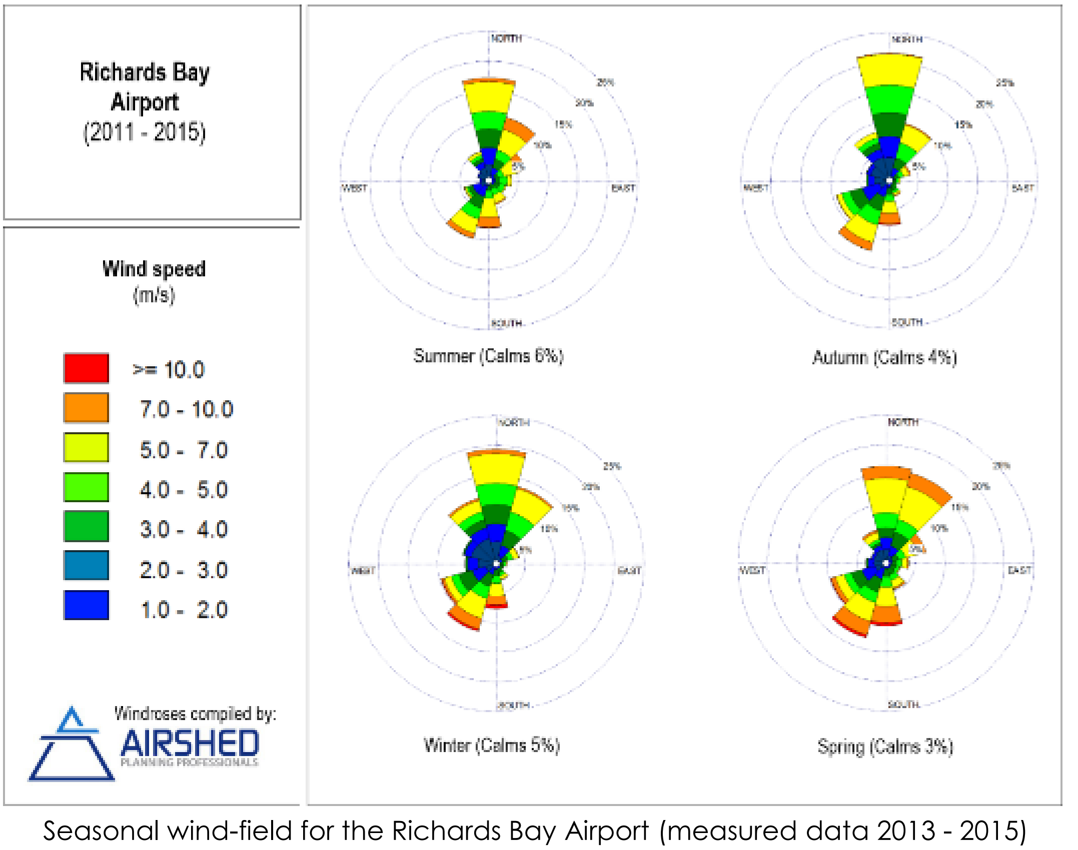

Figure 7.7: Seasonal wind-field for the Richards Bay Airport (measured data 2013 - 2015)

7.3. Biophysical Characteristics of the Study Area and Project Site

7.3.1. Topography, Terrain and Landscape Features

According to Mucina and Rutherford (2006), the region can be described to have a relatively flat landscape. However, the relief for the project site (see **Figure 7.8** below) varies from 25m to 35m mean above sea level (masl) with some depression areas where wetlands are present. The project site is however considered relatively flat with slopes of no more than 4%. The project site slopes mainly to the south in some areas.

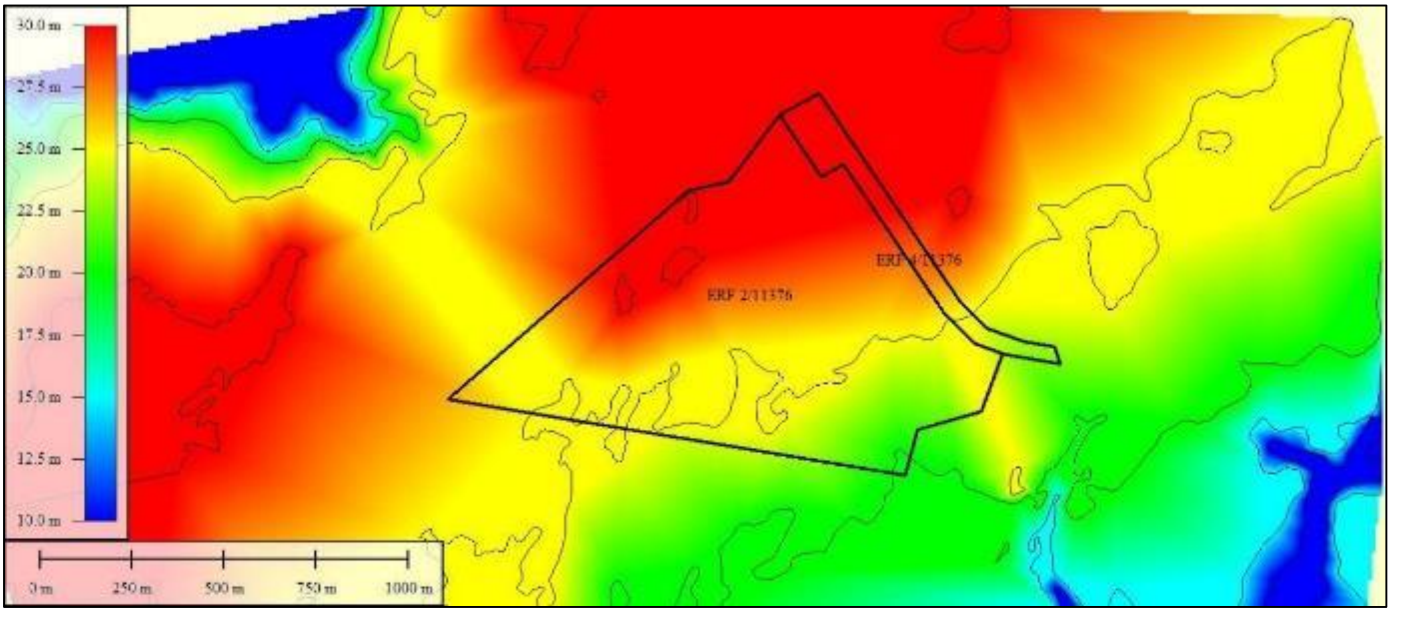

Figure 7.8: Relief of the Project Site

7.3.2. Geology, Soils and Agricultural Potential

7.3.2.1 General Geology

According to Mucina and Rutherford (2006), the geology is made up of quaternary redistributed sand supporting yellowish redistributed sands of the Berea Formation (Maputaland Group). These are dystric regosols building dune crests, slopes and relatively high lying level plains. The water table is found at depths of 1.6 – 2m below the surface in average rainfall years.

7.3.2.2 Land Types of the Project Site

According to the land type database (Land Type Survey Staff, 1972 - 2006) the project falls within the Hb75 land type (**Figure 7.9** and **Figure 7.10**). It is expected that, the dominant soils in the crest and mid-slope positions will be soils of the Fernwood and Villa-fontes forms. The soils that dominated the foot-slopes and the valley bottoms are the Fernwoods and Champagne soil form. The land type catena is shown in **Figure 7.9**.

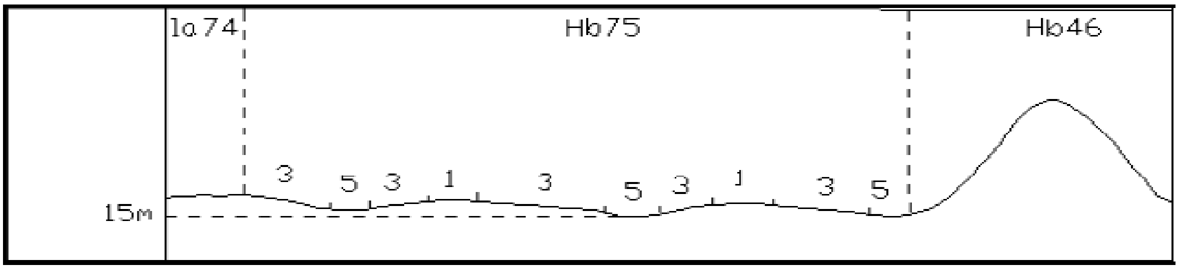

Figure 7.9: Land type HB75 terrain form

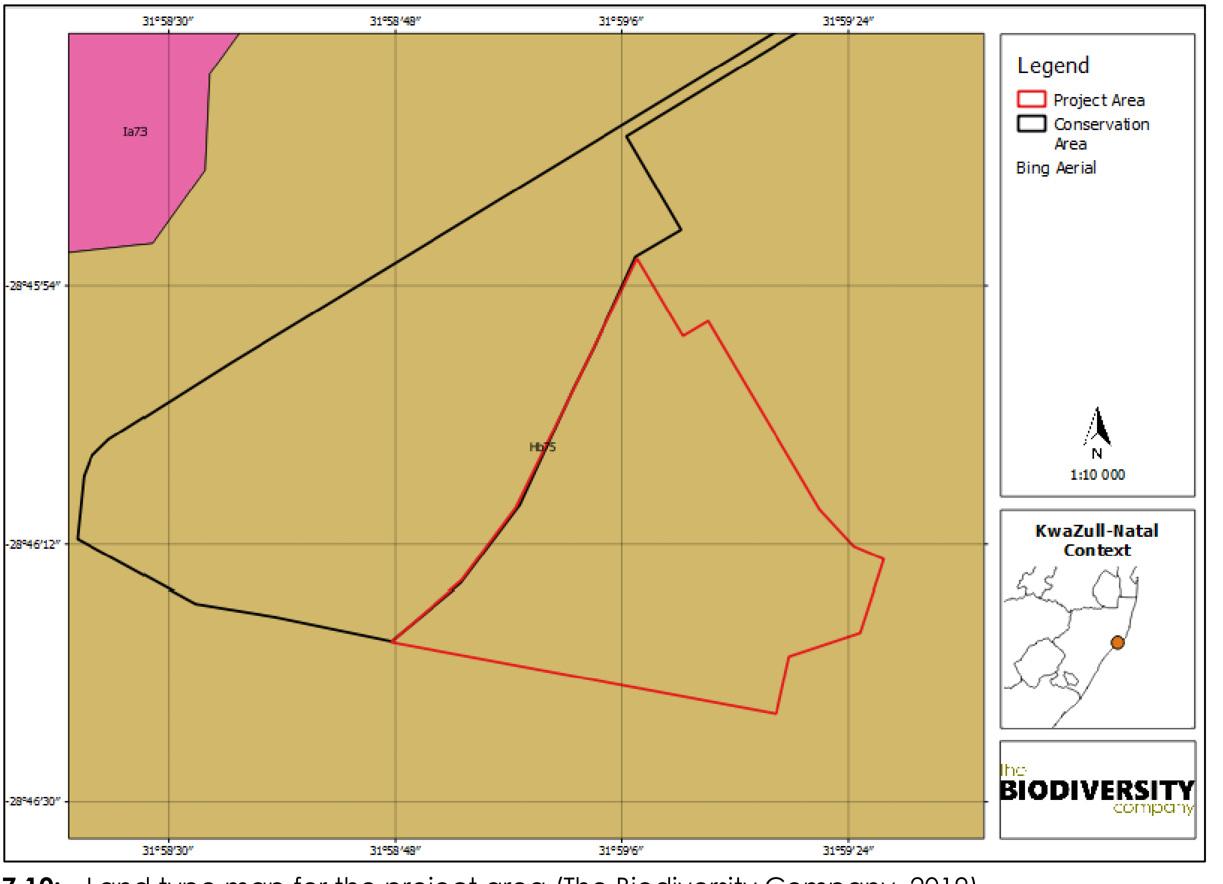

Figure 7.10: Land type map for the project area (The Biodiversity Company, 2019)

7.3.2.3 Soils of the Project Site

The soils in the project area are dominated by sandy alluvial soils. The areas with accumulated windblown sands were classified as Namib soils, which accounted for 27.6 ha (38.8 %) of the project area. The areas with moisture at depths greater than 30cm were classified as the Longlands soil form, which accounted for 3.3 ha (4.6 %) of the project area. The soil forms with moisture at or near the surface were classified as Katspruit / Westleigh soil forms, which accounted for 37.5 ha (52.8 %) of the area. The soils delineation is shown in **Figure 7.11**. The soil distribution is shown in **Table 7.2**.

Table 7.2: Distribution of Soils Surveyed on the Project Site

Soil Forms	Total Area (ha)	Land Capability	Land Potential	Limitation
Namib	**19.2 (38.6 %)**	**Class III**	**L2**	**Sandy, Rapid infiltration**
Longlands	**2.43 (4.9 %)**	**Class IV**	**L3**	**Wetness at depth**
Katspruit / Westleigh	**26.2 (52.7 %)**	**Class V**	**Vlei**	**Wetness at surface**

Soil Forms	Total Area (ha)	Land Capability	Land Potential	Limitation
Disturbed	1.92 (3.8 %)	Class VIII	L8	Disturbed
Total	147.1			

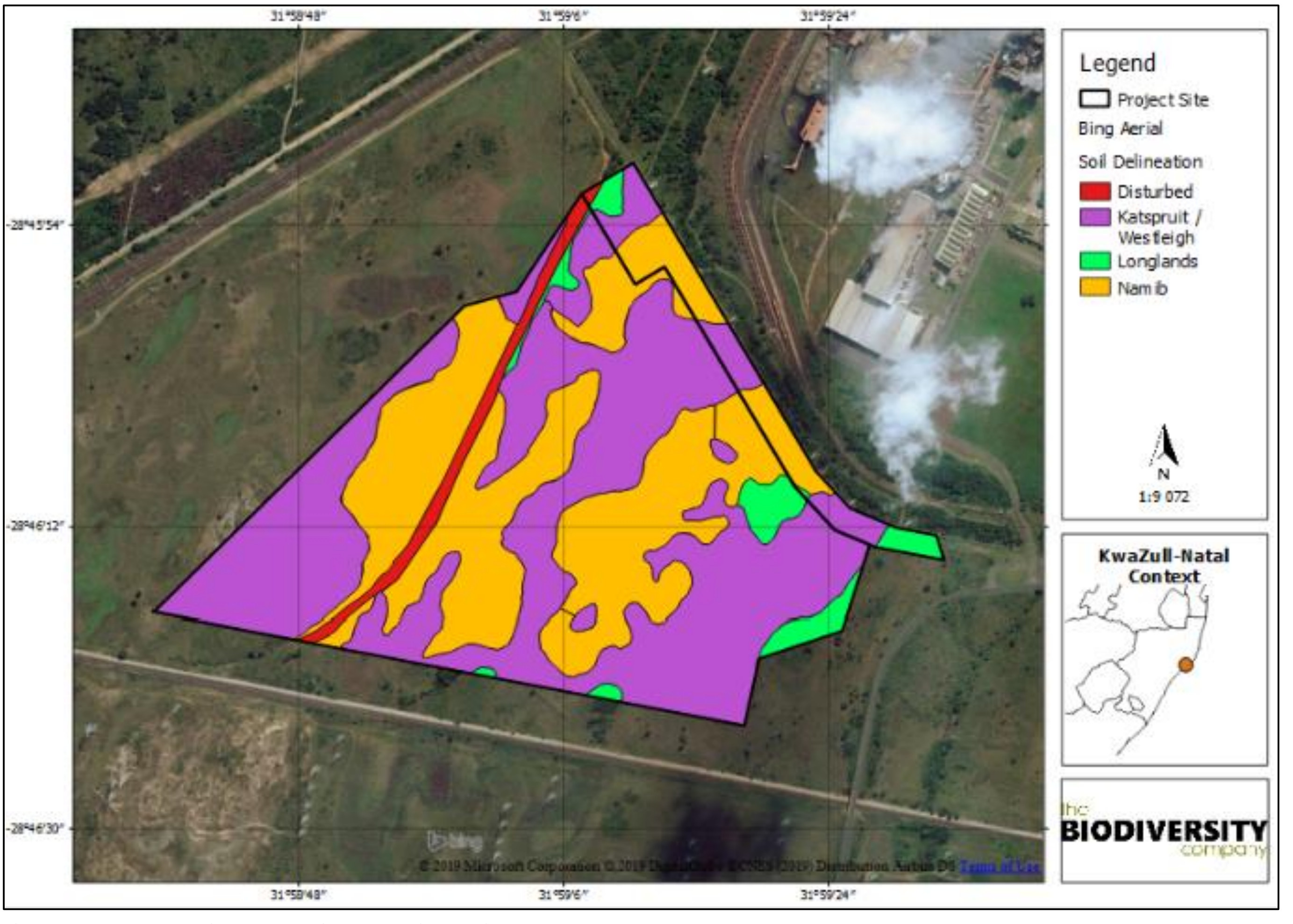

Figure 7.12: Soil Forms of the Project Site

7.3.2.4 Agricultural Potential of the Project Site

Agricultural potential is determined by a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long-term use of land under rain-fed conditions. The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is then determined by combining the land capability results and the climate capability for the region.

The project area is currently being utilised for grazing, no agriculture is possible due to the shallow water table and the sandy nature of the soils present. There are extensive pans across the site and the vegetation is sparse in places.

The climate capability for this region falls within the **C2 classification**. C2 (Slight limitation rating): Local climate is favourable for a wide range of adapted and a year-round growing season. Moisture stress and lower temperatures increase risks and decrease yields relative to C1.

The Land Capability for the project area is shown in **Figure 7.13**. The Namib soils were rated as having a Class III (Moderate Cultivation) land capability based on the flat topography and soils depth greater than 50 cm. The Class III land capability portions accounted for 27.6 ha of the project area. The Longlands soil forms were rated to have a Class IV (Light Cultivation/ Intensive Grazing) land capability based on the soil wetness being between 20cm and 50cm from the surface. The Class IV land capability accounted for 3.3 ha of the project area. The Katspruit and Westleigh soil forms were rated to be Class V (Wetland) land capability based on soil moisture being within 20cm from the surface. The Class V land capability accounted for 37.5 ha of the project area.

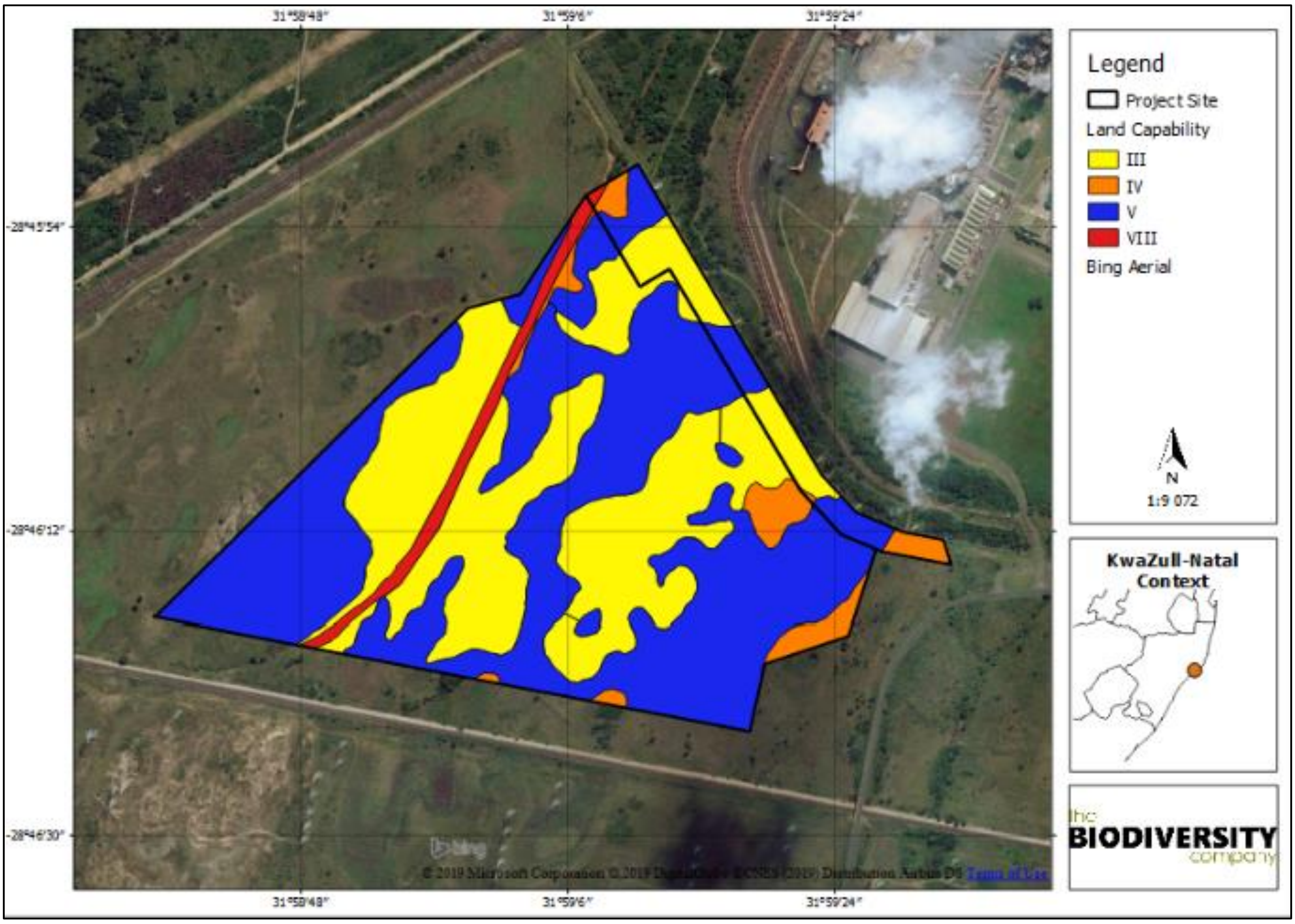

Figure 7.13: Land Capability Classes of Different Soil Forms within the Project Site

The Land Potential of the project area is shown in **Figure 7.14**. The land potential groups are described previously in **Table 7.2**.

The land capability classes were rated to have the following land potentials;

» Class III = L2 (High Potential);
» Class IV = L3 (Good Potential);
» Class V = Vlei (Wetland); and
» Class VIII = L8 (Very Low Potential).

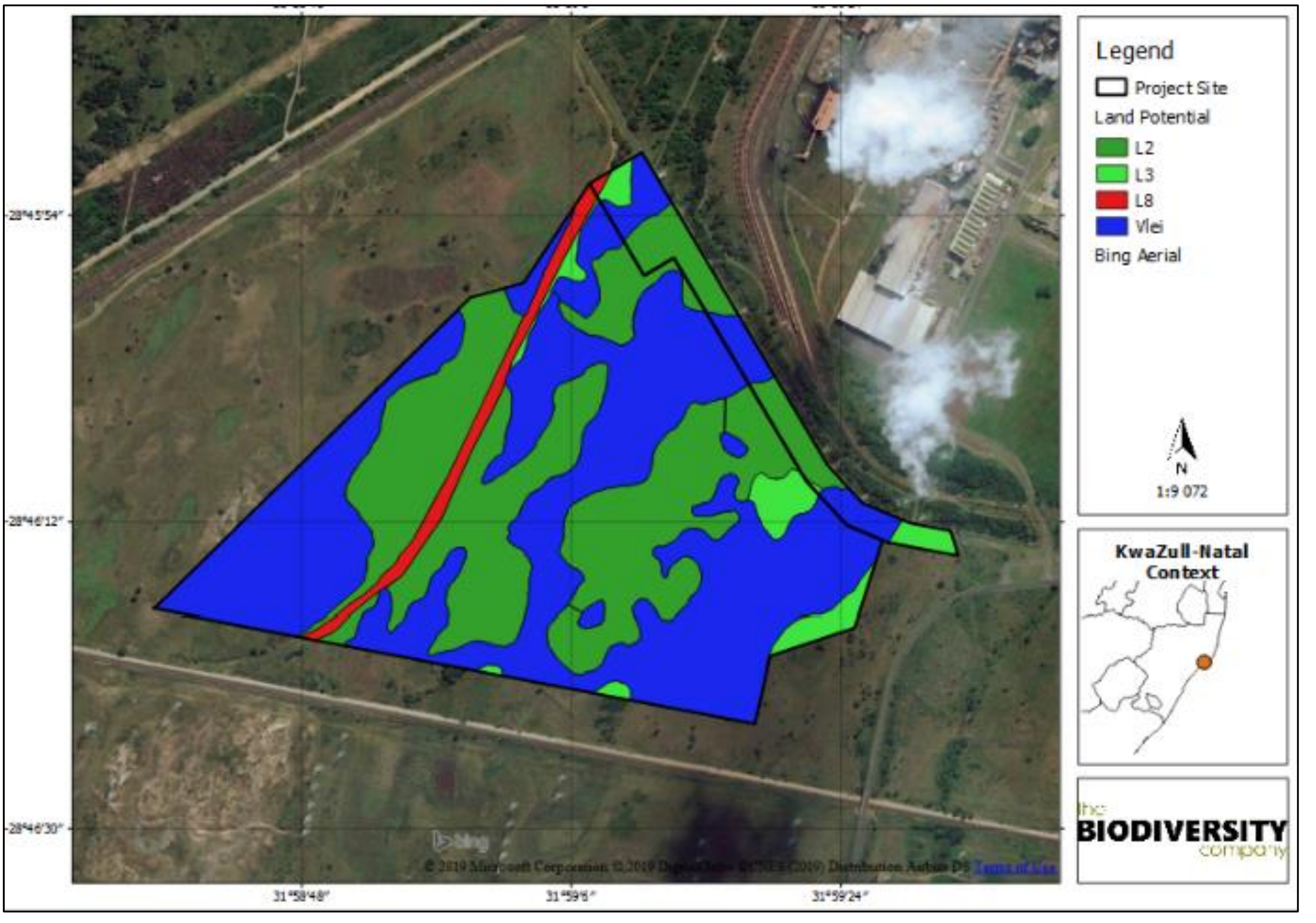

Figure 7.14: Land Potential Classes within the Project Site

7.3.3. Ecological Profile of the Broader Study Area and the Project Site

The project site is located in the 'Critically Endangered' Kwambonambi Hygrophilous Grassland ecosystem (Threatened ecosystem code KZN 9; **Figure 7.15**). The Kwambonambi Hygrophilous Grasslands ecosystem lies inland, but adjacent to the Kwambonambi Dune Forest ecosystem. It incorporates the hygrophilous grasslands behind the primary dune system as well as swamp forests, including the Richards Bay surrounds up to the lower Umfolozi Flats.

This ecosystem contains six threatened or endemic plant and animal species, including one amphibian species, *Hyperolius pickersgilli*, four millipede species, *Centrobolus fulgidus*, *Centrobolus richardi*, *Centrobolus rugulosus* and *Doratogonus zuluensis*; one plant species, *Kniphofia leucocephala*; and six vegetation types viz. KwaZulu-Natal Coastal Forest, KwaZulu-Natal Dune Forest, Mangrove Forest, Maputaland Wooded Grassland, Maputaland Coastal Belt and Swamp Forest.

Approximately 8% of the original area of this ecosystem is protected in the Enseleni Nature Reserve, Richards Bay Game Reserve, Nhlabane Nature Reserve and isiMangaliso Wetland Park (Goodman, 2007).

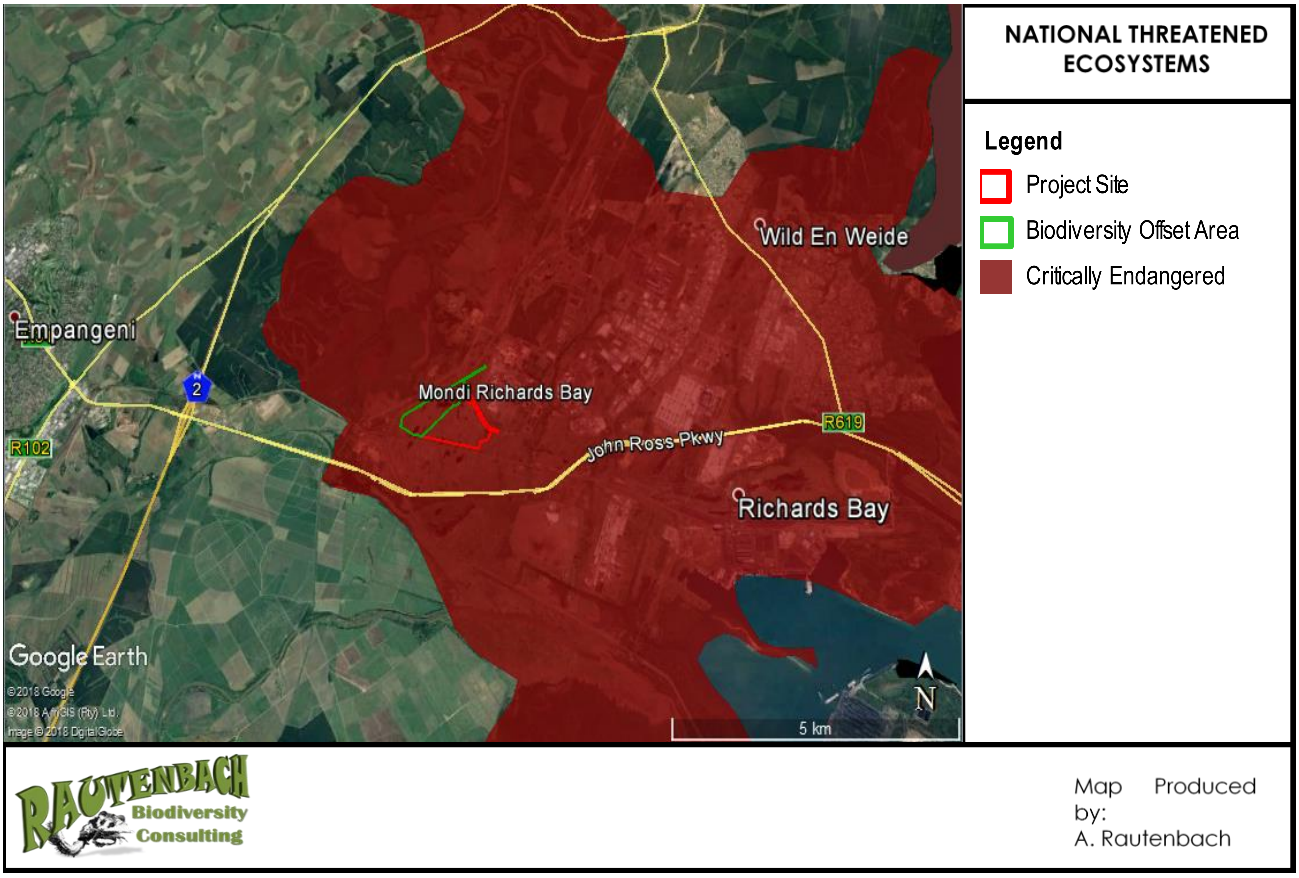

Figure 7.15: Project Site location within the Critically Endangered Kwambonambi Hygrophilous Grassland Ecosystem

This ecosystem is listed under Criterion F in the National List of Ecosystems which categorises it as priority areas for meeting explicit biodiversity targets as defined by a systematic biodiversity plan, including DAFF's systematic biodiversity plans for the Forest biome. Typically, development in 'Critically Endangered' ecosystems, especially those with large footprints, should avoid conflict with or negative impacts on threatened ecosystems.

7.3.3.1 Provincial and District Level Conservation Areas

The provincial scale KZN Systematic Conservation Plan (KZNSCP 2012) and the district scale UThungulu Biodiversity Sector Plan (KZNBSP 2014) identifies and maps critical biodiversity areas and ecological support areas within the Province. Biodiversity mapping covers terrestrial, aquatic and marine environs at Provincial and District scales.

It is important to note that categorical classes of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are reflected differently in the KZN Systematic Conservation Plan (KZNSCP, 2012) (**Table 7.3**) and KZN Biodiversity Sector Plan (KZNBSP, 2014) (**Table 7.4**). The KZNSCP 2012 planning product highlights the key priority areas for biodiversity conservation as reflected against a uniform biome (i.e. the marine, estuarine, freshwater and terrestrial biomes), while the KZNBSP 2014 is a higher order spatial planning tool which takes into consideration locally identified CBA and ESA localities, as well as incorporates priorities identified at a national level.

Table 7.3: Summary of the CBA categories used in the KwaZulu-Natal Systematic Conservation Plan (KZNSCP, 2012).

CBA 1 (Mandatory)	Areas representing the only localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved i.e. there are no alternative sites available.
CBA 2 (Mandatory)	Areas of significantly high biodiversity value. There are alternate sites within which the conservation targets can be met for the biodiversity features contained within, but not many.
CBA 3 (Optimal)	These areas are not necessarily of lower biodiversity value, but only indicate that there are more alternate options available within which the features located within can be met.
Biodiversity Areas/Other Natural Areas	Areas representing the natural and/or near natural environmental areas which still have biodiversity value, but it is preferred that development be focused within these areas.

The KZNBSP 2014 is reflected as biodiversity sector maps consisting of two main layers, namely CBAs and ESAs.

Table 7.4: Summary of the CBA and ESA categories used in the UThungulu District Municipality: Biodiversity Sector Plan (KZNBSP 2014).

Critical Biodiversity Areas (CBAs) – Crucial for supporting biodiversity features and ecosystem functioning and are required to meet conservation targets.	
Critical Biodiversity Areas: Irreplaceable	Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of the ecosystems.
Critical Biodiversity Areas: Optimal	Areas that represent an optimised solution to meet the required biodiversity conservation targets while avoiding areas where the risk of biodiversity loss is high. Category driven primarily by process but is also informed by expert input.
Ecological Support Areas (ESAs) – Functional but not necessarily entirely natural areas that are required to ensure persistence and maintenance of biodiversity patterns and ecological processes within the CBA areas.	
Ecological Support Areas (ESAs)	Functional but not necessarily entirely natural areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs. These areas also contribute significantly to the maintenance of ecological infrastructure.
Ecological Support Areas: Species Specific	Terrestrial modified areas that provide a support function to a threatened or protected species.

Areas to the southwest of the project site are designated as a 'Critical Biodiversity Area' (CBA type 3; KZNSCP 2012; **Figure 7.16A**). This rating is due to the potential presence of a number of threatened invertebrates such as molluscs, millipedes and orthopterans and threatened vegetation types, i.e. Maputaland Coastal Grassland and *Ficus trichopoda* Swamp Forest.

Most of the proposed development footprint on the project site falls into an area classified as 'Biodiversity areas'. These areas represent the natural and/or near natural environmental areas not identified as CBA areas, but still considered to be of biodiversity value.

On a district scale, almost the entire project site falls within a CBA: Irreplaceable area (**Figure 7.16B**). Land-use management objectives for these areas include limited to no biodiversity loss in order to maintain these areas in a natural state, thus the proposed land-use activities are not compatible with the aims of the land-use objectives of CBA: Irreplaceable areas (KZNBSP 2014; Nel *et al.*, 2011).

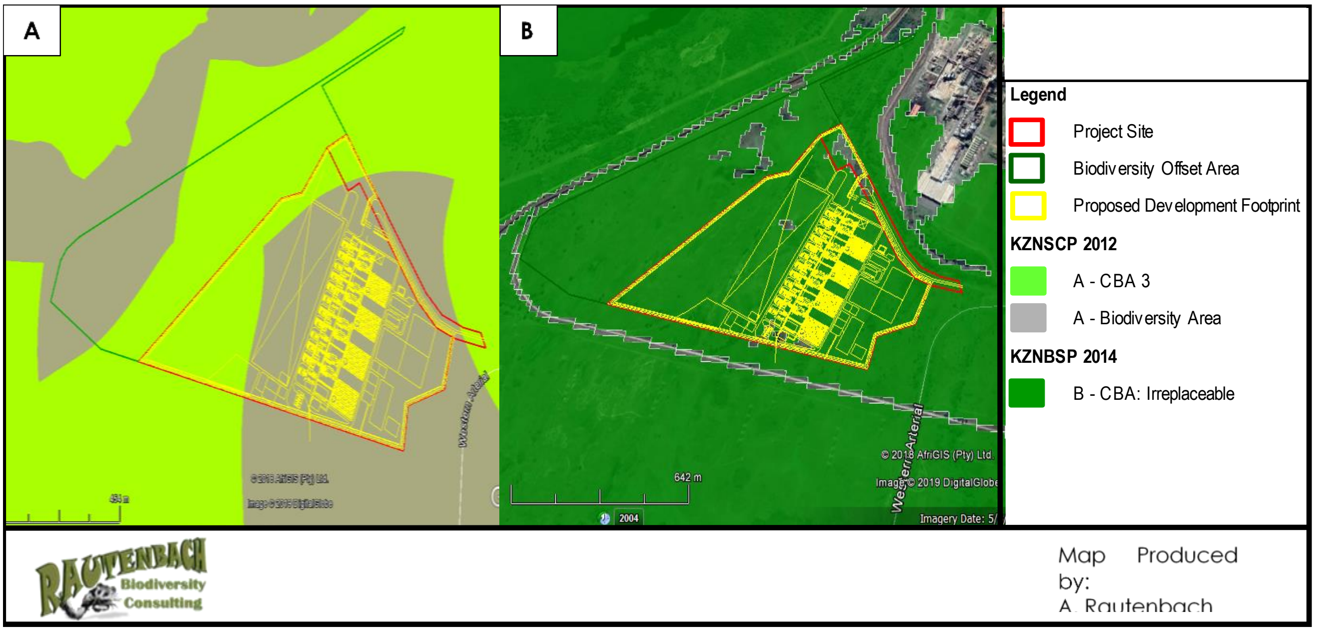

Figure 7.16: A – Project Site within the KSZN Systematic Conservation Plan (2012); B – Project Site within the UThungulu Biodiversity Sector Plan (2014).

7.3.3.2 Regional Vegetation Classification

The project site falls within the following KZN vegetation biomes and vegetation types (**Table 7.5**; **Figure 7.17**).

Table 7.5: Summary of the vegetation types bisecting the project site.

KZN Vegetation Biome	KZN Vegetation Type	Conservation Status
Wetlands	Freshwater Wetlands: Subtropical Freshwater Wetlands	VU
Indian Ocean Coastal Belt	Maputaland Wooded Grassland	EN

Vegetation types that historically covered the project site include Subtropical Freshwater Wetlands and Maputaland Wooded Grassland. Subtropical Freshwater Wetlands ordinarily occurred in low lying areas and were dominated by reeds, sedges, rushes and water-logged meadows dominated by grasses. Important taxa of Subtropical Freshwater Wetlands are detailed within the specialist ecology report contained in **Appendix D**.

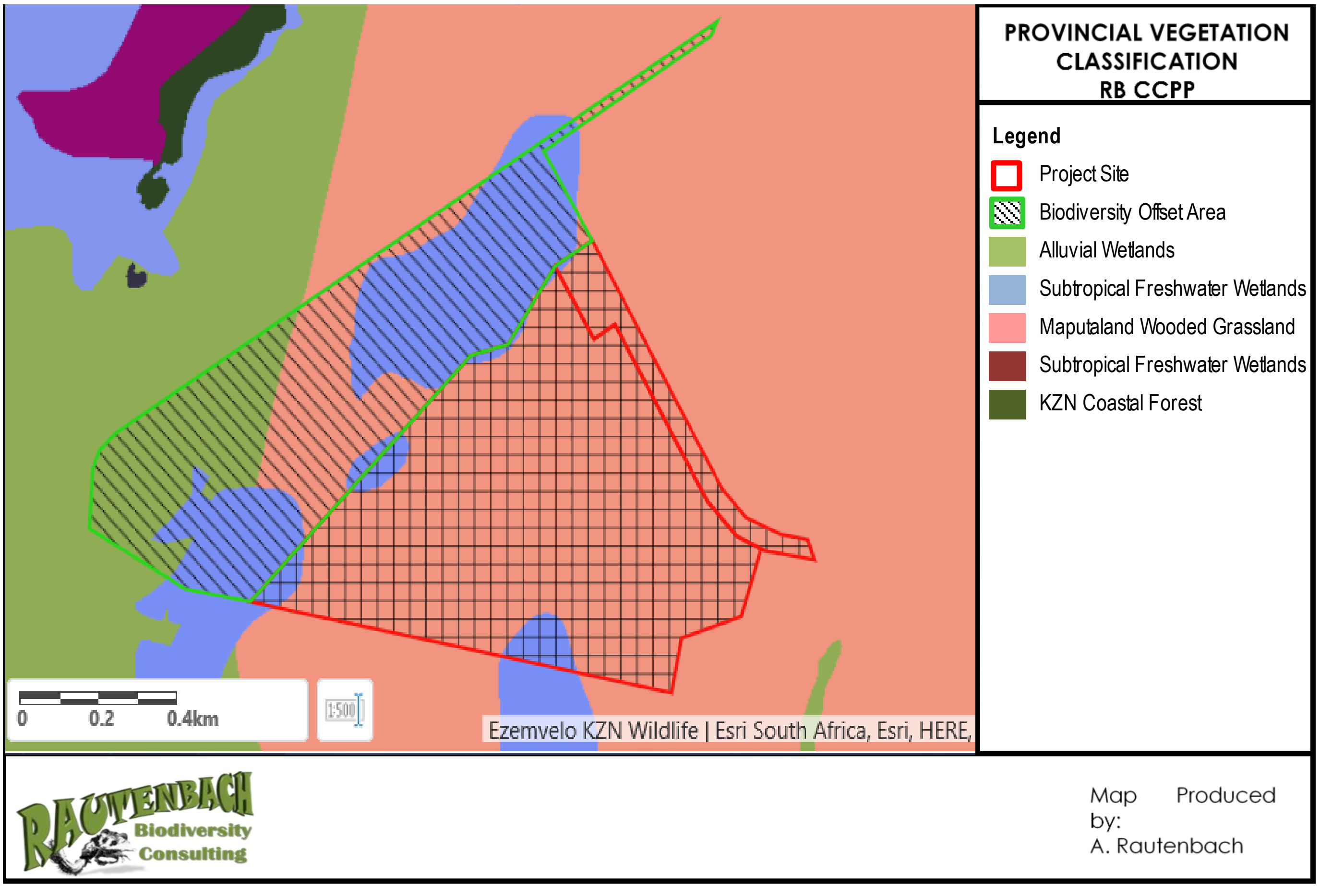

Figure 7.17: Vegetation Types of the Project Site

7.3.3.3 Municipal Level Conservation Priorities

Within the "uMhlathuze Land Use Scheme" (2015), the project site falls in the High Impact Industry zone (**Figure 7.18**), an area earmarked for the development of large industries. This zone permits manufacturing uses which may not be compatible with other manufacturing uses and which would have major externalities on adjacent sensitive land uses. This zone would permit manufacturing activities that may produce significant air pollution, vibration, noise, odour, or high-volume automobile and truck traffic. Warehousing of materials that may be considered noxious or hazardous may be permitted in buildings in this zone, with possible conditions and/or exceptions. Outdoor storage, as either a principal use or an ancillary use, could also be permitted in the zone, with some possible conditions or restrictions.

Conservation areas, identified as environmentally important to protect and conserve important land and/or water bodies, and which are to be rehabilitated back to its original natural state has been identified to the north and south of the project site. These areas normally form part of the sustainable open space system, which includes independent or linked open space areas and permits only limited and specific developments.

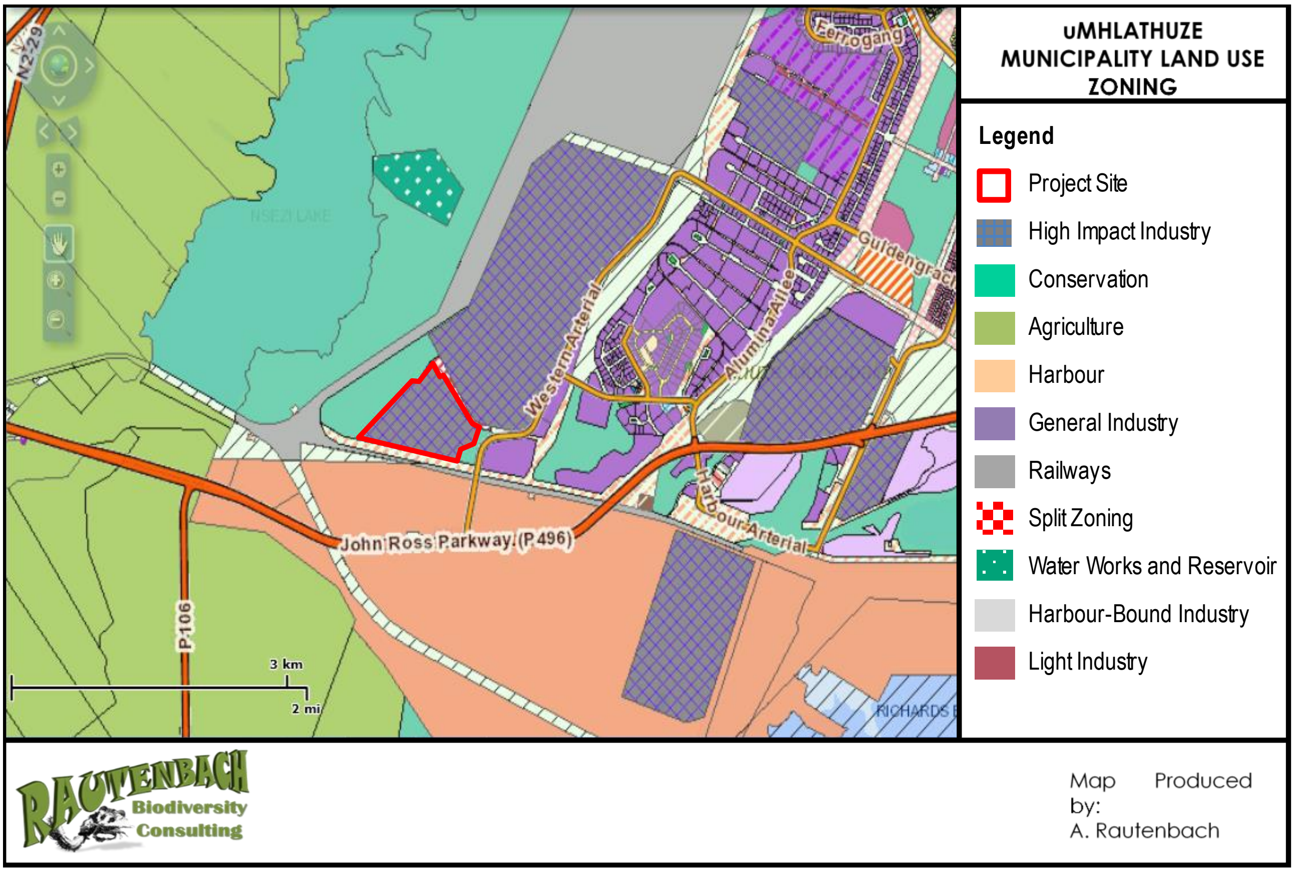

Figure 7.18: Location of Conservation Areas in relation to the Project Site according to the uMhlathuze Land Use Scheme (2015)[12]

7.3.3.4 Local Vegetation Communities

The vegetation of the project site is characterised by plant communities representing two major vegetation types, i.e. Maputaland Wooded Grassland and Subtropical Freshwater Wetlands (**Figure 7.19**). At local scales, such as the project site, variations in environmental factors i.e. soil structure, soil depth and past land use, may result in many different vegetation communities embedded within these major vegetation units.

Four local vegetation communities were identified, described and mapped on the project site and are discussed below:

» *Imperata cylindrica – Syzygium cordatum* wooded grassland (~26,03 ha – includes biodiversity offset area and areas surrounding the site; ~19.13 ha site only);
» *Helichrysum kraussii – Parinari capensis* shrubland (~67.4 ha – includes biodiversity offset area and areas surrounding the site; ~25.09 ha site only);
» Wetlands and wetland ecotones (~3.25 ha includes the biodiversity offset area and areas surrounding the site; ~1.85 ha site only);

[12] The current land use zoning according to the uMhlathuze Land Use Scheme (2015) have not been verified.

» Low-lying hygrophilous grassland (~42.6 ha includes the biodiversity offset area and areas surrounding the site; ~24.96 ha site only).

The *Imperata cylindrica – Syzygium cordatum* wooded grassland, *Helichrysum kraussii – Parinari capensis* shrubland and Low-lying hygrophilous grassland vegetation communities are embedded within the Maputaland Wooded Grassland major vegetation type while the Wetlands with associated ecotone vegetation are embedded within the Subtropical Freshwater Wetlands major vegetation type. Due to the mosaic nature of the vegetation, delineation of the boundaries of local plant communities is not precise, but follows broad patterns.

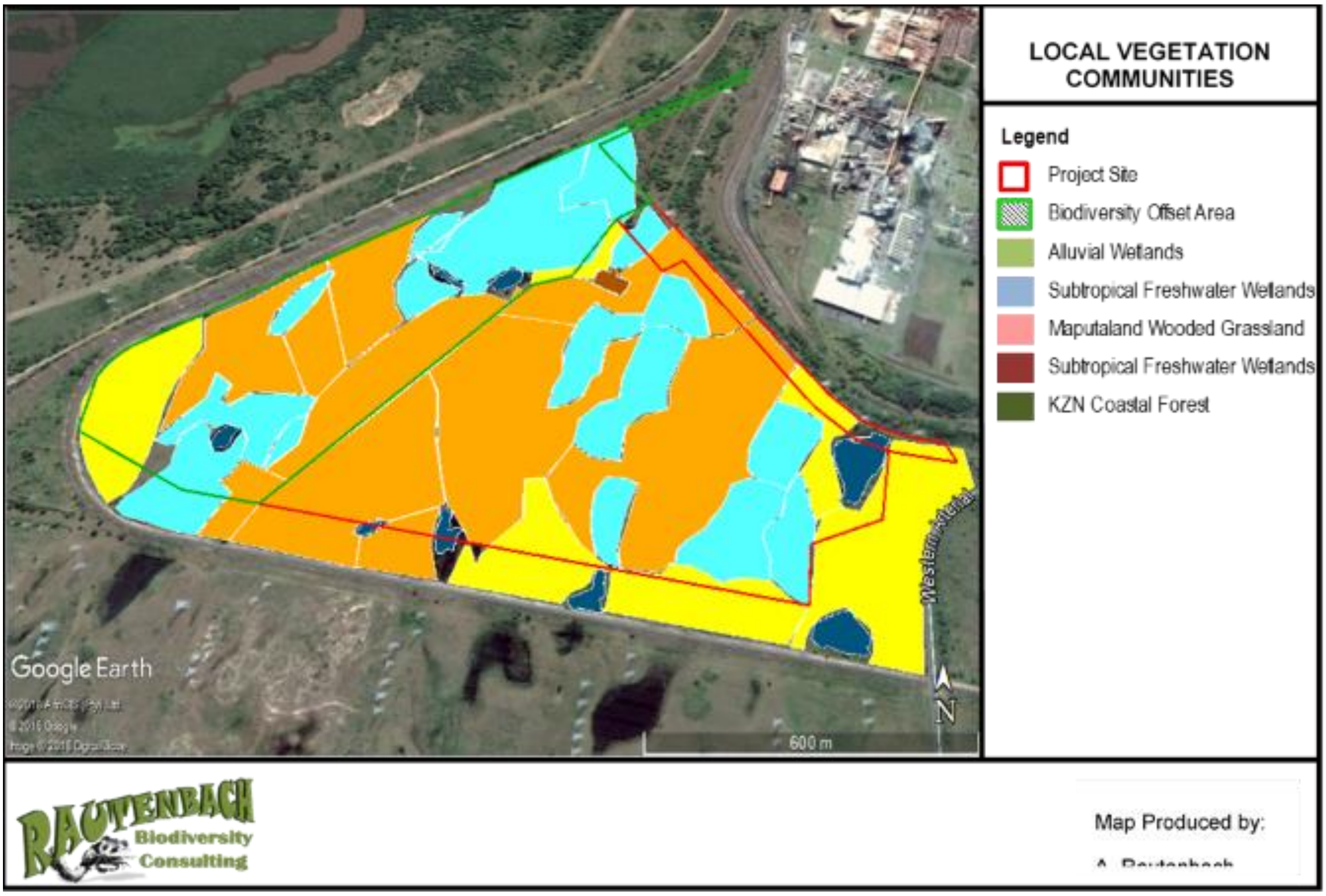

Figure 7.19: Local Vegetation Communities on the Project Site

A total of 101 flora species, from 40 Families were identified on the project site. The number of species in each growth form identified within the vegetation communities is presented in Table 6 within the specialist report contained in **Appendix D**. The sections below provide a brief description of each of the vegetation communities recorded within the site.

1. *Imperata cylindrica – Syzygium cordatum* wooded grassland

This community is prominent on the south-eastern and southern side of the project site and in areas within close proximity to areas where water accumulates. The area is characterised by grasslands dominated by the graminoids *Imperata cylindrica* and *Dactyloctenium aegyptium*, with cyperoids such as *C. esculentes* and *C. rotandus* well represented. Several *S. cordatum* and *H. coriacea* trees are interspersed in the grassland. Two small clumps of trees are present on the eastern border, with trees such as *T. emetica* and *B. micrantha* dominant. A few *Dichrostachys cinerea* thickets are also present on the eastern boundary of this community. Basal cover is high and luxuriant.

Invasive alien species that occur in this vegetation community include *Psidium guajava*, *Schinus terebinthifolius*, *Catharanthus roseus*, *Solanum mauritianum, Lantana camara* and *Verbena bonariensis*.

No threatened medicinal plant species were observed.

Dominant species:
Trees: *Syzygium cordatum, Bridelia micrantha, Dichrostachys cinerea, Trichilia emetica, Hyphaene coriacea*
Herbs: *Asystasia gangetica, Helichrysum auriceps, Helichrysum nudifolium*
Graminoids: *Imperata cylindrica; Digitaria natalensis; Sporobolus africanus, Sporobolus pyramidalis; Dactyloctenium aegyptium*
Cyperoids: *Cyperus esculentes, Cyperus rotandus*
Climbers: *Smilax anceps*

Of the 71 species recorded within this vegetation community, five species, or 7% are regarded as important floristic elements of the Maputaland Wooded Grassland by Mucina & Rutherford (2006). This includes the trees *Hyphaene coriacea, Dichrostachys cinerea* and *Syzygium cordatum* (endemic), the shrub, *Helichrysum kraussii*; and the graminoid *Digitaria natalensis*.

2. Helichrysum kraussii – Parinari capensis shrubland

This vegetation community is prominent in the central and northern parts of the project site. This area is completely dominated by the shrub species *Helichrysum kraussii*, with several *Parinari capensis* shrubs interspersed with *H. kraussii*, specifically on the western site boundary. With the exception of several *D. cinerea* thickets, few trees are present. Evidence of extensive tree harvesting is present. Although both *H. kraussii* and *D. cinerea* naturally occur within the Maputaland Wooded Grassland vegetation type, their abundance on the project site is an indication of past disturbance. As a result, basal cover varied from relatively low to intermediate.

Invasive alien species that occur in this vegetation community include *Psidium guajava*, *Schinus terebinthifolius*, *Catharanthus roseus*, *Solanum mauritianum*, *Lantana camara* and *Verbena bonariensis*.

Dominant species:
Trees*: Dichrostachys cinerea; Hyphaene coriacea*
Shrubs: *Helichrysum kraussii; Parinari capensis*
Herbs: *Senecio pterophorus; Lobelia coronopifolia*
Geophytes: *Hypoxis hemerocallidae*
Graminoids: *Digitaria natalensis; Sporobolus africanus, Sporobolus pyramidalis*
Cyperoids: Cyperus esculentes, Cyperus rotandus
Climbers: *Smilax anceps*

Of the 65 species recorded within this community, seven species, or ~10 % are regarded as important floristic elements of the Maputaland Wooded Grassland by Mucina & Rutherford (2006). This includes the trees *H. coriacea, D. cinerea, S. cordatum*, the geoxylic suffritex *Parinari capensis*, the shrub *H. kraussii*, the graminoid *D. natalensis*, and the cyperoid *Cyperus obtusifolius*.

No threatened medicinal plant species were observed.

3. Wetlands and wetland ecotones

The scattered and isolated patches of these vegetation communities in the wetlands areas of the project site were dominated by several cyperoid species and the swamp-fern *Cyclosorus interruptus*. *Typha capensis* (bulrushes) were only present at one wetland, outside of the project site. Alien and invasive species present in this community includes *Lantana camara, Psidium guajava* and *Schinus terebinthifolius.*

Dominant species:
Herbs/hydrophytes: *Cyclosorus interruptus*
Graminoids: *Chloris gayana, Dactyloctenium aegyptium*
Cyperoids: *Cyperus congestus, C. marginatus, C. dives, C. esculentus, C. natalensis, Pycreus polystachyos*

Of the 45 species recorded within this community, 13 species, or ~28 % are regarded as important floristic elements of the Subtropical Freshwater Wetlands by Mucina & Rutherford (2006). This includes the cyperoids, *Cyperus articulates, C. dives, C. papyrus, C. prolifer, Fuirena ciliaris, Pycreus polystachyos*; the hydrophytes *Nymphaea nouchali*, *Azolla pinnata* subsp. *africana* and *Typha capensis;* the herb/hydrophyte *Ludwigia octovalvis,* the geophyte *Eulophia angolensis*, and the graminoids *Imperata cylindrica* and *Phragmites mauritianus. C. dives* and *C. prolifer* is also regarded as biogeographically important species (Mucina & Rutherford, 2006).

Invasive alien species that occur in this vegetation community include *Psidium guajava, Schinus terebinthifolius,* and *Lantana camara*.

No threatened medicinal plant species were observed.

4. Low-lying hygrophilous grassland

The scattered and isolated patches of these low-lying vegetation communities in the wetlands areas of the project site are almost completely devoid of trees, covered with a tight, low sward with no structural diversity. These vegetation communities were dominated by several cyperoids and hygrophilous graminoids such as *Chloris gayana*, and *C. virgate*.

Of the 35 species recorded within this community, two, or ~ 5 % are regarded as important floristic elements of Maputaland Wooded Grassland by Mucina & Rutherford (2006). These include the tree *Hyphaene coriacea*, and the graminoid *Digitaria natalensis*.

Dominant species:
Graminoids: *Chloris gayana, C. virgate*
Cyperoids: *Cyperus esculentes*

Invasive alien species that occur in this vegetation community include *Catharanthus roseus* and *Lantana camara*.

No medicinal plant species was observed.

7.3.3.5 Flora Species of Conservation Concern

Several plant Species of Conservation Concern (SCC) are present within all vegetation communities (**Tables 7.7**). The distribution of SCC tree species confirmed to be present on the project site is represented in **Figure 7.20**.

Table 7.7: List of SCC Plant Species Identified on the Project Site

					CONSERVATION STATUS		
Family Name	**Scientific Name**	**Common Name**	**Growth Form**	**Ecological Status**	**SA Red List Category (2009)**	**KZNEBPA (2014)**	**KZNCMA (1999)**
Anacardiaceae	* *Sclerocarya birrea*	Marula	Tree		LC	Protected	
Arecaceae	*Hyphaene coriacea*	Southern Lala Palm	Tree	SA endemic		Protected	
Asparagaceae	*Asparagus laricinus*		Shrub/tree		LC	Protected – All Asparagaceae	
Asphodelaceae	*Trachyandra asperata*		Geophyte/ succulent		LC	Protected – All Asphodelaceae	
	Trachyandra saltii		Geophyte/ succulent		LC		
Asteraceae	*Helichrysum auriceps*		Herb	SA endemic	LC		
Lobeliaceae	*Lobelia coronopifolia*	Wild Lobelia	Dwarf shrub/herb	SA endemic	LC		
Meliaceae	*Trichilia emetica*	Natal Mahogony	Tree		LC	Protected	
Moraceae	* *Ficus trichopoda*	Swamp Fig	Shrub/tree		LC	Protected	Protected
Nymphaeaceae	*Nymphaea nouchali*	Blue Waterlily	Epihydate/ herb/ hydrophyte		LC	Protected	
Orchidaceae	*Eulophia angolensis*		Herb	SA endemic	LC	All Orchidaceae	

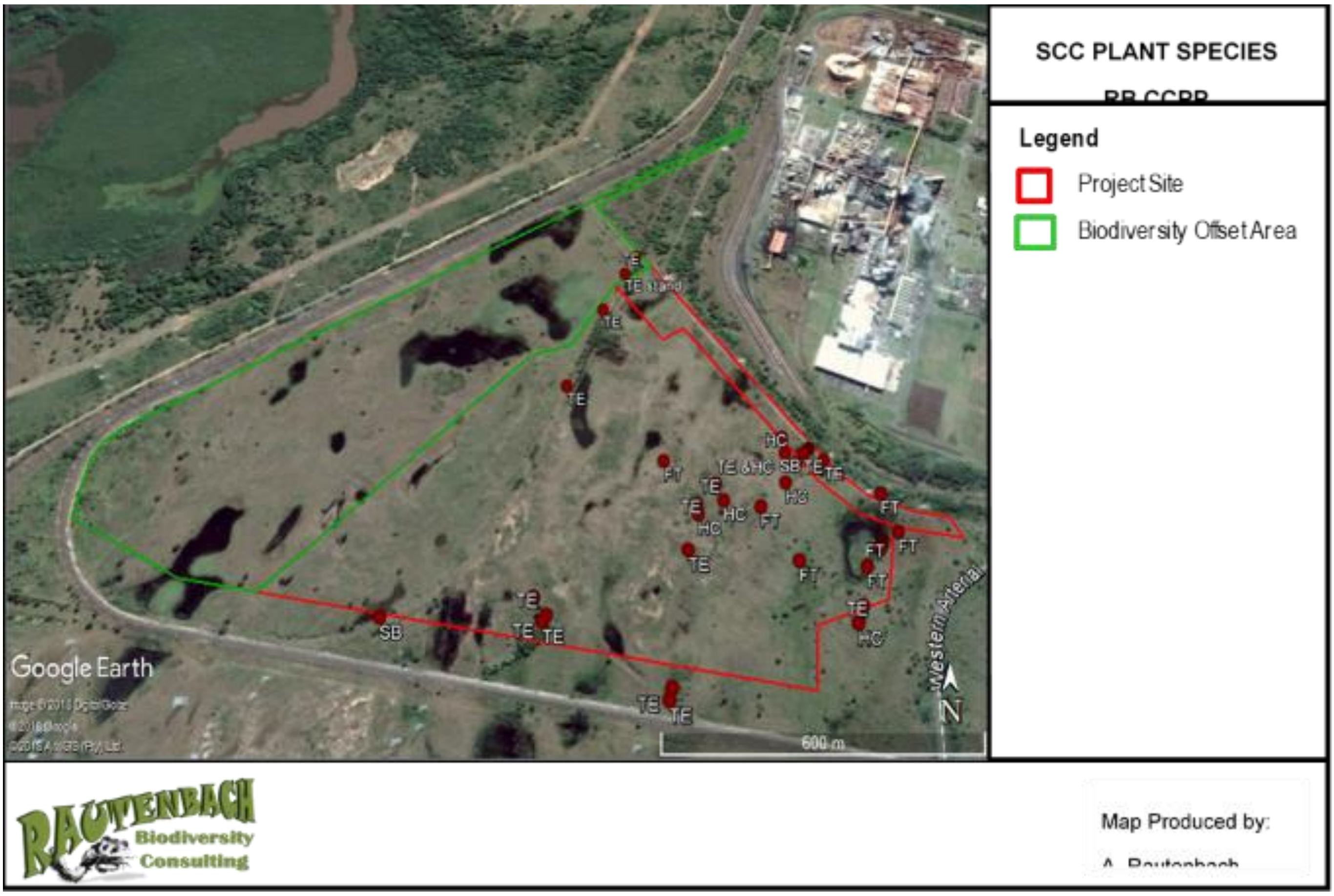

Figure 7.20: Distribution of SCC Plant Species on the Project Site

- The following SCC species could occur on the site (Medium – High probability of occurrence). Species specific information is provided **Appendix D** – Ecological Report.
-
  - *Crinum macowanii* Baker
  - *Crinum moorei* Hook.f.
  - *Crinum stuhlmannii* Baker (Synonym - *C. delagoense*)
  - *Cyrtanthus contractus* N.E.Br.
  - *Boophone disticha*
  - *Scadoxus membranaceus* (Baker) Friis & Nordal
  - *Brachystelma sandersonii* (Oliv.) N.E.Br.
  - *Asparagus falcatus* L.
  - *Asparagus densiflorus* (Kunth) Jessop
  - *Aloe ecklonis* Salm-Dyck
  - *Kniphofia laxiflora* Kunth
  - *Kniphofia leucocephala* Baijnath
  - *Kniphofia littoralis* Codd
  - *Trachyandra asperata* Kunth var. *asperata*
  - *Trachyandra saltii* (Baker) Oberm. var. *saltii*
  - *Senecio ngoyanus* Hilliard
  - *Senecio erubescens* Aiton var. *erubescens*
  - *Monsonia praemorsa* E.Mey. ex R.Knuth
  - *Ledebouria ovatifolia*
  - *Hypoxis hemerocallidae*

» *Ekebergia capensis Sparrm.*
» *Eulophia speciosa* (R.Br. ex Lindl.) Bolus
»

Permit authorisation will be required from eKZNw to remove/destroy or re-locate any species protected in terms of the KZNEBPA (2014) or KZNCMA.

Permit authorisation from DAFF will be required to damage or destroy protected tree species.

7.3.3.6 Alien and Invasive Plant Species

The *Imperata-cylyndrica-Syzygium cordatum* wooded grassland vegetation community located on the western portion of the biodiversity offset area is heavily infested by *Lantana camara* and *Psidium guajava*. Alien and Invasive Plant species (AIPs) are also present in all the vegetation communities on the project site, albeit at low densities. AIPs identified on the project site and biodiversity offset area is listed in **Table 7.8**.

Table 7.8: AIPs identified on the Project Site and Biodiversity Offset Area

Family	Scientific Name	Common Name	Growth Form	IAP Category
ANACARDIACEAE	*Schinus terebinthifolius*	Brazilian Pepper Tree	Tree	1b
	Catharanthus roseus	Periwinkle	Herb	1b
MYRTACEAE	*Psidium guajava*	Guava	Tree	1b
SOLANACEAE	*Solanum mauritianum*	Bugweed	Shrub/tree	1b
VERBENACEAE	*Lantana camara*	Lantana	Shrub	1b
	Verbena bonariensis	Tall Verbena	Herb	1b

7.3.3.7 Mammals

i) Mammal Habitat

Global mammal distributions correlate well with biomes as defined by Acocks (1953), Low & Rebelo (1998), Knobel & Bredenkamp (2005), as well as Mucina & Rutherford (2006). However, the local occurrences of mammals are more closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and wetland/aquatic-associated vegetation cover rather than fine-scale vegetation mapping.

The project site offers three major mammal habitats, i.e. terrestrial, arboreal and wetland/aquatic. These areas may offer refuge to a number of the smaller and more reticent mammal species.

Terrestrial habitat is by far the biggest and may provide habitat to a number of species such as rodents, shrews and mongooses. Arboreal habitat is represented by a few scattered trees and tree copses. Species such as bats may utilise these habitats.

Wetland/aquatic habitat is presented by a few scattered surface water bodies. Although these areas are entirely isolated, which has zoogeographical repercussions; it may still provide habitat and refuge to some of the small mammal species such as shrews. No rupiculous habitat and no caves are present on, or in the vicinity of the project site.

Connectivity with adjacent habitats is severely impaired by industrial developments, the Western Arterial highway on the east, and a railway line with associated service road to the north, south and west of the project site. As a result of urban sprawl, hunting and poaching pressure, none of the larger mammal species are expected to be present on the project site, or in the proximity of the project site.

ii) Expected and Observed Mammal Species Richness

Of the 48 mammal species that could potentially occur in the area, the presence of six species was confirmed (**Table 7.9**). With the exception of *Crocidura mariquensis*, all the species recorded are common and widespread, all with wide habitat tolerances. Only one Species of Conservation Concern was recorded on the site: A single specimen of *Crocidura mariquensis* was collected. *C. mariquensis* is listed as 'NT 'on the most recent Red List of Mammal Species (2016), and is protected within KwaZulu-Natal Province (KZNEBPA 2014, Schedule 3). This species is widely distributed in South Africa and occurs in many protected areas. However, they are restricted to wetlands and waterlogged areas and therefore have a patchy area of occupancy. As a result of urban and rural expansions, overgrazing and water abstractions, these areas have been severely reduced and fragmented; leading to continuous population declines (Taylor *et al*., 2016). Details of other species of Conservation Concern known from the broader region are described in the specialist ecological report contained in Appendix D.

Table 7.9: A list of Mammal Species Observed during the Field Survey

Common Name	Scientific Name	Observation Indicator	Habitat
Marsh Mongoose	*Atelerix paludinosus*	Tracks	Wetlands/Biodiversity Offset Area
Slender Mongoose	*Galerella sanguinea*	Sighting	Grassveld/road
Shrub Hare	*Lepus saxatillis*	Sighting/Nocturnal survey	Shrub
Pygmy Mouse	*Mus minutoides*	TS 2	Wetlland
Natal Multimammate Mouse	*Mastomys natalensis*	TR L 2	Grassland
Swamp Musk Shrew	*Crocidura mariquensis*	TR L 3	Grassland close to wetland

7.3.3.8 Herpetofauna

i) Herpetofauna Habitat

The local occurrence of reptiles is closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and fossorial (underground), rather than fine scale vegetation types. It is therefore possible to deduce the presence or absence of herpetofauna species by evaluating the habitat types within the context of global distribution ranges.

Suitable reptile microhabitats on the project site include scrub, rotting logs, leaf litter at the base of trees/vegetation, grassy clumps and trees. No rocky outcrops are present on the project site.

For frogs, suitable environmental conditions, especially breeding sites, are critically important and most species tend to be located in very specific microhabitats such as pools, ponds, streams, marshlands, rocky outcrops and open grassveld (du Preez & Carruthers, 2009). Frog habitats on the project site include grassveld, trees and wetlands/marshlands.

ii) Expected and Observed Herpetofauna Species Richness

A total of 48 reptile and 38 frog species potentially occur within the area (refer to Appendix 3 of the specialist report contained in Appendix D). It should be noted that potential occurrence is interpreted as to be possible over a period of time as a result of environmentally induced expansion and contractions of population densities and ranges which simulates migration.

During the field survey, only one reptile species, *Hemidactylus mabouia* (Tropical House Gecko) was observed. This species is widespread and common.

Frogs were abundant on the project site. Eleven frog species were identified (**Table 7.11**). With the exception of *Hyperolius microps* (Sharp-nosed reed frog) and *Hemisus guttatus* (Spotted shovel-nosed frog), all species listed in **Table 7.11** are widespread and abundant, with stable population numbers and occurring in several protected areas. Pickersgill Reed Frog was not observed on the project site, or on any area within the proximity of the project site.

Table 7.11: Frog Species Identified on the Project Site

Common Name	Scientific Name	Observation Indicator	Habitat
Broad Banded Grass Frog	*Ptychadena mossambica*	Sighting	Wetland
Brown-Backed Tree Frog	*Leptopelis mossambicus*	Sighting	Tree
Clicking Stream Frog	*Strongylopus grayii*	Vocalization	Wetland
Common Platanna	*Xenopus laevis*	Sighting	Wetland
Gutteral Toad	*Sclerophrys gutteralis*	Sighting	On service road
Marbled Reed Frog	*Hyperolius marmoratus*	Sighting	Wetland
Red Legged Cassina	*Kassina maculata*	Sighting	Wetland
Sharp-Nosed Reed Frog	*Hyperolius microps*	Sighting	Wetland
Snoring Puddle Frog	*Phrynobatrachus natalensis*	Sighting	Wetland
Spotted Shovel-Nosed Frog	*Hemisus guttatus*	Vocalization	Close to wetland
Tinker Reed Frog	*Hyperolius tuberlinguis*	Sighting	Wetland

Hemisus guttatus (Spotted shovel-nosed frog) VU is the only threatened species recorded on the site. This species has a national and provincial conservation status of '**Vulnerable**'. *H. guttatus* is endemic to the atlas region, occurring in southern Mpumalanga and central and eastern KwaZulu-Natal. Along the coast it has been recorded from Hluhluwe (2832BA) in the north, to Durban (2930DD, 2931CC) in the south. It also occurs as far inland as Dundee (2830AA, AB), Newcastle (2729DB) and Piet Retief (2630DD). Although *H. guttatus* may be locally abundant, its fossorial habitat ensures that it is rarely observed and few locality records exist. Calling males are notoriously difficult to find since calling may initially take place underground, with males emerging onto the surface only when the chorus intensity increases. The long-term survival of *H. guttatus* is threatened by rapid and extensive urban development, forestry and other agricultural practices, particularly along the KwaZulu-Natal north coast (FrogMAP, 2018).

Hyperolius microps (Sharp-nosed reed frog) is a Range Restricted Species. Although listed as of 'Least Concern' and not afforded provincial protection, this species' range has been considerably diminished during the past c. 15 years as a result of drainage of wetlands for agricultural and urban development in several areas in KwaZulu-Natal, and is now only encountered rarely outside of protected areas.

iii) Herpetofauna Species of Conservation Concern

No SCC reptile species are expected to be present on the project site. Nonetheless, the project site offers suitable habitat to two SCC frog species that may potentially be present, i.e. *Cacosternum striatum* and *Breviceps sopranus*, listed as 'Data Deficient'.

Table 7.12: SCC frog species deduced to occupy the project site, or to be occasional visitors.

			CONSERVATION STATUS			
Common Name	**Scientific Name**	**Preferred Habitat**	**Red List Category**	**Nemba (2015)**	**Kznepba (2014)**	**Probability Of Occurrence**
Striped Caco	*Cacosternum striatum*	Variety of grassland areas.	DDD			HIGH
Whistling Rain frog	*Breviceps sopranus*	Variety of vegetation types in forest and savanna biomes including coastal forest and thornveld, riparian forest. Preferred soil types vary from sandy to clay loam.	DDD			HIGH

7.3.3.9 Avifauna

i) Avifauna Habitat

It is widely accepted that vegetation structure, rather than plant species richness influence bird species richness and abundance (Corcuera & Alejandro, 2006; Mohd-Azlan *et al*., 2015; Casas *et al*., 2016). Therefore, the avian habitat assessment focuses on factors which are relevant to bird distribution. Bird microhabitats on the project area include grassland, wooded areas and inland water. It must be emphasised that birds, by virtue of their mobility, will utilise almost any area in a landscape from time to time.

» ***Grassland/Shrubland***
The majority of the project site falls within this bird microhabitat. This area may provide habitat to a number of bird species such as pipits, larks, longclaws and cisticolas.

» ***Wooded Areas***
A few small wooded areas (tree copses) may provide habitat to bulbuls, doves and mousebirds.

» ***Inland Water***
These areas are represented by the several wetlands. Wetlands are fringed by *Phragmites mauritianus*, *Papyrus* sp. and several cyperoid species, offering suitable habitat to a number of bird species such as warblers, weavers and geese.

ii) Expected and Observed Avifauna Species Richness

The project site falls within the distributional range of 341 bird species. Of these, the presence of 67 species was confirmed on the site (**Table 7.13**). Large congregations of Spurwinged Geese and Woolly Necked Storks were frequently observed on the Biodiversity Offset area. Woodland bird species was contrary to expectation quite frequently encountered; however, this may be attributed to the small, but well wooded area on the site's eastern boundary, on the premises of Mondi Richards Bay. Woodland species were frequently observed flying from this area, to the small wooded areas on the project site.

No threatened bird species were observed. However, five provincially protected species were present and include the following:

» *Egretta alba* (Great Egret)
» *Ardea melanocephala* (Black Headed Heron)

» *Actophilornis africanus* (African Jacana)
» *Ciconia episcopus* (Woolly-necked Stork)
» *Glareola pratincola* (Collared Pratincole)

These species are protected under Schedule 3 of the KZNEBPA 2014.

Other SCC species observed include the near-endemic *Zosterops virens* (Cape White-eye). Near-endemics are those species with at least 70 % of their population present in South Africa. Further details regarding SCC present in the region are provided in the specialist report contained in Appendix D.

The rest of the species listed in **Table 7.13** are widespread and abundant throughout their distributional range.

Table 7.13: Bird Species observed on the Project Site

		Habitat		
Common Name	Scientific Name	Grassland	Inland Water	Wooded Areas
Apalis Bar-throated	*Apalis thoracica*	+		
Barbet Black-collared	*Lybius torquatus*			+
Barbet Crested	*Trachyphonus vaillantii*			+
Bee-eater White-fronted	*Merops bullockoides*	+		
Bee-eater European	*Merops apiaster*	+		
Bishop Southern Red	*Euplectes orix*		+	
Bulbul Dark-capped	*Pycnonotus tricolor*			+
Camaroptera Green-backed	*Camaroptera brachyura*			+
Canary Yellow-fronted	*Crithagra mozambicus*	+		
Cisticola Zitting	*Cisticola juncidis*	+		
Cisticola Croaking	*Cisticola natalensis*	+		
Crake Black	*Amaurornis flavirostra*		+	
Cisticola Lazy	*Cisticola aberrans*	+		
Coucal Burchell's	*Centropus burchellii*			+
Cuckoo Diderick	*Chrysococcyx caprius*			+
Dove Red-eyed	*Streptopelia semitorquata*			+
Drongo Fork-tailed	*Dicrurus adsimilis*			+
Duck Yellow-billed	*Anas undulata*		+	
Duck White-faced	*Dendrocygna viduata*		+	
Egret Great	*Egretta alba*		+	
Fiscal Common (Southern)	*Lanius collaris*	+		+
Flycatcher Southern Black	*Melaenornis pammelaina*	+		+
Goose Spur-winged	*Plectropterus gambensis*		+	
Goose Egyptian	*Alopochen aegyptiacus*		+	
Heron Black-headed	*Ardea melanocephala*		+	
Hoopoe African	*Upupa Africana*			+
House-martin Common	*Delichon urbicum*	+	+	+
Ibis African Sacred	*Threskiornis aethiopicus*		+	
Jacana African	*Actophilornis africanus*		+	
Kingfisher Brown-hooded	*Halcyon albiventris*	+		+

		Habitat		
Common Name	Scientific Name	Grassland	Inland Water	Wooded Areas
Kite Yellow-billed	*Milvus aegyptius*	+	+	+
Lapwing Crowned	*Vanellus coronatus*	+	+	
Lapwing Blacksmith	*Vanellus armatus*		+	
Lark Rufous-naped	*Mirafra Africana*	+		
Longclaw Yellow-throated	*Macronyx croceus*	+		
Masked-weaver Southern	*Ploceus velatus*		+	
Moorhen Common	*Gallinula chloropus*		+	
Mousebird Speckled	*Colius striatus*	+		+
Pipit African	*Anthus cinnamomeus*	+		
Plover Kittlitz's	*Charadrius pecuarius*		+	
Plover Three-banded	*Charadrius tricollaris*		+	
Pratincole Collared	*Glareola pratincola*		+	
Prinia Tawny-flanked	*Prinia subflava*	+		
Ruff Ruff	*Philomachus pugnax*		+	
Sandpiper Common	*Actitis hypoleucos*		+	
Snake-eagle Black-chested	*Circaetus pectoralis*	+	+	+
Spoonbill African	*Platalea alba*		+	
Starling Violet-backed	*Cinnyricinclus leucogaster*	+		+
Starling Cape Glossy	*Lamprotornis nitens*	+		+
Stilt Black-winged	*Himantopus himantopus*		+	
Stork Woolly-necked	*Ciconia episcopus*		+	
Swallow Barn	*Hirundo rustica*	+	+	+
Swallow White-throated	*Hirundo albigularis*	+	+	+
Swallow Red-breasted	*Hirundo semirufa*	+		
Swallow Lesser Striped	*Hirundo abyssinica*	+		
Swamp-warbler Lesser	*Acrocephalus gracilirostris*		+	
Teal Red-billed	*Anas erythrorhyncha*		+	
Teal Hottentot	*Anas hottentota*		+	
Tinkerbird Yellow-rumped	*Pogoniulus bilineatus*			+
Wagtail African Pied	*Motacilla aguimp*		+	+
Wagtail Cape	*Motacilla capensis*		+	+
Weaver Spectacled	*Ploceus ocularis*			+
Weaver Village	*Ploceus cucullatus*			+
Weaver Yellow	*Ploceus subaureus*			+
Weaver Thick-billed	*Amblyospiza albifrons*		+	
(*) White-eye Cape	*Zosterops virens*			+
Widowbird Fan-tailed	*Euplectes axillaris*	+		
(*) Near-endemic				

7.3.4 Water Resources

7.3.4.1 Wetland National Freshwater Priority Areas

One (1) Freshwater Ecological Priority Areas (FEPA) wetland type was identified within the assessment area of the project, namely a Wetland Flat. The systems are classified as natural or good (class A/B), with more than 75% natural land cover. The rank of the systems is a Rank 2, suggesting ecological significance on a local and regional scale. It is likely that these wetlands are within a sub-quaternary catchment which is regarded as high conservation priority. These FEPA wetlands are within a sub-quaternary catchment that has sightings or breeding areas for threatened wattled cranes, grey crowned cranes and blue cranes. The FEPA wetland systems are listed in **Table 7.15**. The location of the FEPA wetlands in reference to the proposed extension is provided in **Figure 7.21**. A 500m study area has been demarcated for the project area.

Table 7.15: NFEPA description for the FEPA sites

Classification Levels				Wetland Vegetation Class	Natural / Artificial	Wetland Condition	Wetland Rank
System	**Ecoregion**	**Landscape Position**	**HGM**				
Inland System	Natal Coastal Plain	Bench	Flat	Indian Ocean Coastal belt	Natural	AB	Rank 2

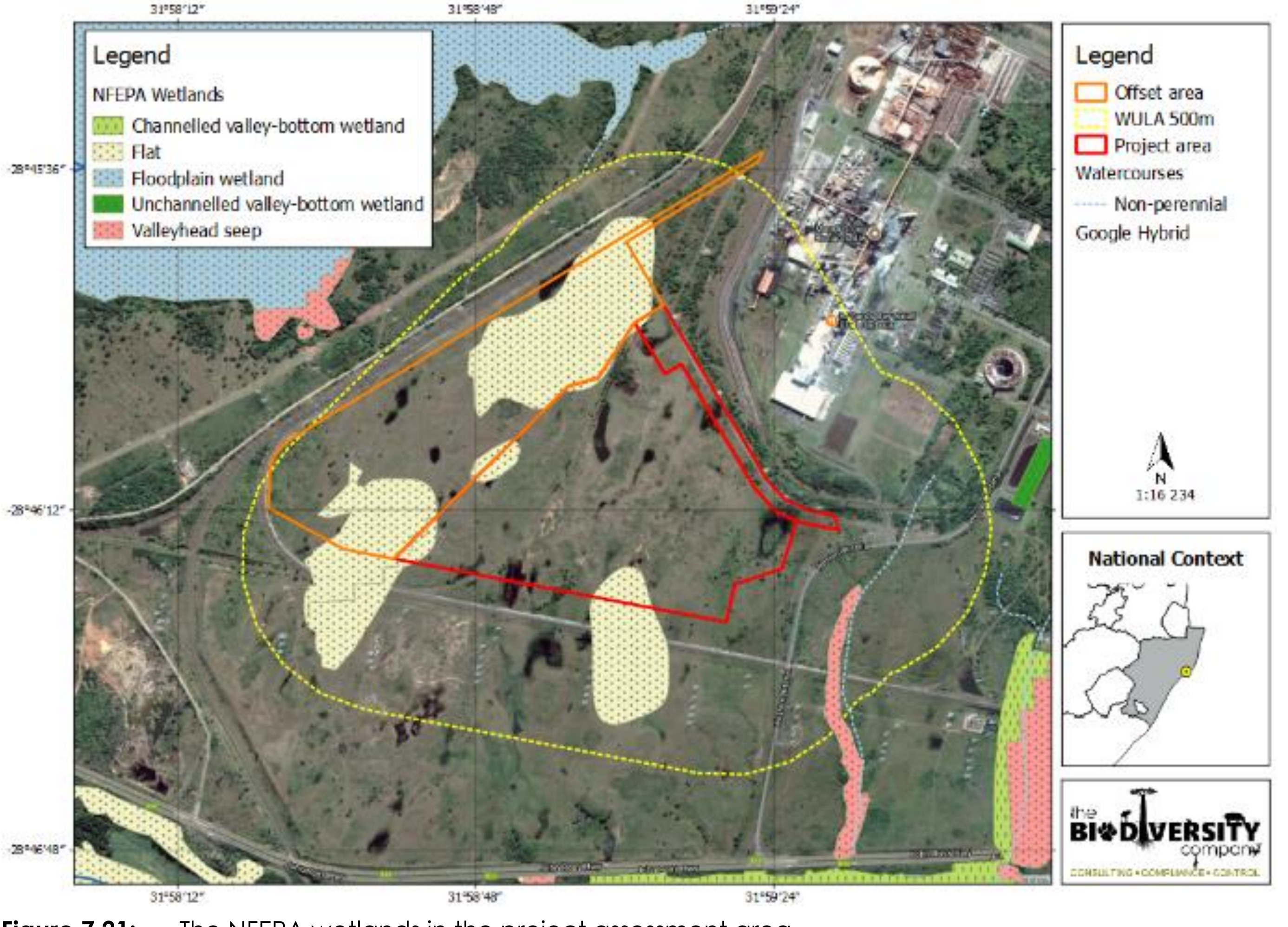

Figure 7.21: The NFEPA wetlands in the project assessment area

7.3.4.2 Wetland Delineation

The wetland delineation is shown in **Figure 7.22**, with the delineated zones of saturation presented in **Figure 7.23**. The wetland classification as per SANBI guidelines (Ollis *et al.*, 2013) is presented in **Table 7.16**. A total of two (2) HGM types were identified and delineated for the project site, biodiversity area and 500m radius assessment area, namely a channelled valley bottom wetland and wetland flat types.

The focus for the project site and the biodiversity offset area are the wetland flat type wetlands, and not the channelled valley bottom wetland which is not located within the project site. The ecological assessments have therefore been prioritised for, and focussed on the wetland flats.

A wetland flat is regarded as a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench (Ollis *et al.*, 2013). According to Ollis *et al.* (2013) horizontal water movements of water within these wetlands, if present, are multi-directional, due to the lack of any significant change in gradient within the wetland.

Approximately 91 ha of wetlands were delineated for the project, with approximately 38ha and 53ha being delineated for the project area and biodiversity offset areas respectively. For this study, the wetland flats have been collectively assessed for the project area and biodiversity offset area, allowing for a comparison between the two study areas. This approach will also allow for a more detailed consideration for any proposed offset plan.

Wetland vegetation which was recorded for the study site includes *Typha capensis, Imperata cylindrica, Cyperus congestus, C. marginatus, C. dives, C. natalensis* and *Pycreus polystachyos.* **Error! Reference source ot found.** within the specialist report contained in Appendix E presents photographs of vegetation recorded for the project area. It must be noted that *Cyperus esculentes, C. rotandus* are regarded as commonly occurring weeds which occur extensively outside of wetlands but may be found in some disturbed areas inside of wetlands (DWAF, 2005).

The range of Soil Forms identified for the study area included the Katspruit (permanent wetland zone), Champagne (permanent zone), Longlands (seasonal zone), Westleigh (seasonal zone), Clovelly (non-wetland) and Namib (non-wetland) forms.

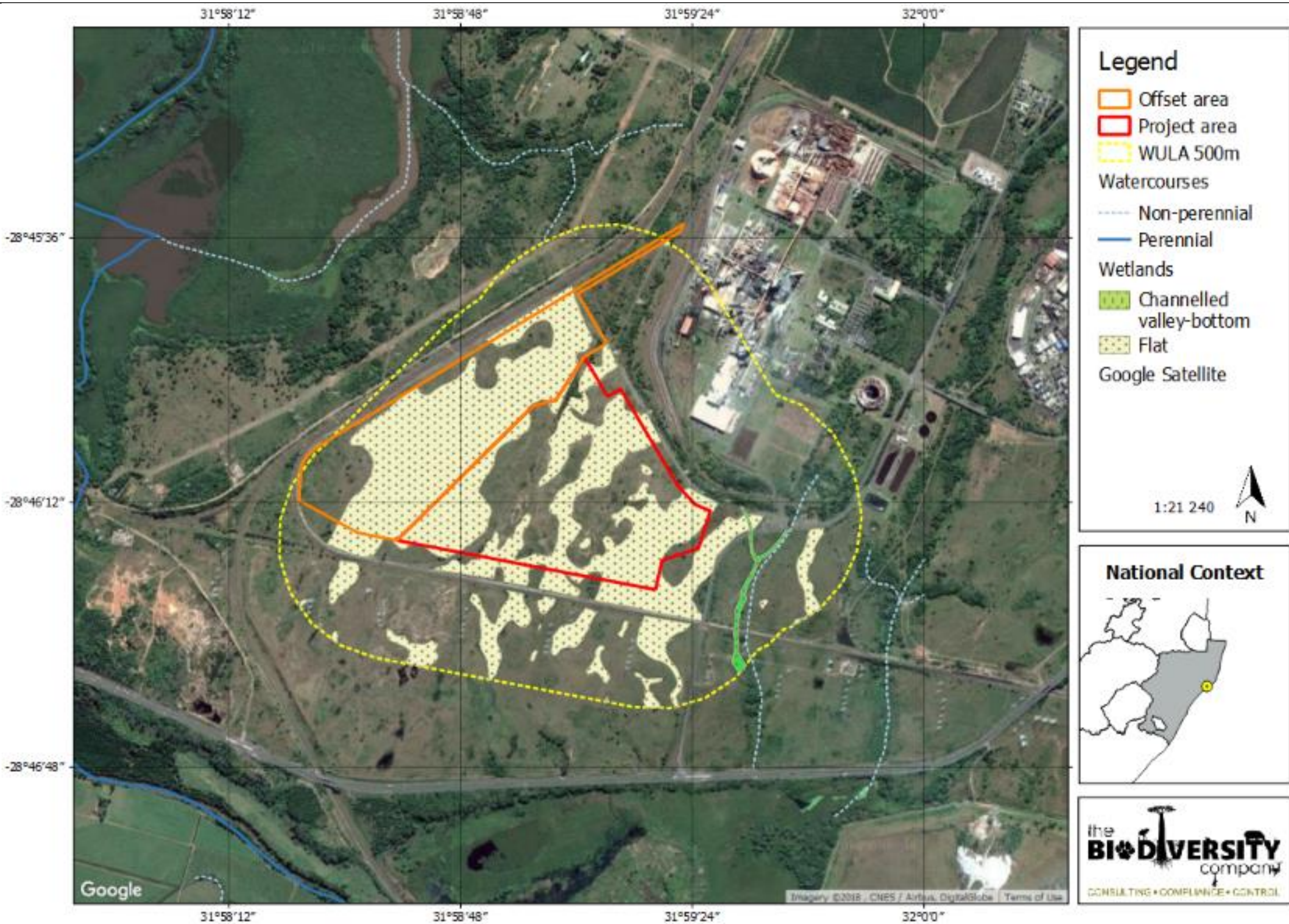

Figure 7.22: The delineated wetlands for the study

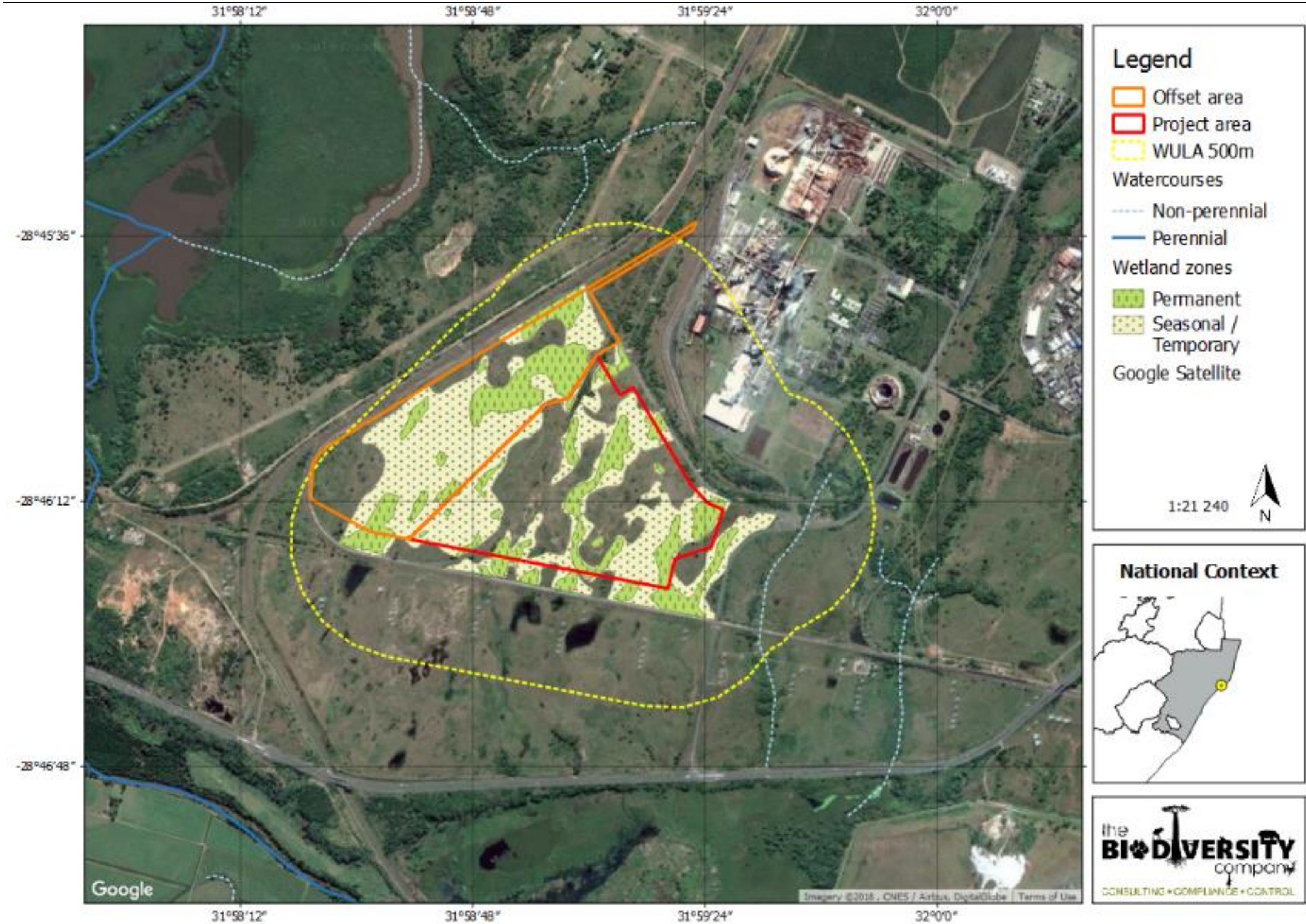

Figure 7.23: The delineated wetlands zones of saturation for the study

Table 7.16: Wetland classification as per SANBI guideline (Ollis et al. 2013)

Level 1	Level 2		Level 3	Level 4		
System	**DWS Ecoregion/s**	**NFEPA Wet Veg Group/s**	**Landscape Unit**	**4A (HGM)**	**4B**	**4C**
Inland	Natal Coastal Plain	Indian Ocean Coastal belt	Plain	Flat	N/A	N/A
Inland	Natal Coastal Plain	Indian Ocean Coastal belt	Valley Floor	Channelled Valley Bottom	N/A	N/A

7.3.4.3 Present Ecological State

The PES for the assessed wetland areas is presented in **Table 7.17**. The overall wetland health for the wetlands for the project and biodiversity offset areas was determined to be Moderately Modified (Class C). **Figure 7.24** depicts the PES of the wetland systems.

The primary source of water for a wetland flat is typically precipitation, with the exception of wetland flats situated on a coastal plain where groundwater may rise to or near the ground surface (Ollis et al. 2013). The hydrology of the project area and the biodiversity offset area has been altered largely due to the industrial development of the surrounding area, historical land uses and the placement of impoundments within the (project) area. The industrial development of the surrounding area has created reduced catchment areas for the project site and the biodiversity area, which are bordered by road and rail routes. The historical deforestation has altered the topography of the project area to some considerable extent. The rail / road routes and the deforested areas have resulted in altered flow dynamics for these areas. Surface run-off has been re-directed and concentrated in certain areas within the project area and the biodiversity offset area. Evidence of altered hydrodynamics for the wetland flats is the construction of impoundments within the lower lying areas, and the placement of culverts below the railway lines. These structures have also impeded flows across the catchment area. It was also apparent from the site visit that water is being directed from the adjacent facility into the project area, which has also contributed to higher levels of saturation in these discharge areas.

The geomorphology of the wetlands has also been impacted on due to the historical and current land uses. The deforestation of the project area had a direct impact on portions of the wetland areas, with these areas being cleared for the harvesting of trees. Indirect impacts associated with the deforestation included the construction of access roads and stockpiles which altered the structure of the wetland areas. The current land uses, notably livestock farming has resulted in wetland areas being trampled and overgrazed. The intensive livestock farming has resulted in the onset of erosion within certain portions of the project area and biodiversity offset area, and also the expanse of wetland areas. Despite these impacts and pressures, the systems currently represent wetland flats which are characterised by multidirectional horizontal water movements.

The vegetation of the wetland systems within the project area and the offset area has been impacted on by the livestock farming practices. Vegetation within these areas has been trampled and overgrazed by cattle. Evidence of overgrazed systems and cattle paths is present within both areas. The historical land uses which included deforestation has resulted in a loss of vegetation (notably tree species) within the project area. This activity required large areas to be cleared which resulted in portions of wetland areas also being cleared, and also indirect impacts to the wetlands stemming from the deforestation activities.

Wetland areas within the project area are also being harvested by local communities for resources which has also imposed pressures on these systems, due to vegetation being removed. Disturbances to both the project area and the biodiversity offset area have resulted in the establishment of alien vegetation within these areas, which included *Lantana camara*, *Psidium guajava* and *Schinus terebinthifolius*.

Table 7.17: Summary of the scores for the wetland Present Ecological State

HGM Type	Hydrology		Geomorphology		Vegetation	
	Rating	Score	Rating	Score	Rating	Score
Wetland Flats (Offset area)	C: Moderately Modified	3.5	B: Largely Natural	1.2	D: Largely Modified	4.6
Overall PES Score	3.1		Overall PES Class		C: Moderately Modified	
Wetland Flats (Project area)	C: Moderately Modified	3.5	B: Largely Natural	1.1	D: Largely Modified	4.1
Overall PES Score	3.0		Overall PES Class		C: Moderately Modified	

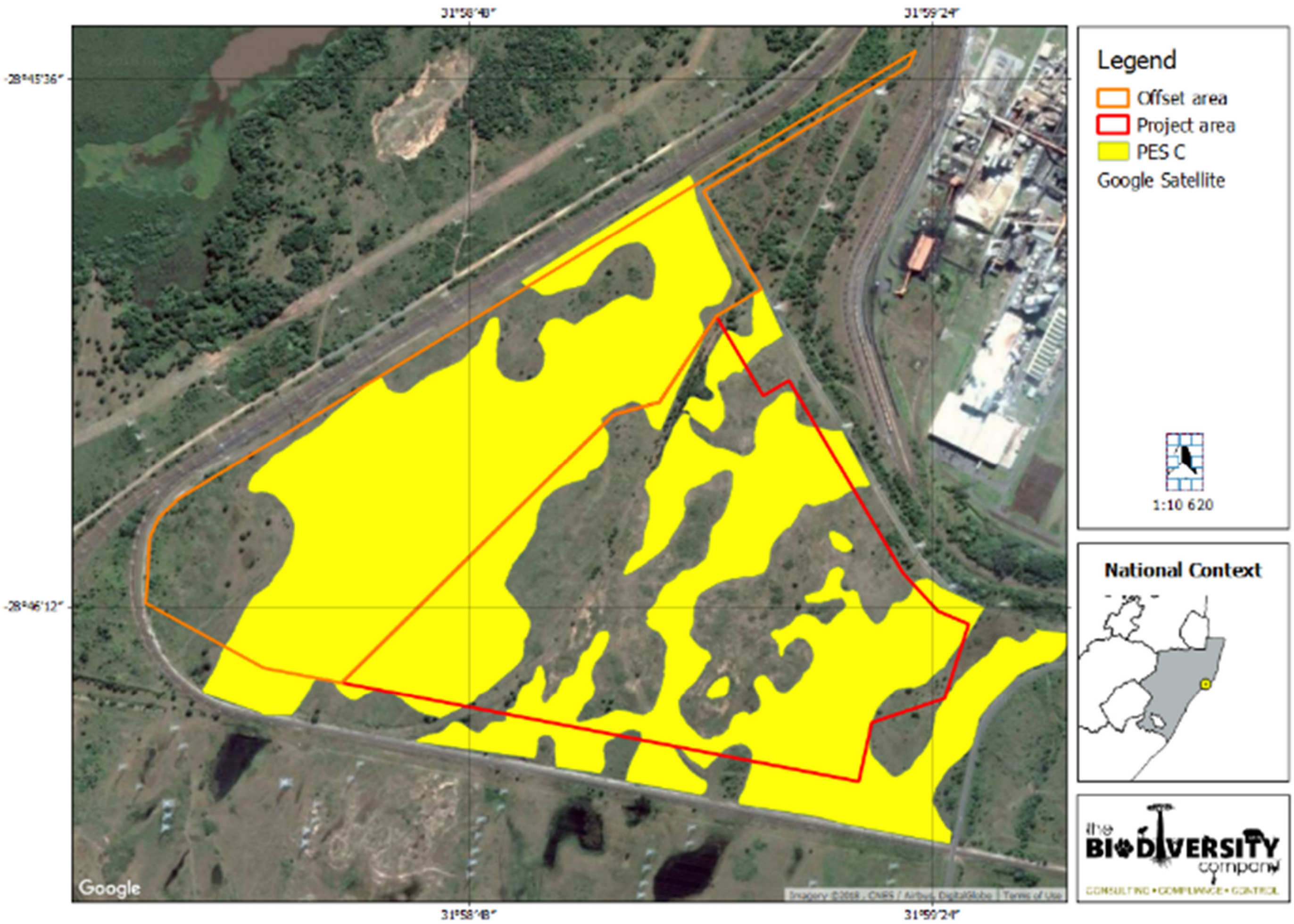

Figure 7.24: The depicted Present Ecological State of the wetlands

7.3.4.4 Wetland Ecosystem Services

The Ecosystem services provided by the HGM types present at the site were assessed and rated using the WET-EcoServices method (Kotze et al. 2009). The summarised results for the HGM types are shown in **Table 7.18**. The wetland flats for both areas had overall intermediate level of service. **Table 7.19** presents a summary of the indirect and direct benefits associated with the two study areas. The indirect benefits associated with both areas also had an intermediate level of service. The level of service for the direct benefits was determined to be moderately low and intermediate for the offset area and project area respectively. It is also evident from the findings that the benefits associated with biodiversity are higher for the project area (moderately high) as opposed to the biodiversity offset area (intermediate).

No services providing moderately high (or higher) benefits are expected for the biodiversity offset area, with moderately high benefits expected for the project area. These moderately high benefits are associated with the enhancement of water quality, the maintenance of biodiversity and the provision of harvestable resources.

Table 7.18: The Eco-Services being provided by the wetland areas

Wetland Area					Project area	Offset area
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation		1.7	1.9
			Streamflow regulation		1.2	1.3
			Water Quality enhancement benefits	Sediment trapping	1.4	1.9
				Phosphate assimilation	1.7	2.1
				Nitrate assimilation	1.9	2.1
				Toxicant assimilation	1.8	2.2
				Erosion control	1.3	1.6
			Carbon storage		1.3	1.7
	Direct Benefits	**Biodiversity maintenance**			**2.0**	**2.8**
		Provisioning	Provisioning of water for human use		**0.9**	**1.2**
			Provisioning of harvestable resources		**1.4**	**2.6**
			Provisioning of cultivated foods		**0.6**	**1.8**
		Cultural benefits	Cultural heritage		**0.0**	**0.0**
			Tourism and recreation		**0.4**	**1.3**
			Education and research		**1.0**	**1.3**
Overall					**18.7**	**25.8**
Average					**1.2**	**1.7**

Table 7.19: A summary of the indirect and direct benefits provided by the wetlands

Wetland Area	Project area	Offset area
Indirect Benefits (including water quality enhancement)	1.5	1.9
Direct Benefits (social / cultural benefits)	0.7	1.4
Biodiversity maintenance (direct benefits)	2.0	2.8

7.3.4.5 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) assessment was applied to the wetland areas described in the previous section in order to assess the levels of sensitivity and ecological importance of the wetland. The systems associated with the project area and offset area have been considered separately for this component of the study, with the wetland flat associated with the offset area encroaching into a portion of the project area. The results of the assessment are shown in **Table 7.20**. **Figure 7.25** depicts the EIS of the wetland systems. The following findings from the biodiversity assessment (Rautenbach, 2018) were considered for the EIS classification:

From a vegetation perspective the sensitivities relating to the proposed development are the presence of:

» Provincially protected species, endemic species and species protected under the Natural Forest Act. Removal/destruction of tree species would require permit authorization;
» The potential presence of several Threatened flora species;
» Wetland vegetation over certain parts of the study area.

From a fauna perspective, the sensitivities relating to the proposed development are the presence of:
» *C. mariquensis* (Near Threatened) and *Hemisus guttatus* (Vulnerable) in wetland areas. A buffer zone width of 60 m around surface water bodies is proposed to protect these wetland dependent species;
» The potential presence of *Balearica regulorum* (EN);
» The presence of provincially protected bird species.

The EIS of the wetland systems was determined to be High (Class B) and Moderate (Class C) for the project area and biodiversity offset area respectively.

The hydrological / functional importance for both areas was rated as Moderate. The direct human benefits were rated as Low (Class D) and Moderate (Class C) for the biodiversity offset area and project area respectively.

Table 7.20: The Ecological Importance and Sensitivity results for the wetland areas

Wetland Important & Sensitivity	Wetland Flats (Offset area)	Wetland Flats (Project area)
Ecological Importance & Sensitivity	1.8	2.2
Hydrological / Functional Importance	1.5	1.9
Direct Human Benefits	0.5	1.4

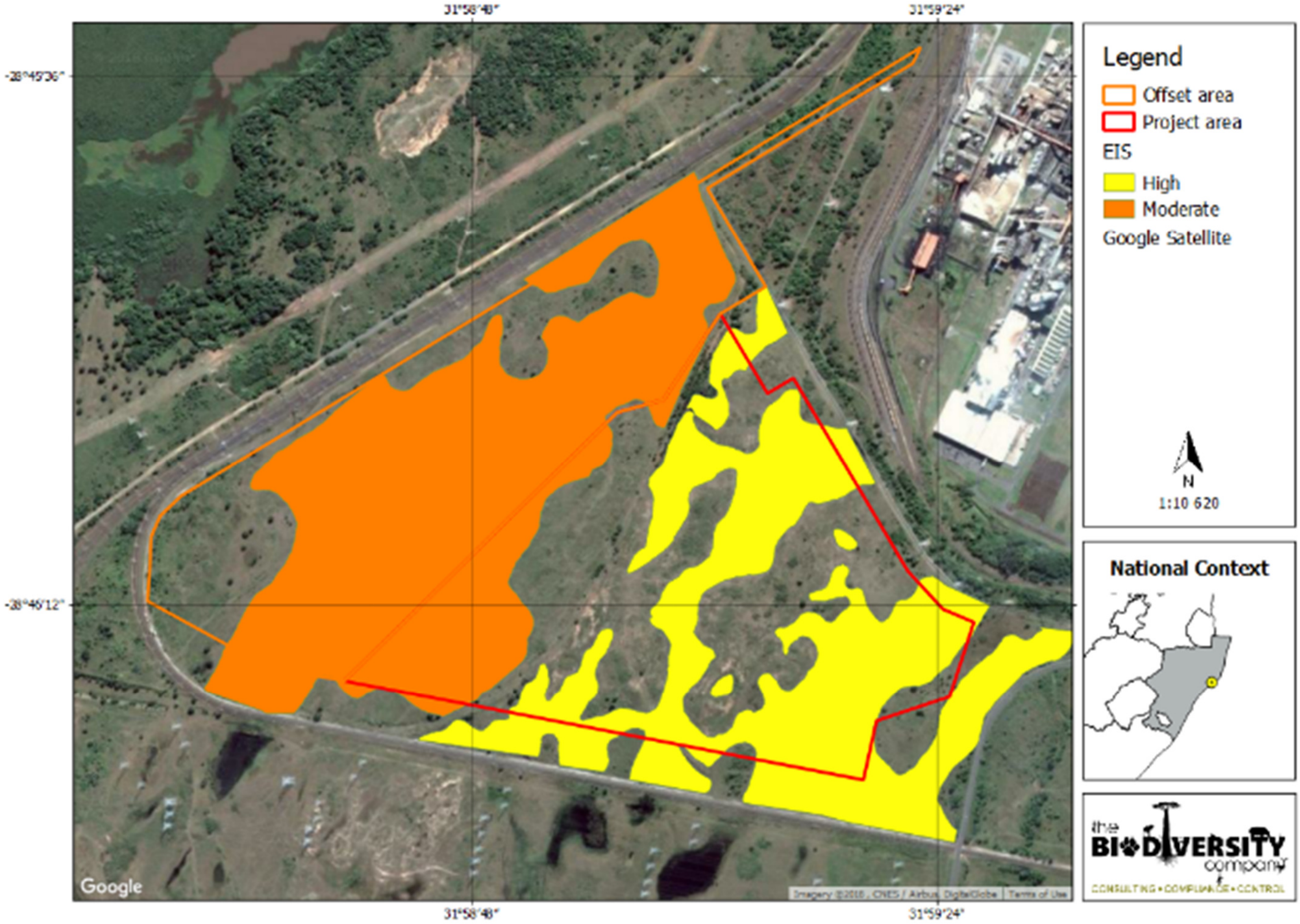

Figure 7.25: The depicted Ecological Importance and Sensitivity of the wetlands

7.3.5 Aquatic Ecology

7.3.5.1 In situ Water Quality

The water quality results of the survey are presented in **Table 7.21**.

Table 7.21: In situ water quality results for the January 2018 survey

Constituent	P1	P2	P3	R1	R2	Water Quality Guideline
pH	6.0	6.6	6.6	6.9	6.8	6.5–9
Temperature (°C)	30	29	31	27	28	5–30
Conductivity (µS/cm)	793	675	346	1330	6980	<700**
DO (mg/l)	2.8	5.1	4.5	3.2	5.8	>5
*Red shading indicates levels not within recommended guidelines (DWAF, 1996) **conductivity value guideline for the freshwater waterbody are based on specialist opinion						

The results of the water quality analysis indicated pH ranges from 6.0 at P1 to 6.9 at R1. Water temperatures ranged from 27°C at R1 to 31°C at P3. The concentrations of dissolved solids ranged from 346 µS/cm at P3 to 6980 µS/cm at R2. The levels dissolved oxygen were found to range from 2.8 mg/l at P1 to 5.8 mg/l at R2.

The pH at the site P1 was determined to be below threshold effect concentrations for sensitive aquatic ecology. The pH of this waterbody is however anticipated to be natural. The lowered pH can be related to the abundance of detritus in the waterbody. The decomposition of the detritus and subsequent formation of carbon dioxide has contributed to a lowered pH value.

Water quality guidelines for freshwater wetland systems have not been defined. Considering this, no interpretations of water quality states can be made. However, comparisons between the waterbodies can provide an indication of the baseline conditions. In comparison to the sites P2 and P3, the levels of conductivity were determined to be elevated at the site P1. Due to the proximity of the sites to each other, this range in the conductivity seen in the freshwater wetland system has been influenced by the historical transitional activities. In addition, differences in the amount of detritus within the physical surrounding landuse have also resulted in some changes to the dissolved solid content of the freshwater wetland systems.

The riverine sampling point R1 was determined to have excessive dissolved solid content (>700 µS/cm). The source of the dissolved solids in the catchment can be attributed to the surrounding/upstream industrial activities. The levels of dissolved solids at the sampling point R2 confirms that the area is within the estuary functional zone with elevated levels of dissolved solids.

The levels of dissolved oxygen were determined to be out of range of the threshold effect levels. The low levels of dissolved oxygen are however anticipated to be natural for the area and a result of the decomposition of detritus in the wetland systems.

The water quality within the freshwater wetland systems is variable. Water quality in the unnamed tributary on the eastern border (R1) of the project area was determined to have excessive dissolved solid content as a result of upstream/adjacent industrial activities. Water quality in the river reach immediately downstream of the project area (R2) was determined to be in line with the estuarine classification.

7.3.5.2 Intermediate Habitat Integrity Assessment

The results for the instream and riparian habitat integrity assessment (IHIA) for the aquatic systems associated with the Eastern Unnamed Tributary (refer to Table 19 in the specialist report contained in **Appendix E**) determined that the riparian and instream habitat integrity was largely modified (class D). Landuse in the catchment of the river system has resulted in the cumulative deterioration of the habitat components considered in the assessment. Notably, channel, flow and bed modification has resulted in large impacts to the considered river reach. Based on the available desktop imagery, the lower reach of the river system is impounded before its confluence with the Nseleni River system. The impoundment covers a linear reach of approximately 3km, which represents 50% of the tributary system and a significant portion of the considered river reach. In addition to impacts to the instream habitat, riparian habitat has been altered through industrial development encroachment and extensive livestock and subsistence agriculture.

7.3.5.3 Aquatic Macroinvertebrates

The results of the biotope assessment indicated homogenous habitat features in the selected freshwater wetland systems. Invertebrate biotopes consisted largely of submerged aquatic macrophytes in the form of *Nymphaea nouchalia*.

Aquatic habitat in the Unnamed Eastern Tributary consisted predominately of vegetated biotope consisting of a variety of marginal plants. The absence of typical habitat in the river reach however has resulted in poor habitat availability. As a result of poor habitat availability, a low diversity of macroinvertebrates can be expected

The results of the macroinvertebrate assessment for the freshwater wetland systems indicated a variation of diversity from 11 families to 17 families. The taxa observed in the freshwater pan systems were predominantly composed of the order Hemiptera with some contributions to the overall diversity from Odonata. The effective water quality tolerances of the macroinvertebrate assemblage was determined to be high with an Average Score per Taxon (ASPT) ranging between 3.5 and 4.5 at the sites. This result confirms the water quality assessment. The tolerance of the invertebrate community can be attributed to the ecosystem type assessed, water quality in the freshwater wetland systems was recorded as having elevated dissolved solids and low concentrations of dissolved oxygen.

Although the diversity of macroinvertebrate families was low, on a species level it is anticipated that diversity in the freshwater wetland systems would be high given the sub-tropical nature of the region. An effective expression of the species diversity was the adult dragonfly species observed at the site. Eighteen species of dragonfly were observed during the survey

Based on the results of the Dragonfly Biotic Index (DBI), the project area considered was classified as MM which indicates a moderate biotope diversity at the site. Considering the low DBI score obtained at the site, a low diversity of endemic dragonfly species were observed. However, several range restricted dragonfly species are known from this region and therefore further investigation is required.

The results of the assessment completed in the Eastern Unnamed Tributary found poor macroinvertebrate diversity and low sensitivities. These scores are effectively representing the modified aquatic habitat and thereby confirm the poor quality of the environment associated with the Eastern Tributary. The results of the MIRAI indicated that the macroinvertebrate community in the Eastern Unnamed Tributary was in a largely modified state (class D). The modified state was primarily attributed to the flow modification criterion. Flow within the considered river reach has been impacted on via several impoundments and therefore flow sensitive taxa were largely absent from the considered sample.

Overall, the macroinvertebrate assemblages sampled at the sites were effective indicators in each of the ecosystem types considered.

7.3.5.4 Fish Assessment

A single fish species, *Enteromius viviparous,* was sampled during the January 2018 survey. The fish species was restricted to the P1 within a freshwater wetland ecosystem. During the survey, no direct surface flow between the wetland system at P1 or the Eastern Unnamed Tributary was observed or is expected during un-exceptional flow periods.

The low levels of fish species in the freshwater wetland systems corroborates that there is limited connectivity with the adjacent river systems. It is anticipated that only during periods of severe flooding, will connectivity within the wetland areas allow for the movement of fish into the wetland systems. No fish species were sampled in the Eastern Unnamed Tributary despite extensive sampling. The absence of fish species from the Eastern Unnamed Tributary could largely be attributed to sampling effort and method.

An expected fish species list for the project area is provided in Table 24 of the specialist report contained in **Appendix E**. A total of 15 fish species are expected to be in the river reaches associated with the proposed project. However, it is noted that no estuarine fish species were considered in this assessment and therefore there will likely be additional fish species in the downstream river reach.

A single listed fish species, *Oreochromis mossambicus* which is threatened by hybridisation, was expected to occur on the project site. Thus, the proposed project presents no risk to the threatened species.

7.3.5.5 Reach-based Present Ecological State

The results of the PES assessment derived a largely modified ecological category (Class D) for the considered river reach. The modified status of the river reach can be attributed to a combination of flow modification, habitat and water quality related drivers.

7.3.5 Geohydrology

7.3.5.1 Aquifer Characteristics

According to the 1:500 000 scale hydrogeological map series (Vryheid, Map sheet 2730) and from available hydrogeological information, Richards Bay groundwater occurs within the inter-granular primary aquifer in the semi consolidated and unconsolidated materials deposited during the Tertiary and Quaternary periods. According to Golder (2014) the depths of boreholes measured within the Richards Bay area varies from 30 to 45 metres below ground level (mbgl) and the aquifer testing conducted indicated the hydraulic conductivity ranging from 0.5 to 5 m/d.

Mean annual rainfall in the Richards Bay area ranges between 994 and 1500 millimetres per year (mm/year) and the mean annual evaporation ranges from 1410 to 1923 mm/year (Germishuyse, 1999). The effective groundwater recharge is estimated to range from 450 to 750mm/year. Generally, it is expected that the groundwater table mimics the surface topography. According to SRK (2008), the static water level estimated along the servitude route in the vicinity of the site varies from <2mbgl to 4mbgl.

The geohydrological data obtained during the Hydrocensus survey in February 2018 indicated that there are two types of aquifers underlying the site including a shallow primary aquifer and a deep fractured aquifer. The current site groundwater level within the shallow primary aquifer varies from 0.64 to 3.89 mbgl. It is anticipated that a fractured aquifer underlying the site is likely to be located at more than 11 mbgl.

7.3.5.2 Aquifer Testing

The hydraulic conductivity (K) of the groundwater beneath the site was calculated to be 0.235 m/d, 0.221 m/d and 0.312 m/d from three boreholes on the site. It is likely the hydraulic conductivity at any point on the site will generally fall within this range.

The aquifer transmissivity (T) value of 1.97m2/d was determined as a product of an average K value and an estimated thickness saturated shallow portion of the shallow aquifer (7.7m).

7.3.5.3 Groundwater Usage

Germishuyse (1997) indicated that there were no groundwater extractions in the Richards Bay area, since private boreholes were prohibited by the uMhlathuze Municipality by-laws. The uMhlathuze Local Municipality Water Services By-laws 2010 allowed the sinking of abstraction boreholes only above the 50m mean sea level contour line. The recorded NGA data reviewed within 5 km radius of the site did not indicate groundwater abstractions.

During the Hydrocensus survey, it was observed that a non-perennial stream which at east of the site is likely to be interacting with the shallow primary aquifer during rainy seasons. This was observed at a borehole located in the close proximity of the stream.

7.3.5.4 Groundwater Flow Direction

From the groundwater level elevation contour map (shown in Appendix C of the Gehydrology Report contained in **Appendix G**), it can be concluded that the groundwater in the study area flows both easterly and westerly with a possible divide in the central area. Generally, groundwater flow mimics topographic levels and groundwater likely flows towards the Nsezi lake to the west and towards the non-perennial streams located to the east of the site.

1.1.2 7.3.5.5 Groundwater Quality

The 1:500 000 scale hydrogeological map (Vryheid, Map sheet 2730) indicates that electrical conductivity (EC) ranges from 0 to 70mS/m. Results from boreholes tested on the site indicate that the chemical constituents from the three boreholes are compliant to SANS 241:2015 guidelines except for Total Coliforms, iron, *E. coli*, Colour, Standard plate count and turbidity.

The results of the groundwater testing reveal that the groundwater is characterised by two hydrochemical facies including calcium-sulphate (Ca-SO4) and sodium-chloride (Na-Cl). Detailed test results are contained within the specialist report included within Appendix H.

7.4 Heritage Resources (including Palaeontology)

Large parts of the study area were previously impacted on by illegal sand mining activities and was waterlogged during the survey (**Figure 7.26**). A contemporary cattle post is (**Figure 7.27**) located on the north-western periphery of the impact area but outside of the study area. Copper theft in the area is marked by the remains of plastic casings scattered across the study site (**Figure 7.28**). A disused railway line occurs in the western portion of the project area outside of the development footprint and is discussed in section 7 of the heritage assessment report in **Appendix H**.

As a result of the sand mining and the development of infrastructure like power lines, water pipelines and railway lines, the property is disturbed or damaged from a heritage point of view and a single undiagnostic potsherd (**Figure 7.29**) was the only cultural find observed during the survey. In terms of the national estate as defined by the NHRA, no sites of significance were found during the survey.

No palaeontological sites were identified to which no further paleontological studies were recommended.

Lastly, no standing structures older than 60 years occur within the study area. No burial sites were recorded. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area. The study area is located in an industrial area away from main tourist routes and the proposed development will not impact negatively on significant viewscapes.

Figure 7.26: Existing site conditions – water logged areas

Figure 7.27: Cattle post.

Figure 7.28: Plastic casings of copper wires.

Figure 7.29: Single, undecorated pot sherd.

7.5 Air Quality

7.5.1 Ambient Air Quality Monitoring Data

The RBCAA operates 12 ambient monitoring stations, measuring meteorological parameters and ambient SO_2, total reduced sulphur, and PM_{10} concentrations (**Figure 7.30**). From the data available, the following can be concluded regarding the ambient air quality conditions in the area:

» The daily PM_{10} concentrations for the data period provided (January 2014 to December 2017) indicate non-compliance with the daily PM_{10} NAAQS at Brackenham and CBD stations during 2015, where daily average concentrations measured exceeded 75 µg/m³ on more than four occasions during the year. The number of exceedances at Esikhawini and Mtunzini remained consistent, and compliant with NAAQS, between years. Annual average PM_{10} concentrations were compliant with the NAAQS at all stations and similarity between years at each station is noted.

» Hourly SO_2 concentrations recorded at seven RBCAA stations complied with the hourly NAAQS for all years in the data set. Scorpio AQMS had the largest number of hourly exceedances of the limit concentration, 5 hours in 2014. The NAAQS allows for 88 hours exceeding the limit concentration per year (350 µg/m³). Although the daily average SO_2 concentrations exceeded the limit concentration at Scorpio for two days during 2014 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 (lower SO_2 concentrations) at all stations.

A recent air quality dispersion modelling study assessing the cumulative impact of operations within the Richards Bay domain quantified emissions from 11 industries within the Richards Bay airshed, based on information provided by the industries and the AELs. Total annual point source emissions for the pollutants of concern are summarised in **Table 7.35**.

Table 7.35: Baseline annual pollutant emission rates in the Richards Bay airshed

Source group	Annual emission rates (tonnes per year)		
	SO_2	NO_X	PM_{10}
Point sources	23 252.97	8.452.15	3 411.15
Area sources	(not reported)		

7.5.2. Sensitive Receptors

Sensitive receptors within the study area were identified where the public is likely to be unwittingly exposed. Identified sensitive receptors included the nearby residential areas, hospitals and schools. The nearest large residential areas to the project site are Bhiliya (6.5 km south); Empangeni (6.6 km west); Richards Bay CBD (6.9 km east); Wild-en-Weide (7.8 km north-east); Arboretum (8.4 km east); Felixton (9.8 km south-west); and Nseleni A (10.5 km north). There are some individual homesteads within 5 km of the proposed location. There are several schools, hospitals and clinics located within 5 km of the proposed location mostly to the north-east (**Figure 7.31**). Industrial areas (Mpangene, Kuleka, ZSM Industrial, Alton, and the Richards Bay Harbour) are located within 5 km of the proposed project.

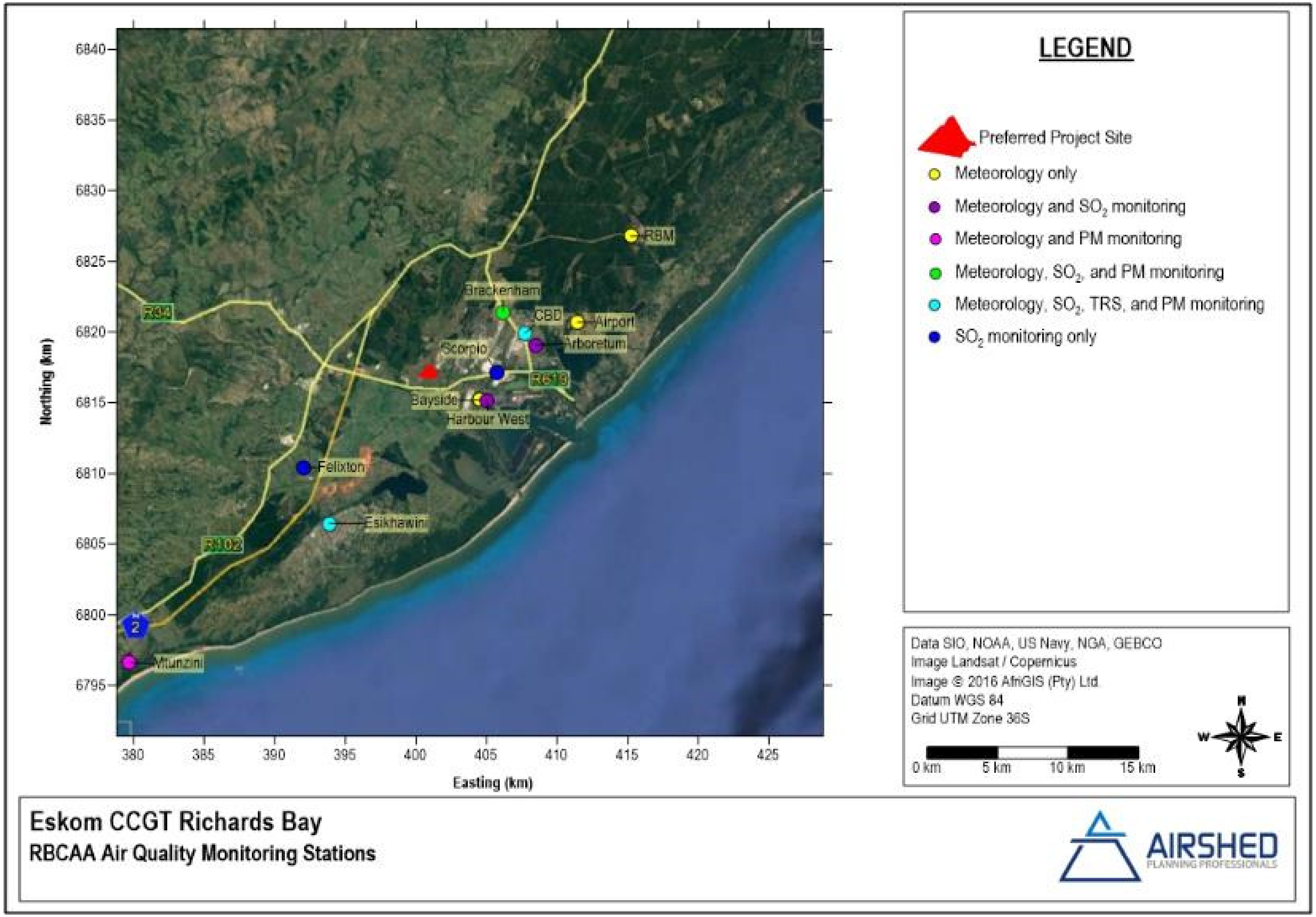

Figure 7.30: RBCAA ambient monitoring network in relation to the proposed project site

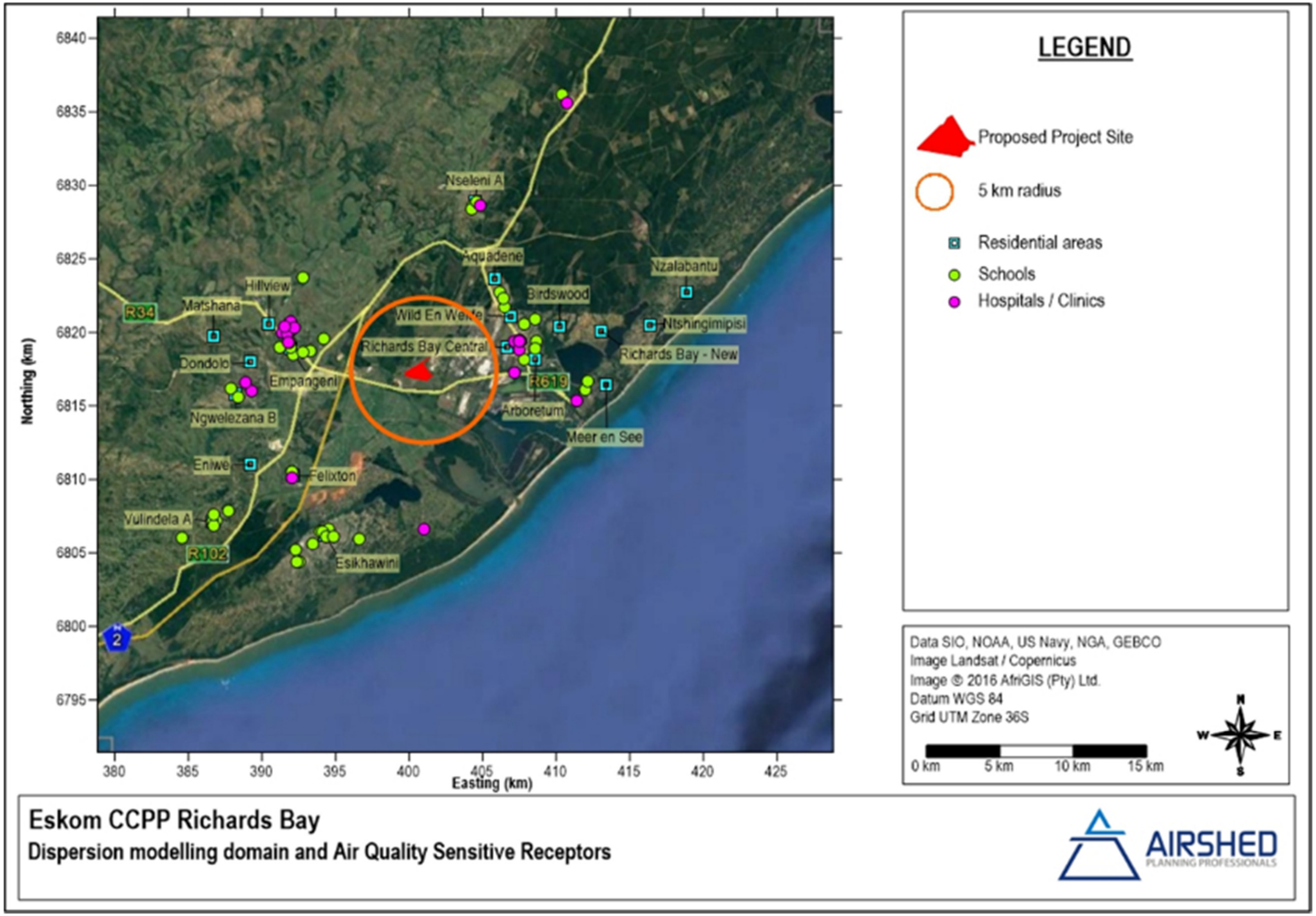

Figure 7.31: Location of the proposed project in relation to the air quality sensitive receptors (AQSRs)

7.6 Visual Environment

The study area is defined by the limit of visibility of the proposed project. As an initial guide, the limit has been set at 27.7km from the proposed stacks being the approximate visual limit of the tallest items associated with the development.

7.6.1 Landscape Character

The proposed project will be located on a wide coastal plain close to Richards Bay. Landform close to the coast to the east and south east of the study area is a high dune cordon that largely blocks views of the sea from inland areas. The coastal plain is generally set at a level of between 5 and 30m amsl, and at its highest, the dune cordon rises to between 50 and 60m amsl.

A large proportion of the coastal plain is comprised of flood plain areas for watercourses that flow through the area. Due to the landform many water courses in the area terminate in closed lagoons. The development of the port of Richards Bay has altered this system to allow the main river within the region, the Mhlatuze, to flow directly into the Indian Ocean. The natural lagoon has been protected however in that the river flows through the lagoon and then through a tidal gate into the port. The Mhlatuze Lagoon forms the basis of the Richards Bay Game Reserve which is an important provincial nature reserve.

The relative flatness of areas around Richards Bay and the visual barriers comprised of the coastal dune cordon and inland hills are significant in assessing visual impacts.

Landcover within the broader region includes urban development, plantations, cultivation and natural areas.

a) Urban Areas

Major urban centres have developed within the coastal plain including Richards Bay, Empangeni and Esikhawini, all of which are in relatively close proximity to the proposed site. Inland of the coastal plain built development has largely developed as smaller more scattered centres. There is little or no urban development within the main coastal dune cordon. The exception to this is Richards Bay where port, residential and recreational areas have developed in close proximity to the coast.

b) Plantation

Forestry plantations extend to the east, the north east and the south west of Richards Bay within the coastal plain. There are also smaller sections of forestry plantation on the coastal dune cordon close to and within areas of natural dune vegetation.

c) Cultivation

There are two types of cultivation evident within the areas identified:

i. Traditional areas. Typically, cultivation in these areas is made up of small-scale agricultural units cultivating vegetables and small areas of sugar cane with groups of houses and kraals located relatively evenly throughout the area.

ii. Large scale intensive sugar cane production generally covers cultivated areas outside traditional areas. Settlement within this area is made up of occasional farmsteads comprised of a main farm house, workers cottages and agricultural buildings.

d) Natural Areas

Natural areas are generally located inland of the coastal plain as well as within a narrow band adjacent to the coast that is generally comprised of the dune cordon and areas surrounding lagoons. In addition, there is also a significant area of natural vegetation cover to the east, south and west of Richards Bay.

e) Industrial Development

Richards Bay is known as an industrial centre. The main industrial areas in the vicinity of the site include:

» Extensive industrial development has occurred to the south of Richards Bay and to the north of the Port. This area is home to numerous large-scale, heavy industrial installations that have largely developed in the area due to their location close to a major port. Whilst there is an extensive area of existing heavy industry, this is likely to expand in the future as currently undeveloped areas have been designated as an Industrial Development Zone.
» The north east area of the port which is largely set up for loading and unloading bulk cargo. This has included the establishment of extensive silos and conveyor systems some of which extend through the adjacent landscape to external industrial operations.
» The south eastern section of the port within which a major coal terminal has been established for export. This area includes extensive coal stockpiles in addition to railway and loading infrastructure.
» A major dune mining operation that is being undertaken to the north of Esikhawini. This operation includes the stripping and processing of dune soils. In addition to disturbance of mined areas, it has resulted in the development of a major slimes dam immediately adjacent and to the south of the N2 on the inland edge of the coastal plain.

Landscape Character Areas (LCAs) (i.e. “single unique areas which are the discrete geographical areas of a particular landscape type[13]”) identified within the study area include:

» **Coastal Plain and Intensive Agriculture LCA** – this area is comprised of cultivated areas indicated as being outside of traditional settlement areas. It is a relatively open landscape however a degree of VAC is provided by small clumps of woody vegetation in the form of occasional natural forest patches and alien species that largely occur along roadsides and property boundaries. The primary importance of this LCA is as a productive landscape. It does have some visual significance however, due to the length of view that is generally possible.
» **Coastal Plain and Traditional Agriculture LCA** - this area is comprised of cultivated areas indicated as being inside of traditional settlement areas. It is a relatively enclosed landscape with a high degree of VAC which is provided by patches of woody vegetation which is mainly made up of alien species that

[13] Landscape Institute and Institute of Environmental Management and Assessment.

largely occur along roadsides and on the boundaries of small scale cultivated areas. This area is important as both a productive landscape and a settlement area.

» **Coastal Plain and Forestry LCA** – this LCA is largely enclosed with very limited views over surrounding LCAs that are generally limited to its outer edge. VAC is therefore high. This area is also important as a productive landscape.
» **Coastal Plain and Open Water LCA** – this LCA is relatively open with long views possible over large water bodies. VAC is therefore generally low although vegetation that fringes the waterbodies is generally dense and relatively natural and it does provide a degree of screening of larger industrial elements. Landscape importance relates to that of a working landscape in terms of the Port, however, all the areas of open water highlighted are also important for tourism and local recreation.
» **Coastal Plain and Urban LCA** – this is generally an inward looking LCA from which views of surrounding areas are only possible from its outer edges. Its primary importance is as a living and working environment. Outlook is therefore important particularly from residential and commercial use areas. Some urban areas particularly those areas in close proximity to the coast also have tourism importance.
» **Coastal Strip and Forestry LCA** – small patches of forestry occur within the coastal strip. This often occurs within areas that have been mined. The coastal strip is particularly important for recreation and tourism. Areas of forest plantation do detract slightly from the natural character that is reinforced by the majority of vegetation within this landform type. However, the fact that it is green and generally undeveloped does help to provide visual continuity along the coastline which is important for coastal recreation and tourism.
» **Coastal Strip and Natural LCA** – this LCA is important for its natural resources as well as providing an attraction and backdrop for coastal recreation and tourism. VAC within the area is relatively high.
» **Upland and Urban LCA** – this LCA consists of the urban area of Empangeni and adjacent settlements. It is located within the low hills inland of the coastal plain and it is generally not visible from lower areas to the south and east. As with other urban areas, external views are generally limited. Its prime importance is as a living and working environment and so outlook is generally important. Due to surrounding rolling hills that are likely to screen the LCA from the proposed site and its inward looking nature, this LCA is unlikely to be significant in the assessment.
» **Upland, Agriculture and Settlement LCA** – this LCA is relevant due to the fact that it consists of the area of rolling hills inland of the coastal plain that generally block views of coastal plain areas from further inland. Where views are possible, they are generally limited to higher hilltops. VAC is therefore generally high. A number of landcover types exist within the LCA including scattered rural settlement, natural areas and intensive sugar cane production.

This landscape analysis is indicated on **Figure 7.32** and was ground truthed during the site visit.

7.6.4 Visual Receptors

Receptors within the landscape which due to use could be sensitive to landscape change include:

» **Area Receptors that include**:
  * Urban areas of Esikhawini which is located approximately 6.5km to the south west of the proposed site. Residential areas particularly may be sensitive to change in view;
  * The Richards Bay Game Reserve is located approximately 4.5km to the south east of the proposed site; and
  * The popular public recreational area on the northern edge of the Port which is located approximately 9km to the east of the proposed site.

» **Linear Receptors** which include the roads that are aligned through the area. The main linear receptors include;
  * The N2 Freeway which runs approximately 3.9km inland and to the west of the proposed site. This road is a key regional route and is important for both tourism and business. In the vicinity of Richards Bay, it runs on elevated ground just inland of the coastal plain and therefore an overview of the coastal plain looking towards the proposed development site is possible.
  * The R34 is the main route into Richards Bay from the south. It links the N2, Empangeni and inland areas to the urban area and the port. This road is duelled over most of its length. It is the main access route that carries a high proportion of business and tourism related traffic. As it crosses flood plain areas it is slightly elevated which does enable views over lower sections of the coastal plain. As it approaches Richards Bay it is located on slightly elevated land that is surrounded by natural vegetation. This vegetation and the landform results in only partial views over the coastal plain being possible. This road traverses close to the proposed site which is located within an area that is planned for industrial development and close to existing major industrial uses.
  * The P106 is the main route between the R34 / Richards Bay and Esikhawini. This road crosses the flood plain of the Mhlatuze River that is largely planted with sugar cane. Whilst it is set at a relatively low level, panoramic views over the flood plain are possible. This road joins the R34 in close proximity to the proposed site. This road is largely a local distributor providing access for local residents and businesses. It is unlikely to carry a large number of tourists although it does provide access to the southern side of the Richards Bay Game Reserve.

» **Point Receptors** that include:
  * Isolated homesteads and small rural settlements most of which are likely to be associated with agricultural uses. There are no isolated homesteads in the vicinity of the proposed site. There are however a number of homesteads located in higher areas inland of the coastal plain.
  * A service station on the N2 overlooking the coastal plain. This facility is used by many local and regional travellers as a rest and refuelling stop. A large proportion of these travellers are likely be travelling for tourism related reasons.

There are a number of activities in the general area surrounding the proposed site that elevate the importance of various areas. These include:

» **Existing Protected Areas** and in particular the Richards Bay Game Reserve that is an important local conservation resource as well as being a local recreation and tourism attraction.

» **Offshore recreation** is important to Richards Bay, particularly deep-sea fishing and whale watching. The two local ski boat clubs undertake numerous competitions during the year and they are an important draw card for international and national participants. Whilst the focus of the activity is game fishing, this experience is no doubt enhanced for many by the perception that it is being undertaken off a reasonably natural coastline.

» **The north eastern edge of the Port** is particularly important for local recreation and tourism. In addition to the area being the home of a number of water-based sports clubs, the back of the port area has generally been laid out as an informal recreation area that attracts large numbers of people particularly during holidays and weekends. The area is also used for formal sporting events such as the Richards Bay / Esikhawini Marathon.

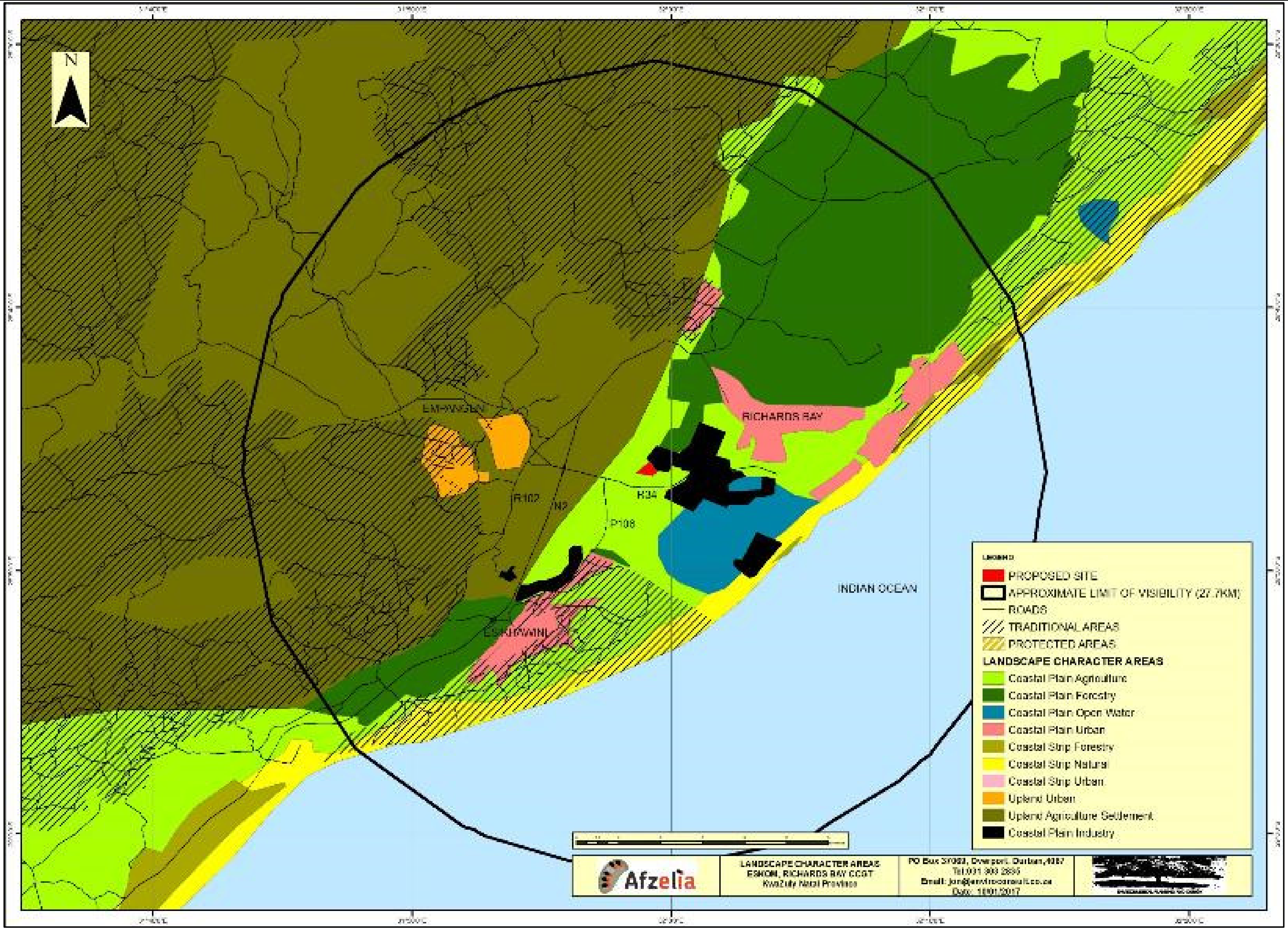

Figure 7.32: Landscape Character Areas Map

7.7 Socio-economic Baseline

The following is a baseline summary of the socio-economic profile of the King Cetshwayo DM within which the project is proposed:

» The project is proposed within the KwaZulu-Natal Province, which is South Africa's third smallest province with an area of over 94 000km². The province houses the second largest population with over 10 million inhabitants, which was nearly 20% of the country's total population in 2012.
» The City of uMhlathuze Municipality has a population of approximately 358 282, with a total of 93 632 households (Stats SA, 2015). The City of uMhlathuze Municipality constitutes over a third of the population, thus having the highest population in the King Cetshwayo District Municipality (DM).
» The average growth rate over the past ten years has been just over 1%. Therefore, the population has been stagnant. A large portion of 58% of the population resides in Tribal areas, followed by 39% located in urban areas, and the remaining 3% resides on Farm land (uMhlathuze LM, 2016). Therefore, the area is dominated by rural dwellings.
» 88% of the population are Black, 7% are White, 4% are Asian/Indian whilst the remaining 1% are Coloured. IsiZulu is the most common language in South Africa, KwaZulu-Natal and City of uMhlathuze Municipality with 23%, 81% and 79%, respectively.
» The City of uMhlathuze Municipality had a reported 60 397 individuals that were HIV-positive in 2015, which equates to 17% of the total LM population.
» The average monthly household income in the City of uMhlathuze Municipality was R8 382 in 2011, with 2% of the households earning no income.
» In the City of uMhlathuze Municipality and the towns of Richards Bay and Empangeni, the adult population with no schooling constitute 7%, 6% and 2%, respectively.
» In 2015, The City of uMhlathuze Municipality's economy was valued at R23 422 million in current prices. The LM contributes 69% to the economy of the King Cetshwayo District Municipality and 5% to the economy of KwaZulu-Natal. Over a period of 10 years (2005-2015), the municipality's economy grew at a positive Compounded Annual Growth Rate (CAGR) of 2% per year. This is similar to the district and provincial growth of 2.4% and 2.9%, respectively.
» The economic sectors with the greatest contribution to the GDP-R of KwaZulu-Natal are Manufacturing and Finance and Business Services. Similarly, manufacturing is the highest contributing economic sector in the City of uMhlathuze Municipality. Electricity, gas and water is the economic sector with the least contribution to the GDP-R of the municipality.
» According to Census 2011 data (Table 7.39), the working age population of the City of uMhlathuze Municipality was about 237 265. Amongst these, 137 187 were economically active. The employed labour in the municipality was estimated at 99 950, whilst the unemployed labour was about 37 237. This results in an unemployment rate of 27%.
» In terms of skill levels, the largest proportion of the labour force is semi-skilled in the KwaZulu-Natal Province, King Cetshwayo DM and the City of uMhlathuze Municipality. This is followed by the low-skilled labour and the least percentage of the labour force is skilled.
» Close to three quarters of the employed individuals in the City of uMhlathuze Municipality were employed in the formal sector and close to a quarter were employed in the informal sector (Table 7.40). In both the King Cetshwayo DM, and the City of uMhlathuze Municipality, the wholesale and retail trade, catering and accommodation economic sector employs the largest number of people, whereas the Electricity, gas and water economic sector has the lowest number of employed people.
» The City of uMhlathuze has a negligible access to water backlog of 2%. Most (89%) of the households in the municipality obtain water from the City of uMhlathuze Municipality.

» 84% of households had access to the basic level of service for sanitation in 2015. A waterborne system is implemented in formalised urban areas and Ventilated Improved Pits (VIPs) are installed in rural areas.
» The City of uMhlathuze Municipality is a licensed electricity provider, however in rural areas, electricity is still supplied by Eskom. The City of uMhlathuze Municipality does not have electricity backlogs in its area of supply, while a few backlogs exist in the areas within the municipality that are directly serviced by Eskom.
» Most of the households use electricity for lighting, cooking and heating. The minority use wood and gas amongst other alternative energy sources for lighting, cooking and heating.
» The municipal housing backlog is estimated at 10 000 urban greenfield low-income housing, 50 000 social and community residential units, and over 6 000 rural housing, including slum clearance. About 5 100 informal dwellings were identified in 2011. The key challenge in the City of uMhlathuze Municipality is the shortage of suitably located land for housing development. Nonetheless, the establishment of rental housing units in Richards Bay and Empangeni has been prioritised.
» According to the City of uMhlathuze IDP (2016), the average condition of the road infrastructure can be rated as fair to poor. A number of the public transport facilities in uMhlathuze form part of retail commercial developments located on either leased land from the Municipality or private land, which constrains expansion options of the facilities.
» With regard to accessibility and connection across areas, the N2 is the national route that connects several areas such as Cape Town to Richards Bay. The proposed development site can be accessed from the R34 and thereafter accessibility can be through access streets.

7.8 Traffic Baseline

The site is approximately the shape of a triangle, where two sides are bounded by a railway line, and the third side by the Western Arterial. The site will take access from the Western Arterial. The Western Arterial is a Class 3 two lane road providing access to Alton Industrial Area with some large industrial sites (like the Mondi Factory) in the vicinity of the site.
The site is ideally located next to existing industrial sites along the Western Arterial, and is approximately 900m from the John Ross Highway. There are no communities in the area and it is centrally located between the N2, the CBD and the suburbs of Richards Bay.

The proposed site access on Western Arterial affords the site good access to the metropolitan road network.

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 Richards Bay (RB) CCPP project. This assessment has considered the construction of a CCPP facility with an installed capacity of up to 3 000MW, within a development footprint of approximately 71ha located on Portion 2 and Portion 4 of Erf 11376 within the Richards Bay Industrial Development Zone (IDZ) Phase 1D.

The main infrastructure associated with the facility includes the following:

» Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
» HRSG to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
» Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
» Bypass stacks associated with each gas turbine.
» Dirty Water Retention Dams and Clean Water Dams
» Storm water channels.
» Waste (general and hazardous) storage facilities.
» Exhaust stacks for the discharge of combustion gases into the atmosphere.
» A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
» Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (potable water is to be supplied by the Local Municipality).
» Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
» Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
» A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process
» Diesel off-loading facility and storage tanks.
» Ancillary infrastructure including access roads, warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
» A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process.

The full extent of the project site was considered through the EIA phase by independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desk-top evaluations and field surveys. A development footprint for the RB CCPP facility within the project site was proposed by Eskom (refer to **Figures 8.1** below) for consideration in the EIA.

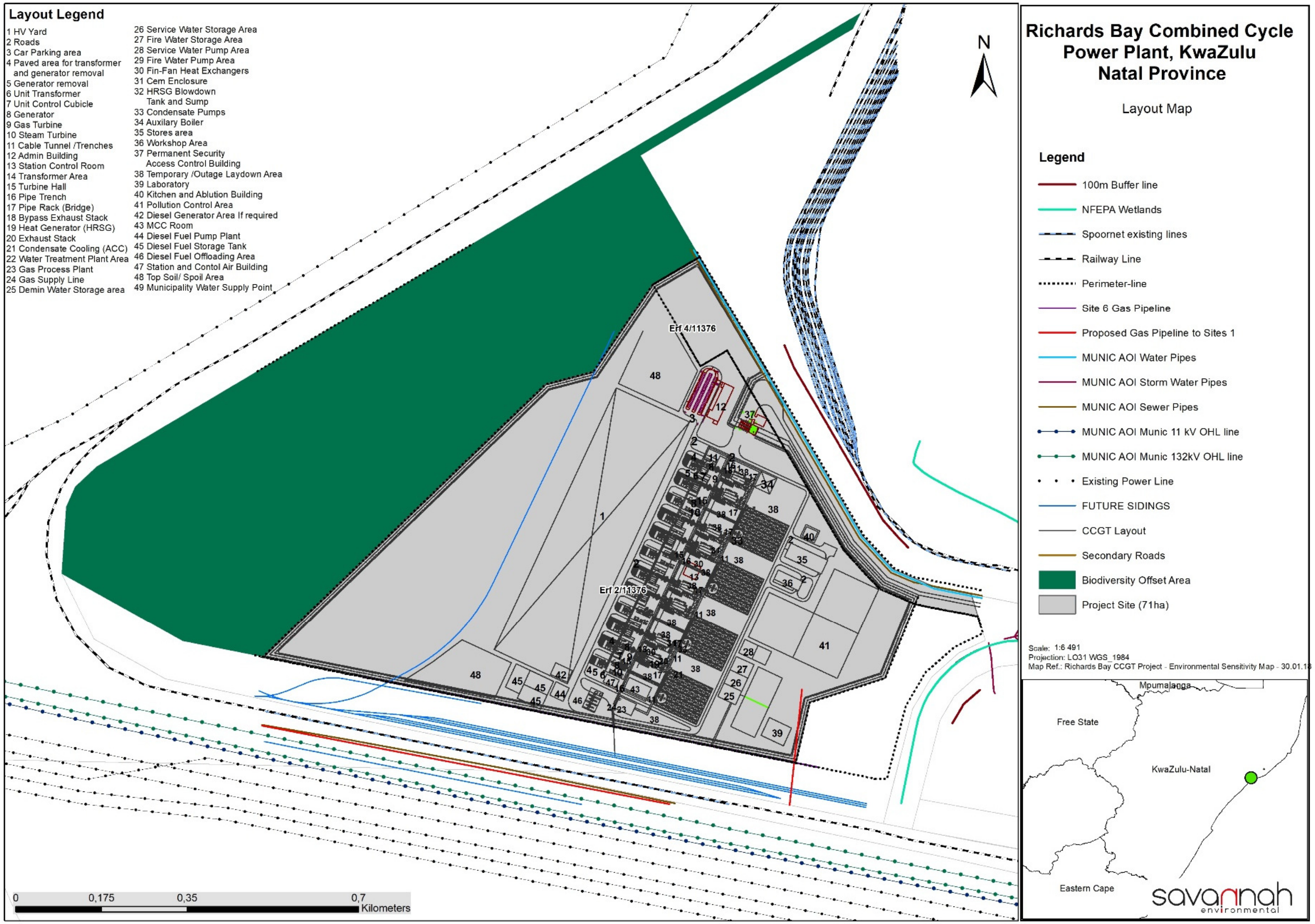

Figure 8.1: Map illustrating the Facility Layout of the RB CCPP

The development of the RB CCPP 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, lights, sanitation facilities, construction of waste storage areas, and site rehabilitation / landscaping where required. The construction phase for the RB CCPP is estimated at 36-48 months.
» *Operation* – will include the testing of each combined-cycle turbine and subsequent operation of the RB CCPP facility, including the generation of electricity, which will be fed into the national grid via the facility on-site substation and an overhead power line. The operation phase of RB CCPP is expected to be approximately 25 years (with maintenance). The transportation of materials to site will also take place (i.e. diesel etc.).
» *Decommissioning* – depending on the economic viability of the RB CCPP facility, the length of the operation phase may be extended beyond a 25 year period. At the end of the project's life, It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA process would comprise the disassembly, removal and disposal of the infrastructure. Decommissioning activities may involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of waste from the site and rehabilitation to the desired end-use, although alternative decommissioning strategy may be adopted at the time.

Environmental issues associated with construction and decommissioning activities may include, among others, threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna, soil erosion, loss of agricultural land, and nuisance from the movement of vehicles transporting equipment and materials during construction and decommissioning. Both positive and negative socio-economic impacts can be expected.

Environmental impacts associated with the operation phase include mismanagement of the facility which may result in increased air emissions, geohydrological impacts, and an increase in alien invasive species. Other impacts associated with the operation phase include risk to human health and safety, visual impacts, and night time lighting impacts. Both positive and negative socio-economic impacts can be expected.

8.1 Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of RB CCPP relate to the direct loss of vegetation and species of special concern, disturbance of animals and loss of habitat (including wetland habitat), and impacts on soils. In order to assess the impacts associated with the RB CCPP, it is necessary to understand the extent of the affected area.

The project footprint being assessed for the RB CCPP will require the full extent of the site (approximately 71ha). Approximately 5-10ha will be required for laydown areas. Of this, 8-9ha/80% of the total area allocated for laydown areas will be temporary and progressively used for construction. Of the remaining 1-2 ha/20% of the total area allocated for laydown areas, this will be landscaped following construction.

8.2 Potential Impacts on Ecology (Fauna, Flora and Avifauna)

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).

8.2.1 Results of the Ecological Impact Assessment

From a vegetation perspective, the project site is not regarded as being particularly sensitive. Reasons for this include the following:

- Extensive developments on surrounding areas have effectively isolated this site from similar plant communities. As a result, plant populations were subdivided and reduced, thereby increasing their probability of extinction (Collinge *et al*., 1996).
- Large areas on the project site showed population increases in *Helichrysum kraussii* and *Dichrostachys cinerea* plants, which are alien/invasive plants?, an indication of past disturbance.
- Deforestation of large woodland tree species particularly within the *Helichrysum kraussii – Parinari capensis*, and to a lesser extent in the *Imperata cylindrica – Syzygium cordatum* vegetation communities.
- In terms of land use planning, the project site falls within a zone intended for the development of High Impact Industry and is not recognised as an area earmarked for conservation.
- The project site falls within the Industrial Development Zone (IDZ) of Richards Bay where future developments are planned. Full restoration of the original environment and biota will thus not be feasible in the long term.
- A number of provincially protected and flora endemic species are present on the project site. However, these species are not restricted to the project site. Threatened plant species that could potentially be present include species such as geophytes and herbs that can be easily translocated.

The wetland areas within the site however, provide habitat to threatened fauna species and should be regarded as of **High Sensitivity** from an ecological perspective (**Figure 8.2**). The loss of wetland areas is unavoidable due to the proposed project requirements. No mitigation is possible for the loss of wetlands since it results in significant residual impacts, and a wetland offset plan was determined as a requirement (refer to **Appendix E**).

8.2.2 Description of Ecological Impacts

Potential impacts on the ecology of the project site due to the RB CCPP would stem from a variety of activities and risk factors associated with the construction and operation phases of the project.

<u>Construction Phase Impacts</u>

- » Establishment of access roads;
- » Vegetation clearance and stripping of topsoil;
- » Excavations for foundations;
- » Concrete works;
- » Mechanical and electrical works

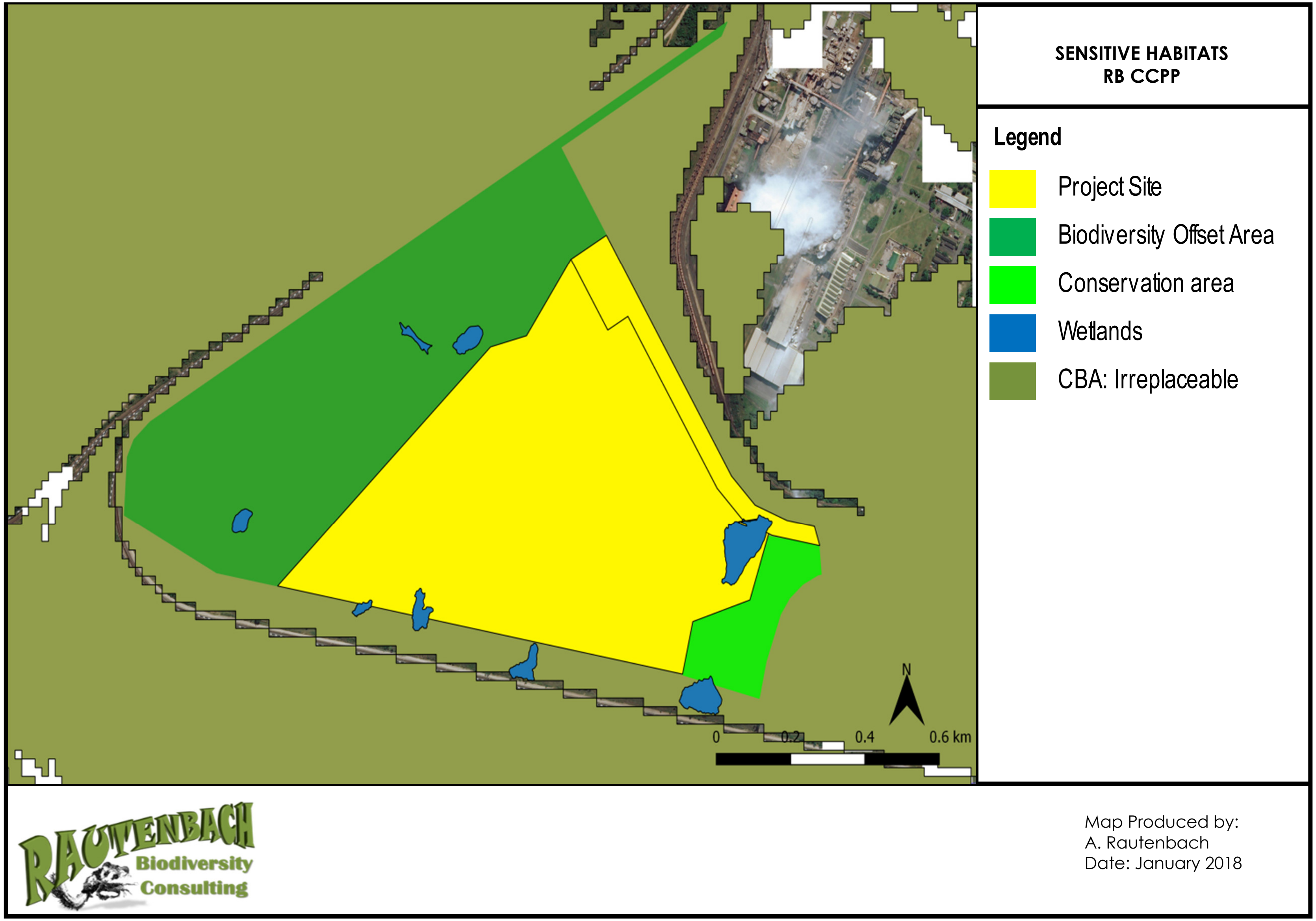

Figure 8.1: Map illustrating Habitat Sensitivity for the project site. Only wetlands are considered highly sensitive. Biodiversity Offset, Conservation & CBA: Irreplaceable areas are no-go areas.

Operation Phase impacts

» Ecological impacts associated with the operation phase of the proposed development are likely to be associated mainly with the operations and maintenance of the power plant and associated infrastructure (i.e. personnel and vehicle site access, handling of hazardous chemical substances, operations and maintenance of the facility and waste generation).

During both the construction and operation phases human presence and uncontrolled access may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purposes.

8.2.3 *Impact tables summarising the significance of impacts on ecology during construction and operation (with and without mitigation)*

Construction Phase Impacts

Nature: *Loss of sensitive terrestrial ecosystems* The project site falls within the Critically Endangered Kwambonambi Hygrophilous Grassland ecosystem. Of particular concern for biodiversity conservation in this region has been the ongoing attrition of this ecosystem to the extent that conservation targets can no longer be met. Consequently, all remaining grassland within this ecosystem is ideally required for conservation but a number of these areas are in high demand for development. In an effort to resolve this conflict, a memorandum of understanding was reached between eKZNW and the uMhlathuze Municipality for the conservation of remaining areas, and the new 'uMhlathuze Land Use Scheme' was adopted by the uMhlathuze Council. With this scheme, the project site falls in the High Impact Industry zone, an area earmarked for the development of large industries and therefore loss of vegetation within this site is considered acceptable. However, areas important for conservation as identified by the 'uMhlathuze Land Use Scheme' are present to the north and south of the project site and should be regarded as no-go areas.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Definite (5)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**(Medium) 52**	**(Low) 21**
Status (positive or negative)	Negative	Negative
Reversibility	No	Reversible
Irreplaceable loss of resources?	Probably	Probably
Can impacts be mitigated?	Should the proposed mitigation measures be correctly implemented, the impacts on conservation areas can be reduced.	
Mitigation: » The biodiversity offset area, conservation area and CBA: Irreplaceable areas surrounding the project site (Figure 25 within the specialist report contained in **Appendix D**) must be considered as no-go areas. » The presence and location of all no-go areas must be clearly communicated to all employees and visitors to the project site. » No vegetation clearance, construction camps, access roads, firewood collecting, hunting, disturbance of fauna must be allowed in the no-go areas. » No stockpiling of topsoil on the no-go areas to be allowed. » No open fires to be allowed on the construction site, or any of the no-go areas.		
Residual Impacts: Expected to be low if mitigation measures are appropriately implemented.		

Nature: *Loss of CBAs*

Provincial level conservation assessments (KZNEBPA 2012) identify the project site as falling mostly within an area classified as 'Biodiversity areas', with areas to the southwest designated as CBA 3 areas. District level conservation assessments (KZNBSP 2014) identify the project site as falling within a CBA: Irreplaceable area, where limited or no loss of biodiversity is advocated.

However, extensive developments on areas surrounding the project site have effectively isolated this site from similar plant communities, and the vegetation on site was found to be significantly transformed by past disturbance. Although remnants of the original vegetation still remain, large areas on the project site are dominated by the woody dwarf shrub *Helichrysum kraussii*, interspersed with several *Dichrostachys cinerea* thickets. Therefore, the area is not considered to be particularly sensitive.

The surrounding CBA: Irreplaceable areas should however be regarded as Highly Sensitive and should be considered no-go areas.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**(Medium) 30**	**(Low) 21**
Status (positive or negative)	Negative	Negative
Reversibility	No	Reversible
Irreplaceable loss of resources?	Probably	Probably
Can impacts be mitigated?	Should the proposed mitigation measures be correctly implemented, the impacts can be reduced.	

Mitigation:

» CBA areas outside of the development footprint must be avoided and considered as no-go areas.
» The presence and location of no-go areas must be clearly communicated to all employees and visitors to the project site.
» No vegetation clearance, construction camps, access roads, firewood collecting, hunting, disturbance of fauna must be allowed in the no-go areas.
» No stockpiling of topsoil on the no-go areas to be allowed.
» No open fires to be allowed on the construction site, or any of the no-go areas.

Residual Impacts:

Expected to be low if mitigation measures are appropriately implemented.

Nature: *Loss of sensitive aquatic ecosystems*

Wet areas on the project site are regarded as Highly Sensitive. The biodiversity offset area located to the north of the project site does not offer suitable habitat to wetland dependent fauna species and is therefore regarded as unsuitable. Candidate biodiversity offset sites with similar habitat structure and ecological functioning are currently being investigated to fully compensate for the loss of wetland habitat on the project site (see **Appendix E** for the wetland offset plan complied for this project).

Wet areas are present on the Biodiversity offset area and the conservation area. Construction activities will result in the disturbance of the existing soils, potentially causing soil erosion and sedimentation of these wetlands. Soil erosion and sediment control measures should therefore be implemented to prevent sediment from being washed from excavated areas.

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (1)

Duration	Definite (5)	Definite (5)
Magnitude	Very High (10)	Moderate (6)
Probability	Definite (5)	Highly Probable (4)
Significance	**(High) 90**	**(Medium) 48**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	To a degree
Irreplaceable loss of resources?	Highly likely	Likely
Can impacts be mitigated?	Yes	

Mitigation:

» Finalisation of candidate biodiversity offset sites prior to vegetation clearance and construction.
» The biodiversity offset area to the north and conservation area to the south of the project site should be regarded as no-go areas.
» No vehicles must be allowed in the no-go areas.
» No equipment or vehicles may be washed on or close to the no-go areas.
» No dumping of waste may be allowed within the no-go areas.
» Refuelling of vehicles and machinery to take place in demarcated areas outside of the no-go areas.
» The construction of access roads must be limited, and be located away from no-go areas where possible.
» The presence and location of these areas, as well as their importance must be clearly communicated to all employees and visitors to the project site during inductions.
» Construction activities should take place during the dry season to reduce erosion of exposed surfaces and sedimentation of adjacent wetland areas, if possible.
» Vegetation should be cleared in a progressive and phased manner to minimise exposed soil surfaces.
» Soil erosion and sedimentation control measures (i.e. silt fences, hay bales) should be implemented and maintained in good condition and left in place for the duration of the construction phase.
» Development of a stormwater management plan for the project site is required. This plan must include clear methods for separating dirty and clean water. Only clean water may be diverted back to wetland systems, provided that it flows across a vegetated strip or other means designed for the reduction of sediments and decreased velocity of water entering the system.

Residual Impacts:

Expected to be moderate if mitigation measures are properly implemented.

Nature: <u>*Loss of natural vegetation*</u>

Most of the project site falls within the 'Endangered' Maputaland Wooded Grassland regional vegetation type, with a few small areas falling within the 'Vulnerable' Subtropical Freshwater vegetation type (Figure 11).

Areas within the Maputaland Wooded Grassland main vegetation type are regarded as being of a low sensitivity. Reasons for this rating include the following:

» Extensive developments on surrounding areas have effectively isolated this site from similar plant communities. As a result, plant populations were subdivided and reduced, thereby increasing their probability of extinction (Collinge et al., 1996).
» Large areas on the project site showed population increases in *Helichrysum kraussii* and *Dichrostachys cinerea* plants, which are alien/invasive plants?, an indication of past disturbance.
» Deforestation of large woodland tree species particularly within the Helichrysum kraussii – Parinari capensis, and to a lesser extent in the *Imperata cylindrica* – Syzygium *cordatum* vegetation communities;
» In terms of land use planning the project site falls within the Industrial Development Zone of Richards Bay where future developments are planned, full restoration of the original environment and biota will thus not be feasible.
» The project site falls within a zone intended for the development of High Impact Industry and not recognised as an area earmarked for conservation.

» A number of provincially protected and endemic species are present on the project site. However, these species are not restricted to the project site. Threatened plant species that could potentially be present, include species that can be easily translocated.

»

During the construction phase of the project, large areas will be cleared from all vegetation to accommodate infrastructure. The loss of natural vegetation is irreversible and permanent. However, most of the area falls within an area regarded as of low sensitivity and the impact is not expected to be highly significant. Although several protected plant species are present, these species are not restricted to the project site. It should be noted that a few threatened plant species could potentially be present that may have been overlooked during the field survey. Nontheless, threatened plant species that could potentially be present include species such as geophytes and herbs that can be easily translocated.

Where protected/threatened plant species fall within the development footprint and avoidance is not posssible, then it may be possible to translocate the affected individual plant specimen outside of the development footprint. Not all species are suitable for translocation as only some species are able to survive this disturbance. Suitable candidates for translocation include mostly geophytes and succulents. It should be noted that the majority of woody species do not survive translocations well, therefore the translocation of tree species is not advised. However, permits from eKZNw and DAFF will be required before the destruction/removal/translocation of SCC species. A list of georeferenced localities of protected tree species on the project site is provided in Appendix 6 of the Ecology Report in **Appendix D**.

Relative intact examples of the Subtropical Freshwater Wetland vegetation type are present within the wetland areas. Approximately 28% of plant species identified within this vegetation community is regarded as important floristic elements of the Subtropical Freshwater Wetlands by Mucina & Rutherford (2006). Futhermore, these areas also provide habitat to wetland dependant SCC fauna species. Destruction of their habitat will ultimately result in further population declines. Candidate biodiversity offset areas with similar habitat structure and ecological functioning are currently being investigated to fully compensate for the loss of wetland habitat on the project site (see **Appendix E** for the wetland offset plan complied for this project).

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Definite (5)	Definite (5)
Magnitude	High (8)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**(High) 64**	**(Medium) 33**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	To a degree
Irreplaceable loss of resources?	Highly likely	Likely
Can impacts be mitigated?	Should the proposed mitigation measures be implemented the impacts can be significantly reduced.	

Mitigation:

» Finalisation of candidate biodiversity offset areas prior to vegetation clearance and construction.
» Prior to vegetation clearance, the development footprint and the 200 m of adjoining areas must be scanned for the presence of protected and threatened flora species, by a suitably qualified Botanist/Ecologist.
» This scan should be conducted at a favourable time of the year when the probability of recognising SCC flora species is high.
» A search and rescue operation must be undertaken to translocate protected species within the development footprint. Affected plant specimens should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. All plants requiring translocations must be translocated by following the plant rescue and translocation guidelines outlined in Appendix 7 of the Ecology Report in **Appendix D**.
» Where translocations are not possible, the necessary permits for the removal or destruction of protected species must be obtained from eKZNw or DAFF, before vegetation clearance starts.

» Any protected plants close to the site that will remain in place must be clearly marked and may not be defaced, disturbed, destroyed or removed. They must be cordoned off with construction tape or similar barriers and marked as no-go areas;
» During construction, the EO must monitor vegetation clearing at the site. Any deviations from the approved plans which will result in the removal of vegetation from additional areas should first be checked for protected species by the EO. Any protected species present which are able to survive translocation should be translocated to a safe site.
» The EO or specialist must translocate any listed species observed within the development footprint that were missed during the pre-construction vegetation walk-through.
» No plant species are permitted to be collected or removed by the contractor outside of the demarcated development area either. The EO should carefully monitor construction activities in sensitive habitats such as near wetlands to ensure that impacts to these areas are minimised.
» The timing between clearing of an area and subsequent development is to be minimised.
» No harvesting of plants for firewood, medicinal or any other purposes are to be permitted.
» The removal of vegetation will result in the disturbance of soil surfaces. The exposed soil surfaces will potentially be open to invasion by alien plant species. A detailed alien invasive species management plan will have to be implemented and maintained during the construction and operational phases. Guidelines are provided in Appendix 8 of the Ecology Report in **Appendix D** and in the EMPr **Appendix O**.

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

Nature: Loss/disturbance of local fauna populations

Based on the results of the field survey it is evident that the project site provides habitat to a number of fauna species. Although it is assumed that the majority of fauna species will move to different areas as a result of disturbance, many SCC fauna species have very specific habitat requirements (i.e. frogs), and the complete destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their complete demise. Of concern is the presence of wetland dependent SCC species such as the frog species *Hemisus guttatus, Hyperolius microps* and the shrew species *Crocidura mariquensis*.

For frogs, wetlands serve as breeding sites, as a habitat for larval development and as a primary food source for adults. Due to their amphibious lifestyles, frogs are very sensitive to changes in the water and surrounding land. Frogs are particularly sensitive to chemical contaminants owing to their permeable skin and eggs. Thus, wetland destruction or disturbance will have significant negative effects on these sensitive species. Similarly, *C. mariquensis* is a wetland specialist, occurring only in moist, swampy habitats (Skinner & Chimimba, 2005). This species is dependent on the medium to tall grass cover surrounding wetland ecosystems. The complete destruction of wetlands will have a devastating effect on these habitat specialists and the impact is therefore considered very high. This will also include the demise of the abundant local frog population currently present on the project site. Candidate biodiversity offset sites with similar habitat structure and ecological functioning are currently being investigated to fully compensate for the loss of wetland habitat on the project site.

The smaller non-volant mammal species such as rodents and mongooses are tolerant to disturbance and would simply move away to more suitable habitats during the construction phase, if provided the opportunity. Consequently, the construction phase impacts on these species are expected to be low. Volant mammal species such as *Scotoecus albofuscus* and *Nycteris hispida* may be affected by the loss of roosting and foraging areas.

However, slower moving species such as reptiles and the more terrestrial frog species would either seek shelter or not be able to move away from construction machinery and would be killed by vehicles and earth-moving machinery. These slower moving species would also be vulnerable to poaching for food, trade or fatality.

	Without mitigation	**With mitigation**
Extent	Local (4)	Local (2)
Duration	Permanent (5)	Permanent (5)

Magnitude	Very High (10)	Moderate (6)
Probability	Definite (5)	Probable (3)
Significance	**(High) 95**	**(Medium) 39**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Reversible to a degree
Irreplaceable loss of resources?	Likely	Unlikely
Can impacts be mitigated?	Although this impact can be mitigated to a degree, all developments have a negative impact on biodiversity. However, with appropriate mitigation measures these impacts can be reduced.	

Mitigation:

- » Finalisation of candidate biodiversity offset areas prior to vegetation clearance and construction.
- » Vegetation clearance should, ideally, start during the non-breeding season of fauna populations (i.e. winter).
- » Where possible work should be restricted to one area at a time. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- » During vegetation clearance, methods should be employed to minimise potential harm to fauna species. Clearing has to take place in a phased and slow manner, commencing from the interior of the project area progressing outwards towards the boundary to maximise potential for mobile species to move to adjacent areas.
- » Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.
- » Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by an Ecologist/Zoologist or a suitably qualified ECO/EO trained in the handling and relocation of animals.
- » Areas beyond the development footprint should be expressly off limits to construction personnel and construction vehicles and this should be communicated to them.
- » It is recommended that, while trenches are open during the construction phase, an appropriately sloping section of the side-wall is made available for the escape of any trapped animals.
- » All stormwater structures should be designed so as to block amphibian and reptile access to the road surface.
- » All contractors and subcontractor personnel working on the project must participate in an environmental awareness program. The program must include appropriate wildlife avoidance methodologies, such as impact minimisation procedures and methods for protecting nesting birds. Information about the importance and purpose of protecting wildlife must be described in the program.
- » No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted in the project site or surrounding areas.

Mitigation measures for mammals and herpetofauna

- » Prior to construction and vegetation clearance a suitably qualified Zoologist should closely examine the project site for the presence of any animal burrows, rock crevices, under logs/stumps and in trees, and relocate any affected non-Red Listed/Protected animals to appropriate habitat away from the project site.

Mitigation measures for birds

- » No more than two weeks in advance of vegetation clearance that will commence during the breeding season (1 September – 1 March) a qualified Zoologist must conduct a pre-construction survey of all potential special-status bird nesting habitat in the vicinity of the project site, and on the project site. If pre-construction surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required.
- » If active nests are found, avoidance procedures must be implemented on a case-by-case basis. Avoidance procedures may include the implementation of buffer zones and relocation of birds or seasonal avoidance. If buffers are created, a no disturbance zone must be created around active nests during the breeding season by a suitably qualified Zoologist.

Mitigation measures for bats

- » Mitigation measures to offset the loss of roosts are detailed below:

Trees:

» Prior to vegetation clearance and construction, all trees will be subject to assessment by means of walk-through surveys for the location of potential bat roosts. This must be done by a bat specialist and/or the Bat Interest Group of KwaZulu-Natal (hereafter referred to as BIG). » Immediately prior to felling, trees should be examined for the presence of bats or bat activity. This survey could be carried out by a suitable bat specialist or member/s of the BIG. Where bats are still present within an identified roost, it will be necessary to undertake exclusion procedures. The bat specialist/BIG member will advise on the steps necessary for exclusion and the likely time period. If a tree containing a confirmed bat roost must be felled outside the optimum time period, a bat specialist must remove any bats to safety. *Tree felling procedures:* » In order to ensure the optimum warning for bats in any unconfirmed bat roosts that may be present, the trees should be pushed lightly two or three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. The tree should then be pushed to the ground slowly and should be left intact on the ground for at least 24 hours to allow any bats within the tree to escape.
Residual Impacts: Expected to be moderate if mitigation measures are properly implemented.

Nature: Noise and artificial light disturbance

Fauna generally respond to disturbances caused by human activities according to the magnitude, timing, and duration of the particular disturbance. Human activities can affect an animal's ability to feed, rest, and breed if it is unable to habituate to the disturbance caused. Disturbance created by general visual and noise pollution associated with workers and construction activities can therefore affect wildlife utilising nearby habitats.

Noise from human activities (in particular from infrastructure and construction sites) has a strong impact on the physiology and behavior of birds. This impact concerns the masking of signals used (1) for communication and mating and (2) for hunting. As a result of this masking, there is a decrease in bird density with an increase in noise level. Furthermore, if alternative silent habitats do not exist, the noise impact could negatively affect wild bird conservation (Bottalico et al., 2015).

Unfortunately it is very difficult to mitigate this impact. This impact is, however, likely to be short-lived during the construction phase and will probably mainly affect local bird species that can easily migrate to other areas.

The ecological effects of artificial light have been well documented. Light pollution has been shown to affect both flora and fauna. For instance, prolonged exposure to artificial light prevents many trees from adjusting to seasonal variations. This, in turn, has implications for the wildlife that depend on trees for their natural habitat. Research on insects, turtles, birds, fish, reptiles, and other wildlife species shows that light pollution can alter behaviors, foraging areas, and breeding cycles, and not just in urban centers but in rural areas as well.

For example, bright electric lights can disrupt the behavior of birds especially during inclement weather with low cloud cover, they routinely are confused during passage by brightly lit buildings, communication towers, and other structures, increasing the risk of collission with these man-made structures. Frogs have been found to inhibit their mating calls when they are exposed to excessive light at night, reducing their reproductive capacity. The feeding behavior of bats also is altered by artificial light (Chepesiuk, 2009).

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short (2)	Short ()2
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**(Medium) 40**	**(Low) 21**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible

Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	To a degree but very difficult to mitigate.	

Mitigation:

» Outside lighting should be designed to minimise impacts on fauna.
» All outside lighting should be directed into the proposed development area as opposed to away from the development, and also not in the direction of sensitive areas, including sensitive areas on neighbouring properties.
» Fluorescent and mercury vapour lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.
» In order to reduce low intensity noise levels, work areas need to be effectively screened to reduce or deflect noise. Engineering controls such as modifications to equipment or work areas to make it quieter, the acquisition of equipment designed to emit low noise and vibration, creation of noise barriers, proper maintenance of tools and equipment must be considered.
» Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment.

Residual Impacts:

Expected to be low if mitigation measures are properly implemented.

Nature: *Soil erosion and sedimentation*

Construction activities will temporarily denude the vegetation on the site and expose the soils to the erosive elements. This could be exacerbated by water flowing down trenches and access roads, as well as from trench de-watering activities. Soil erosion can result in the loss of valuable topsoil and formation of erosion gullies. This can cause localised habitat loss / alteration due to increased sediment deposition or erosion of areas. Rapid and effective rehabilitation of these areas will be important in reducing erosion risk.

Although impacts would be localised, erosion is likely to persist or worsen over time if not addressed. If managed properly, the probability and extent of this impact can be reduced quite significantly.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(Medium) 40**	**(Low) 14**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Can be effectively mitigated and managed onsite through the appropriate control measures.	

Mitigation:

» Adequate characterisation of the natural soil catena through detailed mapping, soil classification and profile descriptions are necessary to provide background data required for restoration of ecological gradients and surface drainage characteristics.
» Program construction activities so that the area of exposed soil is minimised during times of the year when the potential for erosion is high, for example during summer when intense rainstorms are common.
» Site-specific plans for site erosion and sediment control should be developed and implemented. This should include a determination of site erosion potential and the identification of water bodies at risk.
» Site drainage such as those generated by the dewatering of excavated trenches must be diverted away from cleared, graded or excavated areas.
» Sediment barriers or sediment traps such as silt fences, sandbags, and hay bales for example must be established to curb erosion and sedimentation where necessary.

» Sediment barriers should be regularly maintained and cleaned to ensure effective drainage.
» These temporary barriers may only be removed once construction has been completed and there is no further risk of sedimentation.
» Topsoil, leaf and plant litter as well as subsoil removed during the construction of roads and building platforms must be stockpiled separately in low heaps, less than 1.5 m high not exceeding 2 m in height. Microbial activity, seed viability and soil fertility are adversely affected by long periods of stockpiling when high temperatures can be generated in thick deposits, therefore the topsoil should be restored as soon as possible. An alternative is to aerate the stockpiled topsoil regularly (as a minimum every six months). Vegetate with a grass mix natural to the area to control erosion if soil stockpiles will be kept for more than three months.
» Stockpiles are not to be used as stormwater control features.
» Erosion, sediment control measures such as silt fences, concrete blocks and/or sandbags must be placed around stockpiles (i.e. soil and materials) to limit runoff.
» Stockpiling of any materials on slopes is to be avoided, unless appropriate erosion control and management measures are implemented.

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

Nature: *Pollution of soils and habitat*
Waste products and pollutants generated during the construction phase may include fuels and oils from construction vehicles as well as solid waste in the form of building material and litter from labourers. These can potentially enter the surrounding sensitive areas either directly through disposal/mismanagement of waste products, or indirectly through surface water runoff during periods of rainfall.

Chemicals can enter the air, water, and soil when they are produced, used or disposed. Their impact on the environment is determined by the amount of the chemical that is released, the type and concentration of the chemical, and where it is found. Some chemicals can be harmful if released to the environment even when there is not an immediate, visible impact. Some chemicals are of concern as they can work their way into the food chain and accumulate and/or persist in the environment for many years. Harmful effects of such chemical and biological agents as toxicants from pollutants, insecticides, pesticides, and fertilizers can affect an organism and its community by reducing its species diversity and abundance. Such changes in population dynamics affect the ecosystem by reducing its productivity and stability.

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (1)
Duration	Short (2)	Short (2)
Magnitude	High (8)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**(Medium) 52**	**(Low) 15**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable	Reversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Can be effectively mitigated and managed onsite through the appropriate control measures.	

Mitigation:
» Litter generated during construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.
» All building rubble, solid and liquid waste etc. generated during the construction activities must be disposed of as necessary at an appropriately licensed refuse facility.
» Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires shoulld be allowed on site.

» Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project and that the waste is disposed of at dumping site. » Adequate provision must be made for sanitation for the construction workers. Chemical toilets on site are to be emptied weekly or as required to avoid spillages. » Minimise fuels and chemicals stored on site as far as possible. » Install bunds on storage areas and take other precautions to reduce the risk of spills. » Spill kits must be available on site in areas where spills could occur. These must be maintained on an ongoing basis. Appropriate training should be undertaken to ensure personnel are familiar with the operation of these spill kits. » Implement a contingency plan to handle spills, so that environmental damage is avoided. » No refuelling, servicing of plant/equipment or chemical substance storage allowed outside of designated areas. » Drip trays should be used during al fuel/chemical dispensing. » Drip trays to be placed beneath standing machinery/plant. » In the case of petrochemical spillages, the spill should be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).
Residual Impacts: Expected to be low if mitigation measures are properly implemented.

Operation Phase Impacts

Nature: <u>Introduction and spread of alien & invasive plant species and weeds</u> This impact is generally initiated during the construction phase, when large areas of vegetation are cleared to accommodate infrastructure. This creates ideal opportunities and optimal conditions for weeds and alien & invasive plant species to invade disturbed areas. IAPs and indigenous weeds have the ability to out-compete and replace indigenous flora, which will in turn impact on natural biodiversity. Clearance and disturbance can also result in an increase in 'edge habitat' immediately adjacent to disturbed areas. These areas are particularly prone to alien & invasive species invasions and can invade areas of established vegetation. This is particularly concerning since conservation areas are bordering on the proposed development footprint. The spread of IAPs and weeds to adjacent sensitive areas can be exacerbated if not properly managed and may even introduce new alien species to sensitive areas as a result of disturbance. However, the alien invasive plant issue is one that can be successfully mitigated, by means of ongoing alien invasive plant management around the proposed development.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (8)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**High (60)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable	Reversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	The impacts can be effectively managed through the implementation of an appropriate alien plant management programme which includes follow-up treatment/control procedures.	
Mitigation:		

» A preconstruction walk-through of the final development footprint for species of conservation concern that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase. » Development and implementation of an Invasive Alien Plant Control and Eradication Programme. Guidelines are provided in Appendix 8 of the Ecological Report (**Appendix D**) and within the EMPr (**Appendix O** of this report).
Residual Impacts: Expected to be Low if mitigation measures are properly implemented.

Nature: *Disturbance of local fauna communities*

Local fauna populations, with the exception of vermin and a few generalist bird species such as House Sparrows, Indian mynahs and Crows are unlikely to utilise the project site during the operation phase.

However, conservation and sensitive areas (i.e. wetlands) are presently close to and within the project site. The presence of humans close to these areas can lead to increased pressure on the natural resources through illegal hunting/poaching/trapping of fauna and flora species collected for medicinal purposes as well as littering. This is likely to be an ongoing threat during the entire operation phase of the project.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(Medium) 48**	**(Low) 14**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable	Reversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Yes, this impact can be effectively mitigated on the site with proper management.	

Mitigation:

» A suitable perimeter fence should be constructed around the facility to restrict access of fauna to the site and to restrict/control access of staff to adjacent natural areas.
» Education of employees on the conservation importance of natural areas and fauna must be provided.
» Access to no-go areas (Figure 25) to be restricted and controlled. This should be clearly communicated to all employees.
» No hunting, snaring, killing or disturbing any fauna species to be allowed on the site or in any of the no-go areas.
» No collecting of flora species to be permitted in the no-go areas.
» No open fires to be allowed on the site or the surrounding areas.

Residual impacts:

Expected to be low if mitigation measures are properly implemented.

Nature: *Noise and artificial light disturbance*

Potential negative ecological consequences of noise and artificial light disturbance have been discussed under the Construction phase impacts. Since those impacts are also applicable during the Operation phase, it will not be discussed further.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**(Medium) 48**	**(Low) 27**

Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	To a degree but very difficult to mitigate.	

Mitigation:

- Outside lighting should be designed to minimise impacts on fauna.
- All outside lighting should be directed into the proposed development as opposed to away from the development, and also not in the direction of sensitive areas, including sensitive areas on neighbouring properties.
- Fluorescent and mercury vapour lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.
- In order to reduce low intensity noise levels, work areas need to be effectively screened to reduce or deflect noise. Engineering controls such as modifications to equipment or work areas to make it quieter, the acquisition of equipment designed to emit low noise and vibration, creation of noise barriers, proper maintenance of tools and equipment must be considered.
- Noise from vehicles and powered machinery and equipment used during operations should not exceed the manufacturer's specifications, based on the installation of a silencer. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment.

Residual Impacts:

Expected to be low if mitigation measures are properly implemented.

Nature: *Pollution of soils and habitat*

Hazardous chemical substances stored and handled at the proposed development used during operations and maintenance could enter the adjacent sensitive ecosystems if not managed properly and lead to pollution of the affected environment. Potential negative ecological consequences of hazardous substances on ecosystems have already been discussed under the construction phase impacts.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (40	Improbable (2)
Significance	**(Medium) 48**	**(Low) 14**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable	Reversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Yes, this impact can be effectively mitigated on the site with proper management.	

Mitigation:

- In order to reduce the impact on human health and the environment, the minimum requirements and licensing for activities involving the storage, transportation, re-use, recycling, treatment and disposal of waste as set out by the following legislation (http://sawic.environment.gov.za) must be adhere to:
  National Environmental Management Waste Act (Act No. 59 of 2008);
  National Environmental Management Water Amendment Act (Act No. 26 of 2014).
- Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of at dumping site as approved by the Council.
- Fuel storage areas must be appropriately bunded.
- Spill kits must be available on site in areas where spills could occur. These must be maintained on an ongoing basis. Appropriate training should be undertaken to ensure personnel are familiar with the operation of these spill kits.

Residual Impacts:

Expected to be low if mitigation measures are properly implemented.

8.2.4 *Implications for Project Implementation*

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts of Richards Bay CCPP can be reduced to medium/low in the construction phase and low in the operation phase. From the outcomes of the studies undertaken, it is concluded that the Richards Bay CCPP facility and associated infrastructure can be developed. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» Finalisation of candidate biodiversity offset sites prior to vegetation clearance and construction.
» The biodiversity offset area, conservation area and CBA: Irreplaceable areas surrounding the project site (Figure 25 in the specialist report contained in Appendix D) must be considered as no-go areas.
» Prior to vegetation clearance, the development footprint and the 200 m of adjoining areas must be scanned for the presence of protected and threatened flora species, by a suitably qualified Botanist/Ecologist.
» A search and rescue operation must be undertaken to translocate protected species within the development footprint. Affected plant specimens should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. All plants requiring translocations must be translocated by following the plant rescue and translocation guidelines outlined in Appendix 7 of the Ecological Report in **Appendix D**.
» Where translocations are not possible, the necessary permits for the removal or destruction of protected species must be obtained from eKZNw or DAFF, before vegetation clearance starts.
» No plant species are permitted to be collected or removed by the contractor outside of the demarcated development areas. The EO should carefully monitor construction activities in sensitive habitats such as near wetlands to ensure that impacts to these areas are minimised.
» Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by an Ecologist/Zoologist or a suitably qualified ECO/EO trained in the handling and relocation of animals.
» Areas beyond the development footprint should be expressly off limits to construction personnel and construction vehicles and this should be communicated to them.
» Prior to construction and vegetation clearance a suitably qualified Zoologist should closely examine the project site for the presence of any animal burrows, rock crevices, under logs/stumps and in trees, and relocate any affected non-Red Listed/Protected animals to appropriate habitat away from the project site.
» No more than two weeks in advance of vegetation clearance that will commence during the breeding season (1 September – 1 March) a qualified Zoologist must conduct a pre-construction survey of all potential special-status bird nesting habitat in the vicinity of the project site, and on the project site. If pre-construction surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required.
» If active nests are found, avoidance procedures must be implemented on a case-by-case basis. Avoidance procedures may include the implementation of buffer zones and relocation of birds or seasonal avoidance. If buffers are created, a no disturbance zone must be created around active nests during the breeding season by a suitably qualified Zoologist.
» Prior to vegetation clearance and construction, all trees will be subject to assessment by means of walk-through surveys for the location of potential bat roosts. This must be done by a bat specialist and/or the Bat Interest Group of KwaZulu-Natal.

» An IAP Control and Eradication Programme must be developed and implemented. Guidelines are provided in Appendix 8 of the Ecological Report in **Appendix D**.

8.3 Potential Impacts on Wetlands

The proposed project will result in the loss of wetland areas, and the subsequent loss of ecological services. This loss is the key consideration for the impact assessment, with the loss of wetland areas unavoidable. No mitigation is possible for the loss of wetlands, and a wetland offset plan is therefore required. A wetland offset plan (**Appendix E**) has been compiled in consultation with the local conservation authority (Ezemvelo KZN Wildlife). The wetland offset plan offers a long term conservation solution to conserve other wetlands in the region through offsetting the high residual impacts to wetlands on the project site.

An impact assessment has nonetheless been conducted for the remaining wetland portions which will not be lost as a result of the RB CCPP facility. These systems are located outside of the development site and are likely to be impacted on by indirect aspects. The significance of these impacts is far less when compared to the loss of the wetland area (and the extent thereof), but equally important to assess and mitigate.

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

8.3.1 Results of the Wetland Impact Assessment

A total of two (2) HGM types were identified and delineated for the project site, biodiversity area and 500m radius assessment area, namely a channelled valley bottom wetland and wetland flat types.

Approximately 91 ha of wetlands were delineated for the project, with approximately 38ha and 53ha being delineated for the project area and biodiversity offset areas respectively. For this study, the wetland flats have been collectively assessed for the project area and biodiversity offset area, allowing for a comparison between the two study areas. This approach will also allow for a more detailed consideration for any proposed offset plan.

The overall wetland health for the identified wetlands for the project and biodiversity offset areas was determined to be Moderately Modified (Class C).

The aquatic biodiversity of the identified inundated freshwater wetlands was determined to be high. The PES of the above-mentioned channelled valley bottom wetland system, referred to as the Eastern Unnamed Tributary in this study, was found to be largely modified (Class D) as a result of channel, flow and bed modification. A single listed fish species was expected to occur on the project site. However, several rare species are known from the project area and further investigation was recommended. The listed fish species was *Oreochromis mossambicus* which is threatened by hybridisation. Thus, the proposed project presents no risk to the threatened species.

The wetland flats for both areas had overall intermediate levels of service. The indirect benefits associated with both areas also had an intermediate level of service. The level of service for the direct benefits was determined to be moderately low and intermediate for the biodiversity offset area and project area respectively. It is also evident from the findings that the benefits associated with biodiversity are higher for the project area (moderately high) as opposed to the biodiversity offset area (intermediate). No services providing moderately high (or higher) benefits are expected for the offset area, with moderately high benefits expected for the project area.

The Environmental Importance and Sensitivity (EIS) assessment was applied to the wetland areas described in the previous section in order to assess the levels of sensitivity and ecological importance of the wetland. The systems associated with the project area and offset area have been considered separately for this component of the study, with the wetland flat associated with the offset area encroaching into a portion of the project area.

From a vegetation perspective the sensitivities relating to the proposed development are the presence of:

» Provincially protected species, endemic species and species protected under the Natural Forest Act. Removal/destruction of tree species would require permit authorisation;
» The potential presence of several Threatened flora species;
» Wetland vegetation over certain parts of the study area.

From a faunal perspective, the sensitivities relating to the proposed development are the presence of:

» *C. mariquensis* (Near Threatened) and *Hemisus guttatus* (Vulnerable) in wetland areas;
» The potential presence of *Balearica regulorum* (EN);
» The presence of provincially protected bird species.

The EIS of the wetland systems was determined to be High (Class B) and Moderate (Class C) for the project area and biodiversity offset area respectively.

Figure 8.3 provides the wetland sensitivity map for the project site and the biodiversity offset area.

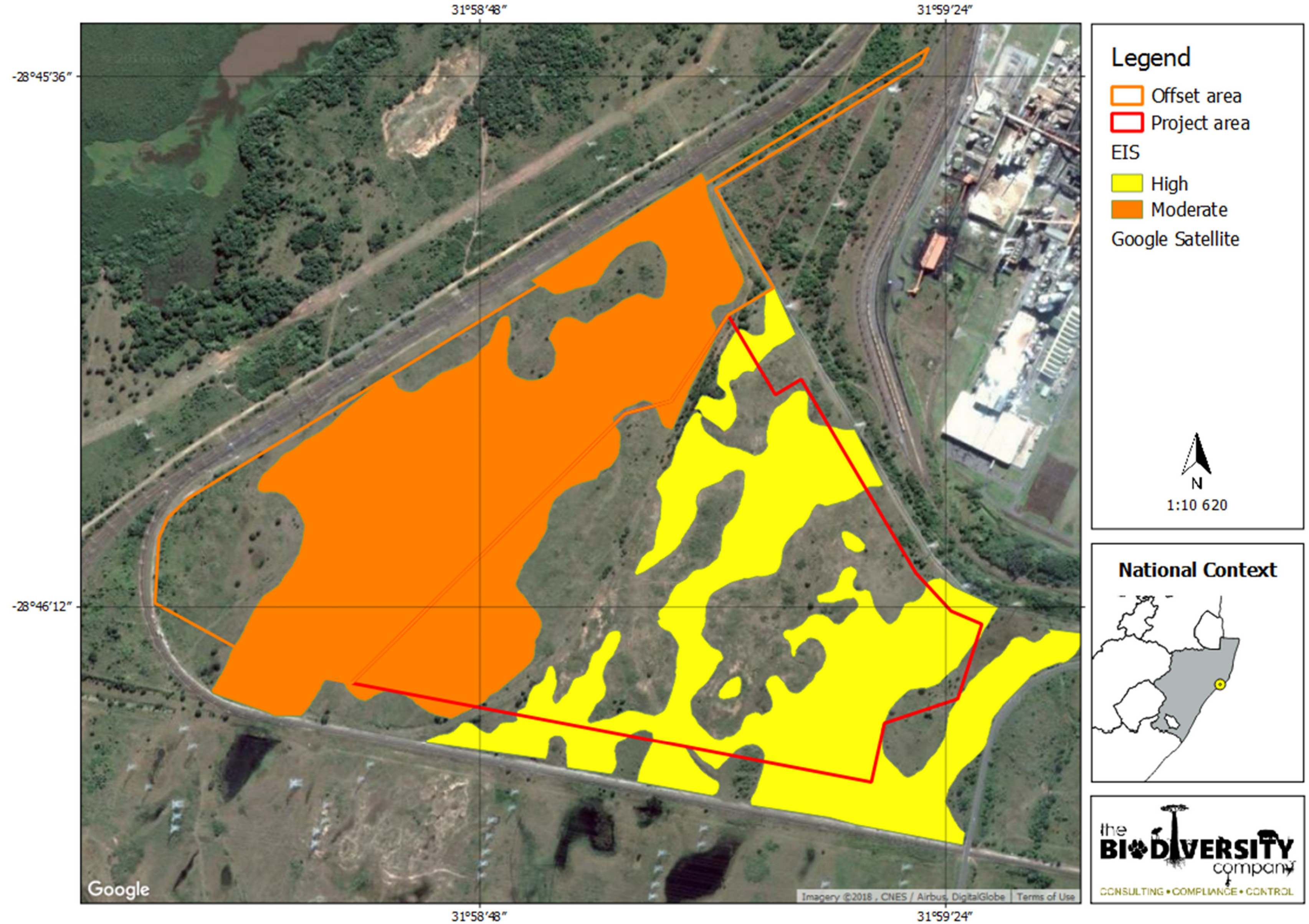

Figure 8.2: Map illustrating the wetland sensitivity within the RB CCPP project site

8.3.2 *Description of Wetland Impacts*

The following existing impacts were observed in or adjacent to the project and offset areas:

- The development of the area has altered the surface flow dynamics, creating directional surface run-off across the assessed areas. Water typically exits a wetland flat through evapotranspiration and infiltration (Ollis et al. 2013), which has been inhibited due to the changes in topography and slope for the catchment area.
- Hydrological inputs from the adjacent facility has altered the hydrological regimes of portions of the project area, with these portions experiencing prolonged periods of saturation. These inputs have also contributed to an increase in water volume for the project area.
- The removal of vegetation due to historical deforestation of the project area, and current livestock farming in the area. Livestock farming has resulted in vegetation being trampled and overgrazed.
- Historical disturbances and current land uses have resulted in the onset and establishment of alien vegetation across the project and offset areas.
- Industrial activities in the upper reaches of the Eastern Unnamed Tributary have resulted in the modification of the aquatic environment (class D). Cumulative impacts in the form of a large impoundment have further altered the natural hydrology of the Eastern Unnamed Tributary.

The proposed project will result in the loss and modifications of water resources, notably the delineated wetland areas. The following list provides a framework for the anticipated impacts associated with the project.

- Loss / degradation of wetlands
  - Project activities that can cause loss of habitat
    - Physical removal of vegetation
    - Soil excavations
    - Dewatering of working areas
    - Access roads and servitudes
    - Construction camps & laydown areas
    - Infrastructure development
    - Linear trench excavation and berm creation
    - Soil dust precipitation
    - Vehicle, machine and facility emissions
    - Stochastic events such as fire (cooking fires or cigarettes from staff)
  - Secondary impacts anticipated
    - Loss of shallow recharge zones
    - Increased potential for soil erosion (in conjunction with alterations in hydrological regimes)
    - Increased potential for establishment of alien & invasive vegetation
    - Loss of ecosystem services
- Spread and/or establishment of alien and/or invasive species
  - Project activities that can cause the spread and/or establishment of alien and/or invasive species
    - Vegetation removal
    - Soil excavations and soil transportation
    - Transportation vehicles potentially spreading seed while moving on, to and from working areas

        - Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents
        - Creation of infrastructure suitable for breeding activities of alien and/or invasive birds
- Environmental pollution due to increased sedimentation and erosion of watercourses
    - Project activities that can cause pollution in water courses
        - Erosion
        - Clearing of vegetation
        - Earth moving (removal and storage of soil)
        - Blasting and excavation
        - Soil dust precipitation
    - Secondary impacts associated with pollution in water courses
        - Groundwater pollution
        - Loss of ecosystem services
- Impaired water quality (surface and groundwater)
    - Project activities that can cause pollution in watercourses
        - Clearing of vegetation, erosion of exposed areas
        - Chemical (organic/inorganic) spills
        - Untreated runoff or effluent
        - Elevated water temperatures
        - Soil dust precipitation
        - Produce stockpiles and storage
- Alterations in hydrological regime (flow of surface and sub-surface water)
    - Project activities that can cause alterations in hydrological regime
        - Vegetation removal
        - Excavations and infrastructure development
        - Road network creation
        - Alterations to surface topography (due to voids and surface structures)
        - Dewatering or changes to groundwater interactions
    - Secondary impacts associated with alterations in hydrological regime
        - Loss of ecosystem services
        - Worsening of the ecological status of wetlands
        - Increased or reduced runoff dependent on system manipulation
        - Loss of soil fertility and topsoil recharge through interruption of seasonal recharge and natural flow, including natural sedimentation
        - Scouring and erosion of wetlands

8.3.3 Impact tables summarising the significance of impacts on surrounding wetlands during construction and operation (with and without mitigation)

Construction Phase Impacts

Nature: Loss /degradation of wetlands – Project life The most notable impact is the expectant loss of some water resources, the delineated wetlands in particular. The significance of the loss is regarded as high, and because avoidance is not possible for this project, mitigation has not been considered and the significance remains high for the duration of the project.		
	Without mitigation	**With mitigation**
Extent	Regional (5)	Regional (5)

Duration	Permanent (5)	Permanent (5)
Magnitude	Very high (10)	Very high (10)
Probability	Definite (5)	Definite (5)
Significance	**(High) 100**	**(High) 100**
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	Definite	Definite
Can impacts be mitigated?	No	
Mitigation: » The loss of wetland is unavoidable with the proposed layout. The only alternative would be to consider avoiding the wetland areas which is not regarded as mitigation. Additionally, the proposed layout will also impact on the surface and groundwater linkages sustaining these wetland flats. In the event that the project is approved, local stakeholders and authorities must be further consulted for the feasibility and requirements for a wetland offset plan.		
Residual Impacts: Expected to be considerably high due to the loss of these wetland areas		

Nature: *Spread and/or establishment of alien and/or invasive* This impact is of greatest concern during the construction phase of the project, when ideal opportunities are plentiful and conditions optimal for the establishment of alien vegetation in the area. The spread of alien invasive vegetation within the wetland systems can be exacerbated if not properly managed and may even introduce new alien species to sensitive areas as a result of disturbance.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Very Probable (4)	Probable (3)
Significance	**(Medium) 52**	**(Low) 21**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Some possibility, but low likelihood	Distinct possibility
Can impacts be mitigated?	Yes	
Mitigation: » An alien invasive plant management plan needs to be compiled and implemented prior to construction to control and prevent the spread of invasive aliens. » Only clean vehicles on the project site and not is the surrounding areas.		
Residual Impacts: Expected to be Low if mitigation measures are properly implemented.		

Nature: *Sedimentation and erosion of watercourses* Construction activities will temporarily denude the vegetation on the site and expose the soils to the erosive elements. Changes in the topography (more slopes) due to the placement of stockpiles and clearing / shaping of areas is also likely to increase the run-off volumes and velocities across the site. This could be exacerbated by the increase in the extent of hardened surfaces. These aspects will all contribute to soil erosion, resulting in the loss of topsoil and formation of erosion gullies. Water resources may become laden with sediment, resulting the loss of habitat and impaired water quality. Sedimentation of these systems will also reduce the holding volume of the systems, possibly reducing the ephemeral lifespan on the systems.		
	Without mitigation	**With mitigation**

Extent	Local (3)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Probable (3)
Significance	**(Medium) 52**	**(Low) 27**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Some possibility but low likelihood	Distinct Possibility
Can impacts be mitigated?	Yes	

Mitigation:

» Compilation of a soil stripping guideline to preserve high value topsoil for rehabilitation. Also input into the location of stockpiles away from preferential flow paths.
» Where possible, reduce the footprint area of exposed ground during periods of high rainfall. Prioritise vegetation clearing for the winter months as far as possible.
» The disturbance footprint area must be kept to a minimum and clearly demarcated.
» Existing headcuts must be rehabilitated during the construction phase.
» Compile a suitable stormwater management plan.
» Construct cut-off berms downslope of working areas.
» Exposed areas must be ripped and vegetated to increase surface roughness.
» Create energy dissipation at discharge areas to prevent scouring. Temporary and permanent erosion control methods may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching.
» **Rehabilitation:** Compacted areas must be ripped (perpendicularly) to a depth of 300mm. A seed mix must be applied to rehabilitated and bare areas. Any gullies or dongas must also be backfilled. The area must be shaped to a natural topography.

Residual Impacts:

Expected to be Low if mitigation measures are properly implemented.

Nature: *Impaired water quality*

Threats to the water quality will be present during the construction phase of the project. During the construction phase water quality is at risk due to erosion of the area, resulting in sedimentation of the water resources. There is a continuous risk of malfunctioning equipment and machinery, or poorly maintained vehicles that will leak or spill contaminants into the systems. The management and disposal of all forms of waste will be a risk for the duration of the project.

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Probable (3)
Significance	**(High) 64**	**(Medium) 39**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	

Mitigation:

» Contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.
» A suitable stormwater management plan must for formulated for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the water resources and that the discharge of water will not result in scouring and erosion of the receiving systems.

» Dirty water must be contained and may be treated to within acceptable DWS water standards (or aquatic ecosystem standards) before being discharged.
» As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site.
» All chemicals and toxicants used during construction must be stored in bunded areas.
» All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site (pre-use inspection).
» All servicing and re-fuelling of machines and equipment must either take place off-site, or in controlled and bunded working areas.
» Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).
» Have appropriate action plans on site, and training for contactors and employees in the event of spills, leaks and other potential impacts to the aquatic systems. All waste generated on-site during construction must be adequately managed.
» Separation and recycling of different waste materials should be supported.
» Should a chemical spill take place, an aquatic ecologist must be contracted to identify the extent of the impact and assist with additional mitigation measures.

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

Nature: *Alterations in hydrological regime*

The primary source of water for a wetland flat is typically precipitation, with the exception of wetland flats situated on a coastal plain where groundwater may rise to or near the ground surface (Ollis et al. 2013). The development of the area will result in a loss of catchment area, thus reducing the amount of run-off sustaining the systems. It is expected that run-off will be diverted around the working area to separate clean and dirty water, by-passing some wetland flat systems. The extent of compaction of the area will also reduce the infiltration potential of the area, resulting in a reduction of the shallow recharge area. The expected excavations, shaping and contours will also alter the topography of the project area, resulting in changes to the surface flow dynamics across the catchment. The removal of vegetation, compounded by the hardening of surfaces will also result in an increase in run-off volumes and velocities for the area.

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(Medium) 52**	**(Low) 20**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Some possibility but low likelihood	Distinct Possibility
Can impacts be mitigated?	Yes	

Mitigation:
» Rehabilitation of the working areas must be concurrent with the construction phase of the project, where possible.
» Any loss/alteration of flow dynamics must be quantified, and mitigation options to re-introduce water in a safe and environmentally friendly way must be assessed.
» Compile a suitable stormwater management plan. Divert clean water around the project area, and consider a release into rock-filled trenches within the project area.
» **Rehabilitation:** All voids must be backfilled, and surface temporary infrastructure must be removed from the project area. Previously compacted areas must be ripped (perpendicularly) to a depth of 300mm, or an appropriate depth. A seed mix must be applied to rehabilitated and bare areas. Any gullies or dongas must also

be backfilled. The area must be shaped to a natural topography. Trees (or vegetation stands) removed must be replaced. No grazing must be permitted to allow for the recovery of the area.
Residual Impacts: Expected to be Low if mitigation measures are properly implemented.

Operation Phase Impacts

Nature: Impaired water quality Threats to the water quality will be present during the operational phase of the project. During the operational phase of the project, impacts to the water quality due to leaks /spillages or increased temperatures would need to be managed. Dirty water may not be permitted for release into the environment, nor pumped into the groundwater system.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Probable (3)
Significance	**(High) 64**	**(Medium) 39**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » A suitable stormwater management plan must for formulated and implemented for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the water resources and that the discharge of water will not result in scouring and erosion of the receiving systems. » Dirty water must be treated and within acceptable DWS water standards (or aquatic ecosystem standards) before being discharged. » As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site. » All chemicals and toxicants used during operation must be stored in bunded areas. » All servicing and re-fuelling of machines and equipment must either take place off-site, or in controlled and bunded working areas. » Separation and recycling of different waste materials should be supported. » Should a chemical spill take place, an aquatic ecologist must be contracted to assess the extent of the impact and assist with additional mitigation measures.		
Residual Impacts: Expected to be Medium if mitigation measures are properly implemented.		

Nature: Alterations in hydrological regime The placement of the facility within the catchment will result in the permanent loss of catchment area. This will result in a loss of infiltration area, affects the groundwater table (probably rising) and altered surface flow dynamics.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Probable (3)
Significance	**(High) 64**	**(Medium) 39**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Some possibility but low likelihood	Some possibility but low likelihood
Can impacts be mitigated?	Yes	
Mitigation: » Regular monitoring for alien plants at the project site must occur and could be conducted simultaneously with erosion monitoring. » Compilation of a soil stripping guideline to preserve high value topsoil for rehabilitation. Also input into the location of stockpiles away from preferential flow paths. » Where possible, reduce the footprint area of exposed ground during periods of high rainfall. Prioritise vegetation clearing for the winter months. » The disturbance footprint area must be kept to a minimum and clearly demarcated. » Existing headcuts must be rehabilitated during the construction phase. » Compile a suitable stormwater management plan. » Construct cut-off berms downslope of working areas. » Exposed areas must be ripped and vegetated to increase surface roughness. » Create energy dissipation at discharge areas to prevent scouring. » Temporary and permanent erosion control methods may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching		
Residual Impacts: Expected to be high due to the loss of these wetland areas		

8.3.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts to the surrounding wetlands associated with Richards Bay CCPP will be High (due to loss of wetlands on the project site) to Low (impacts to wetlands in the surrounding area) in the construction phase. In the operation phase, impacts to the surrounding wetlands will be Medium.

From the outcomes of the wetland study undertaken, it is concluded that the Richards Bay CCPP facility and associated infrastructure can be developed and impacts on wetlands managed by taking the following into consideration:

» Wetland offset plan will be required prior to construction. No construction should be allowed to commence until such an offset plan is approved by authorities..
» A storm water management plan must be formulated and implemented for the proposed development. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the water resources and that the discharge of water will not result in scouring and erosion of the receiving systems.

» Soil stripping guideline must be compiled to preserve high value topsoil for rehabilitation.

8.4 Assessment of Impacts on Land Use, Soil and Agricultural Potential

The impact of the Richards Bay CCPP on the agricultural potential has been assessed as High (both pre- and post-mitigation). However, The impact on soils in general has been assessed as Medium (post-mitigation). Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** – Soils Impact Assessment for more details).

8.4.1 Results of the Land Use, Soil and Agricultural Potential Study

The project area is characterised by a relatively flat and uniform relief.

The project area is approximately 71 ha in size with the current surrounding land use including grazing/veld activities dominating the area. The wetland areas on the project site are 28 ha of the project area, with a small portion being infrastructure and the remaining area being Veld (Grazing)

The soils in the project area are dominated by sandy alluvial soils. the areas with accumulated windblown sands were classified as Namib soils, which accounted for 27.6 ha (38.8 %) of the project area. The areas with moisture at depths greater than 30cm were classified as the Longlands soil form, which accounted for 3.3 ha (4.6 %) of the project area. The soil forms with moisture at or near the surface were classified as Katspruit / Westleigh soil forms, which accounted for 37.5 ha (52.8 %) of the area.

In terms of agricultural potential, the project area is currently being utilised for grazing, no agriculture is possible due to the shallow water table and the sandy nature of the soils present. There are extensive pans across the site and the vegetation is sparse in places.

From a land capability perspective, the Namib soils were rated as having a Class III (Moderate Cultivation) land capability based on the flat topography and soils depth greater than 50 cm. The Class III land capability portions accounted for 27.6 ha of the project area. The Longlands soil forms were rated to have a Class IV (Light Cultivation/ Intensive Grazing) land capability based on the soil wetness being between 20cm and 50cm from the surface. The Class IV land capability accounted for 3.3 ha of the project area. The Katspruit and Westleigh soil forms were rated to be Class V (Wetland) land capability based on soil moisture being within 20cm from the surface. The Class V land capability accounted for 37.5 ha of the project area.

Lastly, in terms of land potential, the land capability classes were rated to have the following land potentials;
» Class III = L2 (High Potential);
» Class IV = L3 (Good Potential);
» Class V = Vlei (Wetland); and
» Class VIII = L8 (Very Low Potential).

8.4.2 Description of Land Use, Soil and Agricultural Potential Impacts

The following existing impacts were observed in or adjacent to the project area:

» The removal of vegetation due to historical deforestation of the project area, and current livestock farming in the area. Livestock farming has resulted in vegetation being trampled and overgrazed.
» Historical disturbances and current land uses have resulted in the onset and establishment of alien vegetation across the project and offset areas.

The undertaking of the specific activities required for the development of Richards Bay CCPP will disrupt the natural soil horizon distribution and will subsequently impact on the current soil hydrological properties and functionality of the soils present within the project site proposed for the development. Potential disturbances include compaction, physical removal and potential pollution. The exposed soil surfaces have the potential to erode easily if left uncovered which could lead to the loss of the soil resource.

The following impacts on soils have been identified and assessed for the construction phase:

» Soils that are excavated for the foundations will have their physical and chemical states altered negatively;
» Potential loss of stockpiled topsoil and other materials through erosion if not protected properly;
» Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding watercourses;
» Increased erosion could result in increased sedimentation which could impact on ecological processes;
» The additional hardened surfaces created during construction could increase the amount of stormwater runoff, which has the potential to cause erosion;
» Physical disturbance of the soil and plant removal may result in soil erosion/loss; and
» Erosion and potential soil loss from cut and fill activities and areas where naturally dispersive soils occur.

8.4.3 Impact tables summarising the significance of impacts on Land Use, Soil and Agricultural Potential during construction and decommissioning (with and without mitigation)

Construction and Decommissioning Phase Impacts

Nature: Loss of agricultural potential The impacts to consider are those relating to the disturbance of the natural soil state. When soil is stripped the physical properties are changed and this impacts on the soil health. When the soil is stockpiled, the soils chemical properties will deteriorate unless properly managed. These all lead to the loss of the topsoil layer as a natural resource. Soil is considered a slowly regenerating resource due to the fact that it takes hundreds of years for a soil profile to gain 10cm of additional soil through natural processes. During a single rainfall event on unprotected bare soil erosion could remove that same amount of soil if not more. Whilst the construction takes place, vehicles will drive on the soil surface compacting it. This reduces infiltration rates as well as the ability for plant roots to penetrate the compacted soil. This then reduces vegetative cover and increases run-off potential. The increased run-off potential then leads to increased erosion hazards. If the topsoil and subsoil are stripped and stockpiled as one unit, the topsoil seed bank and natural fertility balance is diluted. This will affect the re-growth of vegetation on the stockpiles as well as the re-growth when they have been replaced during the rehabilitation process, therefore soils should be handled with care from the construction phase through to the decommissioning phase.		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)

Magnitude	Very High (10)	Very High (10)
Probability	Definite (5)	Definite (5)
Significance	**(High) 95**	**(High) 95**
Status (positive or negative)	Negative	Negative
Reversibility	None	Medium
Irreplaceable loss of resources?	Definite	Definite
Can impacts be mitigated?	Yes	

Mitigation:

» Bush clearing of all bushes and trees taller than one meter; Ensure proper storm water management designs are in place.
» If any erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place.
» If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion.
» Only the designated access routes are to be used to reduce any unnecessary compaction.
» Compacted areas are to be ripped to loosen the soil structure.
» The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks.
» Topsoil stockpiles are to be kept to a maximum height of 1.5m, not exceeding 2 m in height.
» Topsoil is to be stripped when the soil is dry, as to reduce compaction.
» Bush clearing contractors will only clear bushes and trees larger than 1m the remaining vegetation will be stripped with the top 0.3 m of topsoil to conserve as much of the nutrient cycle, organic matter and seed bank as possible.
» The subsoil approximately 0.3 to the designated thickness in the stripping guidelines, will then be stripped and stockpiled separately.
» The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly;
» Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles.
» The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil.
» Place the above cleared vegetation were the topsoil stockpiles are to be placed.

Residual Impacts:

Expected to be considerably high due to the permanent loss of agricultural potential.

Nature: *Loss of soil resources*

The impacts to consider are those relating to the disturbance of the natural soil state. When soil is stripped the physical properties are changed and this impacts on the soil health. When the soil is stockpiled, the soils chemical properties will deteriorate unless properly managed. These all lead to the loss of the topsoil layer as a natural resource. Soil is considered a slowly regenerating resource due to the fact that it takes hundreds of years for a soil profile to gain 10cm of additional soil through natural processes. During a single rainfall event on unprotected bare soil erosion could remove that same amount of soil if not more.

Whilst the construction takes place vehicles will drive on the soil surface compacting it. This reduces infiltration rates as well as the ability for plant roots to penetrate the compacted soil. This then reduces vegetative cover and increases run-off potential. The increased run-off potential then leads to increased erosion hazards.

If the topsoil and subsoil are stripped and stockpiled as one unit, the topsoil seed bank and natural fertility balance is diluted. This will affect the re-growth of vegetation on the stockpiles as well as the re-growth when they have been replaced during the rehabilitation process, therefor soils should be handled with care from the construction phase through to the decommissioning phase.

	Without mitigation	**With mitigation**
Extent	Moderately High (4)	Moderately Low (2)
Duration	Permanent (5)	Short Term (2)
Magnitude	Very High (10)	Low (4)

Probability	Definite (5)	Definite (5)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	Definite	Distinct Possibility
Can impacts be mitigated?	Yes	

Mitigation:

» Regular monitoring for alien plants at the project site must occur and could be conducted simultaneously with erosion monitoring.
» Bush clearing of all bushes and trees taller than one meter; Ensure proper storm water management designs are in place.
» If any erosion occurs, corrective actions (erosion berms) must be taken to minimise any further erosion from taking place.
» If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion;
» Only the designated access routes are to be used to reduce any unnecessary compaction.
» Compacted areas are to be ripped to loosen the soil structure.
» The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks.
» Topsoil stockpiles are to be kept to a maximum height of 1.5m.
» Topsoil is to be stripped when the soil is dry, as to reduce compaction.
» Bush clearing contractors will only clear bushes and trees larger than 1m the remaining vegetation will be stripped with the top 0.3 m of topsoil to conserve as much of the nutrient cycle, organic matter and seed bank as possible.
» The subsoil approximately 0.3 to the designated thickness in the stripping guidelines, will then be stripped and stockpiled separately.
» The handling of the stripped topsoil will be minimized to ensure the soil's structure does not deteriorate significantly;
» Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles.
» The stockpiles will be vegetated (details contained in rehabilitation plan) in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil.
» Place the above cleared vegetation were the topsoil stockpiles are to be placed.

Residual Impacts:

Expected to be moderate due to possible alien vegetation infestation and erosion.

8.4.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of Richards Bay CCPP is expected to have a High and Medium on the agricultural potential and soils, respectively. These impacts can be reduced by keeping the footprints minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites. From the outcomes of the studies undertaken, it is concluded that the Richards Bay CCPP facility can be developed and impacts on soils managed by taking the above-mentioned mitigation measures into consideration and implementation.

8.5 Assessment of Impacts on Geohydrology

Negative impacts during the construction phase on geohydrology resources will be due to groundwater flow direction, groundwater levels, accidental fuel and oil spills / leaks from construction vehicles in the construction phase and impacts to groundwater quality due to possible leakage of diesel and / or chemicals from storage facilities / pipelines and from emergency back-up generators, receptors receiving leachate from construction waste disposal areas. During the operation phase, negative impacts can include rain water seepage containing hydrocarbon products. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G**).

8.5.1 Results of the Geohydrological Impact Assessment

The results of the geohydrological assessment include the following findings:

- Aquifer Characteristics:
  - According to the 1:500 000 scale hydrogeological map series (Vryheid, Map sheet 2730) and from available hydrogeological information, Richards Bay groundwater occurs within the inter-granular primary aquifer in the semi consolidated and unconsolidated materials deposited during the Tertiary and Quaternary periods.
  - According to Golder (2014) the depths of boreholes measured within the Richards Bay area varies from 30 and 45 metres below ground level (mbgl) and the aquifer testing conducted indicated the hydraulic conductivity ranging from 0.5 to 5 m/d.
  - Mean annual rainfall in the Richards Bay area ranges between 994 and 1500 millimetres per year (mm/year) and the mean annual evaporation ranges from 1410 to 1923 mm/year, Germishuyse (1999). The effective groundwater recharge is estimated to range from 450 to 750mm/year. Generally, it is expected that the groundwater table mimics the surface topography. According to SRK (2008), the static water level estimated along the servitude route in the vicinity of the site varies from <2mbgl to 4mbgl.
- Aquifer Testing:
  - Slug tests were performed on the 16th February 2018 at three of the monitoring boreholes namely BH_M2, BH_M4 and BH_M5 to determine the site-specific hydraulic conductivity beneath the site. In performing a slug test, the static water level in a borehole is suddenly lowered or raised by lowering a closed cylinder into the borehole. This is followed by the measurement of the recovery of the water level within the borehole using a dipmeter and a stopwatch.
  - Hydraulic conductivities determined for three boreholes using FC method will cover the entire hydraulic conductivity range across the site. The hydraulic conductivity (K) of the groundwater beneath the site was calculated to be 0.235 m/d, 0.221 m/d and 0.312 m/d from BH_M2, BH_M4 and BH_M5 respectively. It is likely the hydraulic conductivity at any point on the site will generally fall within this range.
  - The aquifer transmissivity (T) value of 1.97m2/d was determined as a product of an average K value and an estimated thickness saturated shallow portion of the shallow aquifer (7.7m).
- Groundwater Usage
  - Germishuyse (1997) indicated that there were no groundwater extractions in the Richards Bay area, since private boreholes were prohibited by the uMhlathuze Municipality by-laws. The uMhlathuze Local Municipality Water Services By-laws 2010 allowed the sinking of abstraction boreholes only above the 50m mean sea level contour line. The recorded NGA data reviewed within 5 km radius of the site did not indicate groundwater abstractions.
  - During the Hydrocensus survey, it was observed that a non-perennial stream which can be found at east of the site is likely to be interacting with the shallow primary aquifer during rainy seasons. This was observed at borehole BH_M3 (static water level of 0.64mbgl) located in the close proximity of the stream.
- Groundwater Flow Direction
  - Groundwater levels measured in the five boreholes were used the determine a groundwater level elevation contour map. The map indicated that the site has two hydraulic gradients, one

sloping towards west and the other toward east. Therefore, the groundwater flows both easterly and westerly with a possible divide in the central area.
- o Generally, groundwater flow mimics topographic levels and groundwater likely flows towards the Nsezi lake to the west and towards the non-perennial streams located to the east of the site.

» Groundwater Quality
- o The 1:500 000 scale hydrogeological map (Vryheid, Map sheet 2730) indicates that electrical conductivity (EC) ranges from 0 to 70mS/m.
- o Groundwater sampling was conducted on-site during the Hydrocensus survey. One sample was taken from a newly drilled borehole namely BH_M2 and two samples from existing boreholes namely BH_M4 and BH_M5. These three boreholes were then purged using a bailer until electrical conductivity (EC) and pH stabilised to within 10% in each borehole. Three groundwater samples were collected and transferred to bottles provided by Talbot & Talbot laboratory and were submitted to be analysed for abridged SANS 241:2015 guidelines and for total petroleum hydrocarbon (TPH).
- o The results indicated that the newly drilled borehole contained a certain concentration of TPH while in the two existing boreholes it was not detected. The presence of TPH in the new borehole is likely to originate from drilling tools used. This needs to be confirmed through a second groundwater sampling run.
- o It is anticipated that the chemical constituents from the three boreholes are compliant to SANS 241:2015 guidelines except for Total Coliforms, iron, E-coli, Colour, Standard plate count and turbidity.

8.5.2 Description of the Geohydrological Impacts

The following potential impacts were identified from the desktop risk assessment within the site area:

» Groundwater flow direction will be impacted throughout the site area and will be only for the duration of the construction phase as groundwater will recover its initial conditions after completion of construction.

» Groundwater level will be lowered during the construction phase, due to dewatering to facilitate erection of building foundation, static water level being between 0.64 to 3.89 mbgl.

» During the construction phase, a potential impact exists on groundwater and surface water bodies including the Nseleni River, Nsezi dam, Voor River and Bhizolo Stream and an unnamed dam (receptors) as a result of on-site accidental fuel spills and leaks (sources) from construction vehicles and/or fuel storage areas. Fuel spills can either migrate off-site to surrounding surface water bodies by means of rain surface runoff or seep into the groundwater by means of rain water seepage (pathways).

» During the construction phase, a potential impact exists for identified receptors as a result of leachate from construction waste disposal areas (sources) and infiltration through soil (pathway) of dirty water from ablution facilities (sources).

» During the operation phase, a potential impact exists on groundwater and surface water bodies including the Nseleni River, Nsezi dam, Voor River, Bhizolo Stream and an unnamed dam (receptors) due to possible leakage of diesel and/or chemicals from storage facilities and/or pipelines and form emergency backup generators leaks (sources). With rain water seepage, hydrocarbon products (diesel) can migrate through unconsolidated formations and the reach groundwater table or migrate off-site to surface water bodies by means of rain water runoff (pathways).

» During the operation phase, a potential impact exists on identified receptors due to waste water discharges from the waste water treatment plant and pond (sources) by means of water seepage and/or rain surface runoff (pathways).
» A potential cumulative impact on groundwater quality can be expected during operation phase as a result of industrial activities form Mondi Plant located adjacent to the site.

8.5.3 Impact tables summarising the significance of impacts on the geohydrology related to the RB CCPP facility and associated infrastructure during construction and operation (with and without mitigation)

Construction Phase Impacts

Nature: A Potential impact on groundwater flow direction due to dewatering to facilitate erection of building foundation		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Medium (3)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**(Medium) 44**	**(Medium) 32**
Status (positive or negative)	Negative	Negative
Reversibility	low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » Supervision of dewatering process during construction by a qualified geohydrologist to ensure implementation of an appropriate pumping rate and pumping schedule; and to minimise impact extend and magnitude on groundwater condition. » Supervision of excavation and erection of building foundation by qualified civil engineering team to minimise impact on groundwater condition.		
Residual Impacts: None.		

Nature: Potential impact on groundwater level due to dewatering to facilitate erection of building foundation		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Medium (3)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**(Medium) 44**	**(Medium) 32**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » Supervision of dewatering process during construction by a qualified geohydrologist and excavation and pipeline installation by qualified engineering team are required to minimise impact on groundwater condition		
Residual Impacts: None.		

Nature: _A Potential impact on surface water bodies due to on-site accidental fuel spills and leaks/leachate and infiltration of dirty water_		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local (2)
Duration	Medium Term (3)	Very Short (1)
Magnitude	High (8)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(High) 60**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	

Mitigation:

» Contaminated surface and storm water run-off needs to be diverted through an oil/water separator before leaving the site.
» Emergency spill kits should always be present at strategic locations.
» Good housekeeping practices are to be implemented.
» Immediate reporting of significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.
» Construction waste on an impermeable base, keep away from drains.
» Use of temporary toilets during construction.

Residual Impacts:

None.

Nature: _A Potential impact on groundwater due to on-site accidental fuel spills and leaks/ leachate and infiltration of dirty water_		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local (2)
Duration	Medium (3)	Very Short (1)
Magnitude	High (8)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**(High) 60**	**Low (15)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	

Mitigation:

» Storage of fuel, oils and chemicals on an impermeable base; keep away from drains.
» Emergency spill kits should always be present at strategic locations to be used.
» Good housekeeping practices are to be implemented.
» Report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.
» Construction waste must be stored on an impermeable base, away from drains.
» Use of temporal toilets.

Residual Impacts:

None.

Operation Phase Impacts

Nature: A Potential impact on locale groundwater due to possible leakage of diesel from storage facilities and/or pipelines and/or Emergency backup generators		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short (2)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(Medium) 48**	**(Low) 18**
Status (positive or negative)	Negative	Negative
Reversibility	Low	low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » The site should be paved to avoid direct contact with impacted soils. » Good housekeeping practices are to be implemented. » Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.		
Residual Impacts: None.		

Nature: Potential impact on locale surface water bodies due to possible leakage of diesel from storage facilities and/or pipelines and Emergency backup generators.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short (2)	Short (2)
Magnitude	High (8)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » Good housekeeping practices are to be implemented. » Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary. » Surface and storm water run-off need to be diverted through an oil/water separator before leaving the site. » Regular integrity tests on fuel storage tanks and pipelines to prevent leak occurrence.		
Residual Impacts: None.		

Nature: Potential impact on groundwater due to waste water and solid waste discharges.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short (2)	Very Short (1)
Magnitude	Moderate (6)	Low (4)

Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (40)**	**(Low) 14**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » Regular quality monitoring of waste before discharge. » Compliance to appropriate construction standards of the waste storing and drainage systems. » Implementation of procedures for storage and handling hazardous substances. » Solid waste must be collected and disposed of at an appropriate municipal waste disposal site. » The dirty water retention dam needs to be lined to prevent any seepage of waste water.		
Residual Impacts: None.		

Nature: <u>*Potential impact on surface water bodies due to waste water and solid waste discharges.*</u>		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**(Medium) 40**	**(Low) 12**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	None	None
Can impacts be mitigated?	Yes	
Mitigation: » Regular quality monitoring of waste before discharge. » Compliance to appropriate construction standards of the waste storing and drainage systems. » Implementing of procedures for storage and handling hazardous substances. » Solid waste must be collected and disposed of at an appropriate municipal waste disposal site.		
Residual Impacts: None.		

8.5.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the RB CCPP will be Medium to Low for the construction phase (depending on the specific impacts), and Low for the operation phase. From the outcomes of the studies undertaken, it is concluded that the RB CCPP facility can be developed.

The following recommendations are to be implemented in addition to the mitigation measures stipulated above:

» A groundwater monitoring plan is required to prevent the CCPP activities from negatively impacting the groundwater quality and quantity. As part of the monitoring plan to be included in the environmental management plan the following actions are required:

* Site groundwater monitoring network will consist of background monitoring borehole (BH_M2) and two impact monitoring borehole as early warning of groundwater contamination (BH_M1 and BH_M3).
* A second groundwater sampling run and groundwater levels measurements during dry season need to be performed by a geohydrologist before construction phase for a baseline quality data characterisation.
* During operation phase, groundwater level and quality need to be monitored weekly. This will assist in detecting early contaminated groundwater migration to off-site receptors and in initiating promptly a remediation process.
* Because of groundwater and surface interaction within the study area, it is suggested that surface water monitoring of the Nsezi dam, Nseleni River, Voor River and Bhizolo stream in the vicinity of the CCPP is also undertaken to assess any impact during the construction phase and when the CCPP is operational.
* The dirty water retention dam needs to be lined to prevent any seepage of waste water.

8.6 Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources could occur be due to loss of archaeological and palaeontological resources during construction activities of the RB CCPP Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H**).

8.6.1 Results of the Heritage Impact Assessment (including archaeology and palaeontology)

Large parts of the study area were previously impacted on by illegal sand mining activities and was waterlogged during the survey. A contemporary cattle post is located on the north-western periphery of the impact area but outside of the study area. Copper theft in the area is marked by the remains of plastic casings scattered across the study area. A disused railway line occurs in the western portion of the project area outside of the development footprint.

As a result of the sand mining and the development of infrastructure like power lines, water pipelines and railway lines, the property is disturbed or damaged from a heritage point of view and a single undiagnostic potsherd was the only cultural find observed during the survey.

No archaeological, palaeontological, heritage or burial sites were identified within the proposed development area. It is therefore considered that the construction and operation of the development footprint and associated infrastructure is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. No further study is required in terms of palaeontology.

8.6.2 Description of the Heritage Impacts

The impact on heritage sites by the proposed development is considered low. Any direct impacts that may occur would be during the construction phase only, limited to the construction footprint and would be of very low significance.

8.6.3 Impact tables summarising the significance of impacts on heritage related to the RB CCPP facility and associated infrastructure during construction (with and without mitigation)

Nature: Impact to archaeological heritage resources		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Not probable (2)	Not probable (2)
Significance	**(Low) 16**	**(Low) 16**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	No resources were recorded	No resources were recorded.
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	
Mitigation: » A Chance Find Procedure should be implemented for the project should any sites be identified during the construction process.		
Residual Impacts: If sites are destroyed this results in the depletion of archaeological record of the area. However, if sites are recorded and preserved or mitigated this adds to the record of the area.		

8.6.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the RB CCPP will be low for the construction phase. No negative impacts are expected for the operation and decommissioning phase of the proposed development. From the outcomes of the studies undertaken, it is concluded that the RB CCPP facility can be developed. Although there were no other archaeological or heritage resources identified during the project survey, some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. A Chance Find Procedure must therefore be implemented for the project should any archaeological, paleontological or heritage sites be identified during the construction process.

8.7 Assessment of Impacts on Air Quality

Negative impacts on air quality can be expected during the construction of the RB CCPP due to the release of particulate and gaseous pollutants. This impact was rated to have a potentially Low impact (after mitigation). During the operation phase, negative impacts as a result of sulphur dioxide emissions and other atmospheric pollutants due to the RB CCPP can be expected, and were assessed to be of Medium to Low significance (after mitigation), respectively. The potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I**).

8.7.1 Results of the Air Quality Impact Assessment

The impact of emissions from the proposed facility on the environment was assessed using the pollutant critical levels that may affect vegetative productivity, and nuisance dustfall. The same dispersion modelling approach was used as in the assessment of impact of the facility on human health.

The findings from the air quality impact assessment include the following:

» Measured ambient air quality within the Richards Bay domain were non-compliant for daily PM_{10} at Brackenham and CBD stations during 2015. Annual PM_{10} compliance was recorded at all stations between 2014 and 2017.
» Compliance for all RBCAA stations was reported for all stations in the Richards Bay domain for SO_2 for hourly, daily and annual averaging periods between 2014 and 2017.
» The proposed CCPP facility was assessed for three operational phases:
  - Construction phase, using:
    - emissions calculated based on MES
    - emissions calculated using emission factors;
  - Operational phase (natural gas combustion venting through the main stacks); and,
  - Three different emergency event types.
» The simulated incremental impact of the proposed RB CCPP was assessed to include:
  - Compliance with daily and annual PM_{10} NAAQS during the construction phase, if emissions are mitigated using water sprays and active (cleared) areas are kept as small as possible (monthly average area).
  - Compliance with daily and annual PM_{10} and $PM_{2.5}$ NAAQS under normal operations and emergency events.
  - Emissions at the Minimum Emission Standard (MES) for SO_2 will likely result in non-compliance with hourly and daily SO_2 NAAQS under normal operations and Emergency 2-type events, when diesel is used as a source of energy?. It is unlikely that gas combustion will result in SO_2 emissions at the emission standard used to assess the maximum potential impact of the proposed facility, and therefore this scale of impact is unlikely under normal operations. Using emission factors for gas turbines combusting natural gas, compliance was simulated for hourly and daily SO_2 NAAQS.
  - Compliance with annual SO_2 NAAQS under normal operations.
  - Compliance with NO_2 hourly and annual NAAQS under normal operations.
  - Under the Emergency 3 (diesel combustion venting via the by-pass stacks) non-compliance with hourly NO_2 NAAQS is possibly if emissions are at MES. Using emission factors compliance with NAAQS is likely.
  - Compliance with NDCR, odour thresholds, and toluene health-effect screening levels due to fugitive emission sources.
  - Annual SO_2 concentrations, simulated using MES, may impact productivity of various vegetation types up to 10 km from the proposed facility (using the United Nations Economic Commission for Europe (UNECE) Convention on Long Range Trans-boundary Air Pollution Limits). These simulations assumed that the facility will operate at the regulated emission limits; however it is highly probable that the normal operation of the facility will be much lower than the emission limits. Using emission factors for gas turbines combusting natural gas, annual SO_2 concentrations are not likely to impact vegetative productivity.

8.7.2 Description of the Air Quality Impacts

The construction phase is likely to have a “medium” impact rating if unmitigated; however, suggested mitigation measures could reduce the incremental impact of construction to “low”.

Operating below the SO_2 emission limits, at levels approximating calculated emission rates, the facility would have a “medium” impact on the surrounding area (due to small extent and high probability of impact). The very low simulated concentrations for the other pollutants (PM, NO_2, TVOCs, and odour) resulted in a "low" impact significance rating.

Emergency events would have a "high" consequence rating. However, these events would only occur for very short durations and therefore an impact significance rating of "low" was assigned (like other unmitigated emissions of other atmospheric pollutants.

8.7.3 Impact tables summarising the significance of impacts on the air quality related to the RB CCPP facility and associated infrastructure during construction and operation (with and without mitigation)

Construction Phase Impacts

Nature: Emissions from Particulate and Gaseous Pollutants

Construction 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 because 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 3 km. Although residential areas may be affected, schools and medical facilities are unlikely to be affected by elevated concentrations. Areas to the south and east 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.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Local (1)
Duration	Short (2)	Short (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?	Unlikely	Unlikely
Can impacts be mitigated?	Yes, with minimum control efficiency of 50%.	

Mitigation:

» Wet suppression 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 (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 to reduce emissions from open areas.
» Restriction of construction disturbance to periods of low wind speeds (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 Impacts:

Expected to be low if mitigation measures are properly implemented

Operation Phase Impacts

Nature: Sulphur Dioxide Emissions

The normal operation of the proposed combined cycle power station will result in emission of gaseous SO_2. Increased ambient concentrations of these pollutants may contribute to negative human health impacts. If the facility normally operates at emissions rates approximating those calculated for natural gas, which is inherently very low in sulphur, it is improbable that the facility would approach the emission limits. Under these conditions, off-site exceedances of the SO_2 NAAQS are unlikely. The plant design, including fuel selection, include relevant mitigation technologies to meet emission and ambient standards under normal operations and therefore a significance rating for an additional scenario was not included.		
	With mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**(Medium) 36**	**(Medium) 36**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	
Mitigation: » 99% of operational time combusting natural gas. » A revised (lower) maximum emission limit is implemented at the facility. This could be based on the estimated limit based on simulated ambient concentrations or based on mass balance calculations using Sulfur content of natural gas (after the gas supply agreements have been reached).		
Residual Impacts: Expected to be low if mitigation measures are properly implemented.		

Nature: *Emissions due to other Atmospheric Pollutants* The normal operation of the proposed combined cycle power station will result in emission of gaseous and particulate pollutants including: NO_X, VOCs, and to a lesser extent PM and H_2S. Increased ambient concentrations of these pollutants may contribute to negative human health impacts, and nuisance odours. Increased nuisance dustfall is likely because of vehicle entrainment of particulates along access roads. 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	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Minor (2)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	**(Low) 21**	**(Low) 15**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	To some extent	
Mitigation: » Access roads are paved, and particulate content minimised through sweeping or watering. » Haul trucks to be restricted to specified haul roads and using the most direct route when making deliveries. Vehicles should not idle when stationary for extended periods of time. » Strict on-site speed control (40km/hr for heavy vehicles).		

» Control of odorous emissions from the dirty water dam through pH management, especially when sulphate loads are high.
Residual Impacts: Expected to be low if mitigation measures are properly implemented.

8.7.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the RB CCPP will be Low in the construction phase (after mitigation), and Medium to Low in the operation phase depending on the impacts. Overall, from an air quality perspective, it is recommended that the project proceed, on condition that:

» Emissions due to construction activities be mitigated using good practise guidelines.
» Maintain SO_2 and NO_X emissions near the emission factor estimates.
» To limit the possibility of off-site SO_2 exceedances during emergency events, it is suggested that Emergency 2-type events be avoided as far as practically possible, by using low sulphur (50 ppm) diesel only, when diesel is used as energy source.

8.8 Assessment of Impacts on Climate Change

Negative impacts on climate change will be due to potential greenhouse gas emission during operation activities of the RB CCPP. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix J**).

8.8.1 Results of the Climate Change Impact Assessment

This specialist climate change assessment explores the potential greenhouse gas emission and climate change impact of the proposed power plant. The study calculates the potential direct emissions from the combustion of fuel to generate electricity in the proposed power plant. These emissions from the project are interpreted in terms of their contribution to the national greenhouse gas inventory and global climate change. The emissions intensity of the proposed project is also compared against the alternative technologies and possible mitigation options as well as the baseline emissions of the national electricity grid.

The outcome of the analysis illustrates that the proposed CCPP power plant fired with natural gas is the least emissions intensive of the technology alternatives to provide mid-merit power. It is calculated to have an emissions intensity of 0.37 tonnes CO_2e per MWh. This intensity will position the proposed plant significantly below the emissions intensity for the national grid (historically and in the foreseeable future). Due to its scale, the proposed plant will still produce very large quantities of greenhouse gas emissions annually (4.6 million tonnes CO_2e). These emissions will contribute to anthropogenic climate change and its ensuing environmental impacts. The calculated significance of the power plant's impact on national emissions, and thus climate change, is high for an individual source, as it will account for as much as 1% of the South African greenhouse gas inventory. However, the greenhouse gas emissions from the individual source would not be linked, directly or indirectly, with any specific local environmental impacts as a consequence of climate change.

8.8.2 Description of the Climate Change Impacts

Climate change is a global phenomenon which is caused by collective greenhouse gas emissions from all the world's sources. As an isolated source, the greenhouse gas emissions from the proposed power plant alone will not significantly impact global climate change. The global and collective nature of climate change also makes it impossible to link the emissions from the power station to any particular climate change effects. However, in the interest of addressing the issue, each actor can take on an individual responsibility through minimising its negative emissions contributions. Thus, the project's environmental impact can be understood as its contribution to the national greenhouse gas emissions.

As the emissions from the proposed CCPP plant will significantly contribute to the national greenhouse gas inventory, the extent of the project's greenhouse emissions are considered to be very large (national). The duration of the impact of the greenhouse gas emissions is considered as effectively permanent as the greenhouse gas emissions produced are assumed to remain in the atmosphere for 100 years. As a single source, the proposed CCPP power plant's relatively large contribution to national emissions classify its impact as low . The combustion of natural gas will definitely produce carbon emissions and it is certain that these emissions will contribute to the onset of global climate change. From these parameters the significance score for the project is calculated to be high (>60). As the emitted greenhouse gases are assumed to remain in the atmosphere for such long durations the impact is effectively irreversible with the effects of climate change often resulting in the irreversible loss of resources.

8.8.3 Impact tables summarising the significance of impacts of climate change related to the RB CCPP facility and associated infrastructure during operation (with mitigation)

Nature: *Climate change impacts of the Estimated Greenhouse Gas Emissions from the proposed RB CCPP* The combustion of natural gas at the proposed power plant will produce greenhouse gas emissions which will contribute to the global phenomenon of anthropogenic climate change. Climate change is projected to effect many environmental changes across the globe. However, none of the environmental impacts can be linked directly or indirectly on any particular sources of greenhouse gas emissions. The proposed CCPP power plant will however contribute substantially to South Africa's national emissions inventory		
	Without mitigation[14]	**With mitigation**
Extent	N/a	National (4)
Duration	N/a	Permanent (5)
Magnitude	N/a	Low (4)
Probability	N/a	Definite (5)
Significance	**N/a**	**High (65)**
Status (positive or negative)	N/a	Negative
Reversibility	N/a	None
Irreplaceable loss of resources?	N/a	Yes
Can impacts be mitigated?	Yes	
Mitigation:		

[14] The proposed CCPP will use technology that has mitigation built into the technology, hence the without mitigation scenario is not applicable.

» The project can only mitigate its contribution to the national emissions and climate change by reducing its greenhouse gas emissions. This would involve substituting towards combusting sustainable biofuels or utilising carbon capture and storage technologies. » In the event that the operation of the CCPP plant provides load following capacity to mitigate grid stability for the introduction of intermittent renewable energy, it will enable increased renewable energy penetration on the South African grid as the load following capacity is able to balance shortfalls in supply from the variable renewable sources. The enabled renewable energy development will more than offset the emissions from this project.
Residual Impacts: Even if the proposed project is able to reduce its greenhouse emissions and mitigate its contribution to global climate change the risks associated with the onset of climate change will still be prevalent. This is due the vast number of other sources of greenhouse gas emissions around the world.

8.8.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of RB CCPP will be High. Despite the High significance rating of the impacts, from the outcomes of the study undertaken, it is concluded that the proposed project case of a CCPP fired with natural gas is the least emissions intensive of the option for the project. In addition, in the event that the operation of the CCPP plant provides load following capacity to mitigate grid stability for the introduction of intermittent renewable energy, it will enable increased renewable energy penetration on the South African grid as the load following capacity is able to balance shortfalls in supply from the variable renewable sources. The enabled renewable energy development will more than offset the emissions from this project. It is therefore concluded that the project can be developed. However, it is advisable for the proposed CCPP power plant to establish a carbon emissions management plan. The most effective plans will extend carbon management into the everyday organisation practices and be supported by a good governance structure with high level responsibility. It is advisable to consider the inclusion of emissions measurement systems in terms of ISO 14064.

8.9 Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of the RB CCPP. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix K**).

8.9.1 Results of the Visual Impact Assessment

Whilst this site is highly visible, the proposed development is likely to be seen in the context of other heavy industrial structures from all but the closest viewpoints. The assessment indicates that the proposed power plant and associated infrastructure will impact a highly modified landscape. Existing heavy industry is likely to screen the development from areas to the east and north east.

The likely visibility of the proposed development include the following:

» Visibility to Recreation Areas
  - o Development of the proposed site is visible to limited areas of the coastal strip and recreational areas to the north of the port. It will be seen in the context and is not likely to be distinguishable from existing adjacent industrial development. From the site visit, it was obvious that whilst segments of the proposed development could be visible, considering the distance involved, the

amount of vegetation and other industrial elements that provide screening and the industrial backdrop, it is unlikely that the development will be distinguishable.

- A view was taken from the eastern edge of the recreational area closest to the proposed development (VP10) from this viewpoint, Mondi was not visible. It is therefore highly unlikely that the proposed power plant will be visible.

» Visibility to Urban Areas
- Development is indicated as being visible to all indicated urban areas. The proposed power plant is however located immediately adjacent to existing heavy industrial areas and will either be viewed against this industrial backdrop as in the case of Esikhawini or existing industry will act as an effective screen as is the case for all other residential areas.
- In reality, the high Visual Absorption Capacity (VAC) associated with urban areas is likely to limit visibility of proposed power plant to negligible levels.
- A view was taken on the P106 on the northern edge of Esikhawini (VP4). From the site visit this was declared to be the worst case viewpoint from any residential area. From a point approximately 50m to the south of the viewpoint, it became impossible to gain a view towards the site. Views towards the site could not be found in any other settlement area.

» Visibility to Protected Areas
- The Richards Bay Game Reserve is the only formal protected area that is likely to be affected. This area is comprised of a large open lagoon fringed by mangroves and coastal vegetation.
- During the site visit it was not possible to access the Reserve as it required a permit from Transnet to access through the port.
- Development of the proposed site may be visible from sections of the Reserve, however as with views from the Coastal Recreation Area, should views be possible they will be seen in the context of other major industrial development in the area. Distance and the VAC of the intervening landscape is also likely to result in only small partial views of the development.
- A view was taken from a slightly elevated viewpoint that is located as close to the Reserve as possible (VP9). It is obvious from the viewpoint that Mondi is not visible. It is highly unlikely that the proposed development will be visible from within the Reserve, if it is it visible, the view is likely to be of a small section of the plant only and is unlikely to be distinguishable.

» Visibility to Roads
- Development of the proposed power station will be visible to approximately 11km of the N2, 13km of the R34 and 8km of the P106. However, the development will be seen against a backdrop of other heavy industrial developments that are located immediately to the north and east from most viewpoints. It is therefore unlikely to create a new area of impact but may intensify the existing industrial character of the area.
- Three views have been taken on the N2 (VP 1, VP 2 & VP 8), two viewpoints on the R34 VP 6 & VP 7), and two viewpoints on the P106 VP 4 & VP 5), in order to illustrate the anticipated impacts of the power plant.

» Visibility to Rural Homesteads
- The proposed power plant is likely to be visible to a small number of rural homesteads within the Upland Agriculture LCA inland of the coastal plain. However, only views in excess of 5.5km will be possible. Developments will also be seen in the context of other industrial development. Whilst it is possible that the development could increase the degree of industry visible it is unlikely to be a significant impact.
- Viewpoint VP2 is typical of the worst-case views of the development that are likely to be possible from Rural Homesteads.

» Visibility to the N2 Service Station

   - o The change in view experienced from the N2 Service Station is likely to be similar in nature as that described for the N2 Road.
   - o The proposed development is likely to be visible but it will be partially screened and it will be viewed against other heavy industry. It is therefore unlikely to be obvious.
   - o Viewpoint VP2 is indicates the worst-case view from this receptor.
- » Possible Implications for Landscape Character
   - o In general terms, the development of the proposed project is in keeping with the heavy industrial base in the Richards Bay area.
   - o The proposed site is located immediately adjacent to large scale industrial development and within an area in which industrial expansion is planned, and is therefore likely to have minimal impact on the character of surrounding areas.
- » Possible Implications for Visual Receptors
   - o Whilst development on the site will be visible over a relatively wide area it is unlikely to be discernible over much of the ZTV from existing heavy industry.
   - o It will be most obvious from the R34 which runs approximately 800m to the south of the site. Travellers on this road will experience closer views than any other sensitive receptor. Even here however, the development will be viewed in the context and largely with a backdrop of other heavy industrial installations. Impacts in terms of further industrialisation of surrounding landscapes as experienced by possible sensitive receptors are therefore likely to be negligible.

Overall, the significance of the visual impacts is expected to be low as a result of the generally highly modified character of the landscape.

The facility would be visible within an area that incorporates certain sensitive visual receptors, as mentioned above, who would consider visual exposure to this type of infrastructure to be intrusive. Such visual receptors are shown in **Figure 8.3.**

8.9.2 Description of Visual Impacts

Potential visual impacts on sensitive receptors that have been identified through scoping and the site visit include:

- » The proposed development could have a negative impact on urban areas. The desktop analysis indicates that distance and the VAC of the landscape is likely to help mitigate this possible impact.
- » There are eight protected areas within the approximate limit of visibility of the development. The desktop analysis indicates that the majority of these areas are likely to be unaffected although, the development may be visible from within the Richards Bay Game Reserve.
- » The proposed development could be visible from routes throughout the area. From the desktop analysis it is anticipated that some of these routes will have tourism significance although they are all currently impacted by industrial development to a degree.
- » The proposed development could impact negatively on local homesteads. There are a small number of homesteads from which the development could be visible.
- » The recreational uses on the northern side of the port could be negatively impacted by further industrialisation of the landscape.
- » A service station on the N2 that overlooks the coastal plain to the south of Richards Bay. This facility is used by many tourists as a rest and refuelling stop. Heavy industry is currently visible from this location

but the project has the potential to extend the industrial character over larger sections of the landscape as seen from this location.

- Lighting associated with the development could extend existing light pollution. There is already significant lighting associated with industry and urban development. The introduction of a new light source is not anticipated to be a significant issue particularly as it will be seen in the context of lighting associated with other industrial uses. However, good practice in ensuring that it causes minimum impact and nuisance for receptors should be ensured.

»

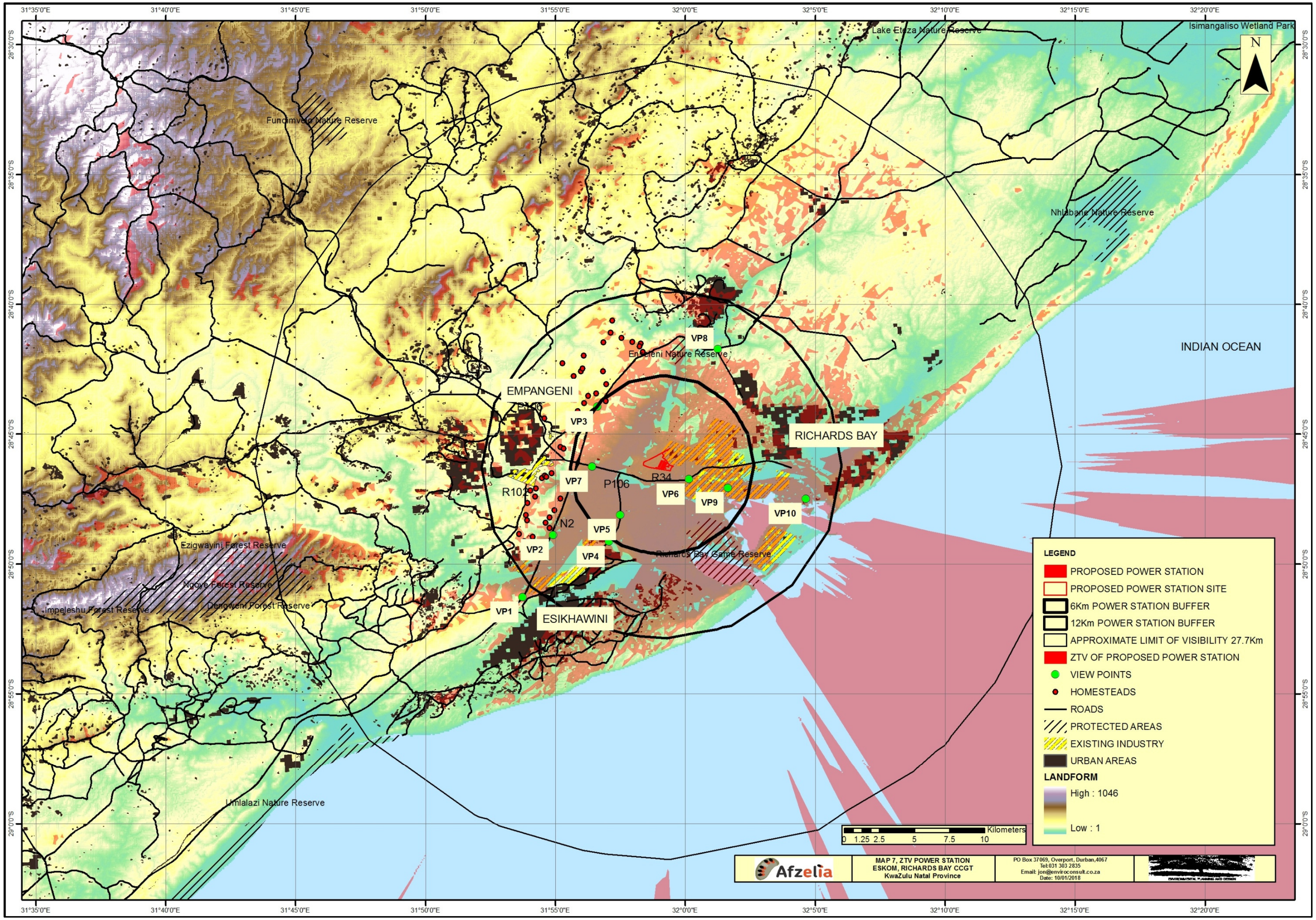

Figure 8.3: Potentially sensitive visual receptors in the area surrounding the site for the RB CCPP facility

8.9.3 Impact table summarising the significance of visual impacts during construction, operation and decommissioning (with and without mitigation)

Nature: *Industrialisation of views from Urban Areas*
The proposed development could have a negative impact on urban areas.

The analysis indicates that all urban areas other than Esikhawini will be screened from the development by existing heavy industry, landform and existing vegetation.

The assessment also indicates that the site is only likely to be visible from small sections of the northern edge of Esikhawini. From this area the power plant will be viewed against existing heavy industrial development and, due to distance, it is unlikely to be highly obvious and will not be differentiable from existing development

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	(Low) **12**	(Low) **12**
Status (positive or negative)	The affected landscape is already industrialised. From a landscape quality perspective therefore the identified impacts is likely to be neutral to negative.	Neutral to negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Not to any significant degree	

Mitigation:
Planning:
» Retain and maintain natural vegetation immediately adjacent to the development footprint.
» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

Construction:
» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake screen planting; and
» Undertake dust control.

Operations:
» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season); and
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Industrialisation of Views from Protected Areas*

There are eight protected areas within the approximate limit of visibility of the development. The analysis indicates that only the Richards Bay Game Reserve could be affected as distance, landform, forestry and other intervening landscape features will result in the development being screened from other protected areas.

Development of the proposed site may be visible from small sections of the Richards Bay Game Reserve, however, should views be possible they will be seen in the context of other major industrial development in the area. Distance and the VAC of the intervening landscape is also likely to result in only small partial views of the development being possible. These are unlikely to be obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (12)**
Status (positive or negative)	The affected landscape is already industrialised. From a landscape quality perspective therefore the identified impacts is likely to be neutral to negative.	Neutral to negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Not to any significant degree	

Mitigation:

Planning:

» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

Construction:

» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake dust control.

Operations:

» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial

and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Industrialisation of Views from Roads* The proposed project could affect views from the N2, the R34, the R102 and the P106. The N2 and R34 carry a proportion of tourism related traffic. The other affected roads are likely to carry mainly local commuter and business-related traffic. From the N2 the proposed power plant is likely to be visible. At its closest the road is approximately 4.9km from the road. The proposed power plant will be viewed with the backdrop of existing heavy industry. It is therefore unlikely to be highly obvious and will not change the nature of views from this road. The R34 is the road that runs closest and to the south of the proposed power plant. At its closest it is just under 1km from the proposed plant. From the R34, the power plant will be visible intermittently over approximately 8km. From every viewpoint it will be seen in the context of existing heavy industry. From the closest sections of the road particularly to the east of the plant the development will appear to increase the extent of existing industry. The proposed power plant will be visible from the P106, from the entire road however, it will be viewed against the backdrop of existing heavy industry. By virtue of the fact that it is closer to the road than existing industry, it will marginally increase the extent of visible industry as the viewer travels towards the plant.		
	Without mitigation	**With mitigation**
Extent	N2 Site and immediate surroundings (2) R34 Site and immediate surroundings (2) P106 Site and immediate surroundings (2)	N2 Site and immediate surroundings (2) R34 Site and immediate surroundings (2) P106 Site and immediate surroundings (2)
Duration	N2 Long term (4) R34 Long term (4) P106 Long term (4)	N2 Long term (4) R34 Long term (4) P106 Long term (4)
Magnitude	N2 Small (0) R34 Minor (2) R106 Small (0)	N2 Small (0) R34 Small to minor (1) R106 Small (0)
Probability	N2 Improbable (2) R34 Probable (3) R106 Improbable (2)	N2 Very improbable (1) R34 Probable (3) R106 Improbable (2)
Significance	**N2** **Low (12)** **R34**	**N2** **Low (12)** **R34**

	Low (24) **R106** **Low (12)**	**Low (21)** **R106** **Low (12)**
Status (positive or negative)	The affected landscape is already industrialised. From a landscape quality perspective therefore the identified impacts is likely to be neutral to negative.	Neutral to negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No irreplaceable loss.	
Can impacts be mitigated?	Not to any significant degree	

Mitigation:

<u>Planning:</u>

» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

<u>Construction:</u>

» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake dust control.

<u>Operations:</u>

» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

<u>Decommissioning:</u>

» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *<u>Industrialisation of Views from Homesteads</u>*

48 homesteads have been identified largely located between Empangeni and the N2 that have potential to be affected by views of the proposed development.

Due to fact that most homesteads are located inland of the N2 within an area or rolling hills above the coastal plain, due to VAC and distance, visibility of the proposed power plant is likely to be limited.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Small (0)
Probability	Improbable (2)	Very improbable (1)
Significance	**Low (12)**	**Low (6)**
Status (positive or negative)	Neutral to negative	Neutral to negative

Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

Construction:

» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake dust control.

Operations:

» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Recreational uses on the Northern Side of the Port could be negatively impacted by further Industrialisation of the Landscape*

The proposed power plant may be just visible to small sections of this LCA. However only small partial views are likely to be possible from a distance. These are unlikely to be distinguishable from the surrounding landscape.

Impacts therefore will be negligible.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (6)**	**Low (6)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Low	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Not to any significant degree.	

Mitigation:

Planning:

» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

Construction:

» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake dust control.

Operations:

» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Industrialisation of the view as seen from the N2 Service Station*

The proposed power plant will be viewed at a distance in excess of 8km from the viewpoint. It will also be seen against the backdrop of existing heavy industry. The development is therefore unlikely to be obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (12)**
Status (positive or negative)	Neutral	Neutral
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Not to any significant degree	

Mitigation:

Planning:

» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
» Plan colours of structures to visually blend with the local landscape.

Construction:

» Minimise disturbance and loss of existing vegetation;
» Undertake rehabilitation of disturbed areas;
» Undertake dust control.

Operations:

» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Return all possible areas to their original state; and
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. It is likely that by the time that decommissioning occurs that rural areas to the south may be developed due to both industrial and port expansion. In order to minimise this risk however, it is important that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: Lighting Impacts The introduction of a new light source is not anticipated to be a major issue in terms of general light pollution as the surrounding area already has numerous light sources. Lighting is likely to include: » Aviation warning lights are may be required on the top of the stacks; » Operational lighting will be required at buildings; » Floodlighting is likely to be required for key operational areas including the sub-station. This may be required to ensure that maintenance work can be undertaken during hours of darkness; » Internal road lighting is likely to be required; and » Security lighting is likely to be required. This may be high mast lighting or boundary lighting along the fence line. The largest risk of nuisance is likely to be associated with flood lit areas, boundary security lighting and high mast lighting. Receptors at greatest risk of impact include minor access roads.		
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small, (0)
Probability	Improbable (2)	Vey improbable (1)
Significance	**Low (16)**	**Low (6)**
Status (positive or negative)	Lighting glare affecting adjacent roads is likely to be considered negative by affected people. Negative	If lights are visible but there is no / minimal glare then lighting is unlikely to be considered as a negative impact. Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	
Mitigation: Planning: » Ensure that lighting is focused on the development with no light spillage outside the site; and » Keep lighting as low as possible.		
Residual Impacts: No residual risk has been identified.		

8.9.4 Implications for Project Implementation

Overall, the significance of the visual impacts is expected to be low after mitigation. From the outcomes of the study undertaken, it is concluded that the RB CCPP facility can be developed and the visual impacts can be managed by taking the above-mentioned mitigation measures into consideration and implementation.

8.10 Assessment of Socio-Economic Impacts

Potential social impacts and the relative significance of the impacts associated with the development of the RB CCPP are summarised below (refer to **Appendix L**).

8.10.1 Results of the Socio-Economic Impact Assessment

The construction phase of the RB CCPP development is associated with a number of social impacts. Many of the social impacts are unavoidable and will take place to some extent, but can be managed through the careful planning and implementation of appropriate mitigation measures. A number of potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as "fatal flaws".

Based on the social impact assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of a CCPP project (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e. noise and dust, wear and tear on roads) and safety and security risks), and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- Overall, numerous positive socio-economic impacts will ensue as a result of the CCPP.

8.10.2 Description of Socio-economic Impacts

The following positive and negative impacts have been identified and assessed for the RB CCPP:

Positive social impacts associated with the construction phase of RB CCPP:
- Increase in production;
- Impact on Gross Domestic Product (GDP);
- Employment creation;
- Skills development; and
- Household income and improved standard of living.

Negative social impacts associated with the construction phase of the RB CCPP:
- Demographic shift due to influx of migrant labour;
- Increase in demand for housing; and
- Pressure on basic services, social facilities and economic infrastructure.

Positive social impacts associated with the operation phase of the RB CCPP:
- Impact on production;
- Impact on GDP;
- Employment creation;
- Skills development;
- Household income and improved standard of living;
- Government revenue; and

» Improvement in energy generation sector.

8.10.3 *Impact tables summarising the significance of socio-economic impacts during construction and operation (with and without mitigation measures)*

Construction Phase Impacts

Nature: *Increase in Production* Expenditure associated with the construction of the proposed development will impact on the production of the local economy.		
	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 enhanced?	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		

Nature: *Impact on GDP* Temporary increase in country's GDP due to capital expenditure during construction		
	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 enhanced?	Yes	
Enhancement: » The project developer is to use locally sourced inputs where feasible in order to maximize the benefit to the economy.		

Nature: *Employment creation* The construction of the Combined Cycle Power Plant will positively impact on the community and beyond by creating a number of job opportunities (albeit temporary).		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)

Magnitude	High (8)	High (8)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (75)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	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 Impacts: » No residual risks are applicable.		

Nature: <u>*Skills development*</u> Employees will develop and enhance skills thereby increasing experience and knowledge.		
	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 enhanced?	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 Impacts: » No residual risks are applicable.		

Nature: <u>*Household income and improvement of standard of living*</u> Employed individuals will increase the income of their respective households and thereby experience an improvement in their 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 enhanced?	Yes	
Enhancement:		

» Local employment will benefit local households and the local area.
Residual Impacts:
» No residual risks are applicable.

Nature: _Demographic shift due to influx of migrant workers_ An impact on the demographics of the area as a result of in-migration in response to job opportunities will occur.		
	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	
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.		
Residual Impacts: » A minimal amount of migrant labour will not be employed by the proposed project.		

Nature: _Increase in demand for Housing_ The construction of CCPP may have a negative impact on the physical capital of the area by placing strain on the housing market.		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Short duration (2)	Short duration (2)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Communication and collaboration with the City of uMhlathuze Municipality in ensuring that additional housing is planned in areas that are accessible from the project site is to take place. » Hiring people who reside within the area will decrease demand for new houses by migrant labour. » Utilising housing which comes available from the completion of other construction in the area would minimise the impact.		
Residual Impacts: » No residual risks are applicable.		

Nature: _Pressure on Basic Services, social facilities and economic infrastructure_

Pressure on basic services, social facilities and economic infrastructure may occur due to increased demand from migrant labour and job seekers.		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Short duration (2)	Short duration (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Clearly inform the local municipality of the potential impact of the proposed project in order for the necessary preparations to take place. » 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. » Hiring people who reside within the area will decrease demand for basic services by migrant labour.		
Residual Impacts: » No residual risks are applicable.		

Operation Phase Impacts

Nature: *Impact on Production* Expenditure associated with the operation of the proposed development will have a positive impact on production.		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (60)**	**High (68)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	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 risks are applicable.		

Nature: *Impact on GDP* Positive impact on GDP due to operating expenditure during operations.		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)

Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (60)**	**High (68)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	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 risks are applicable.

Nature: *Employment Creation*

The operation of the combined cycle power plant will positively impact on the community and beyond by creating a number of job opportunities.

	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (75)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes	

Enhancement:

» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impacts:

» No residual risks are applicable.

Nature: *Impact on skills development*

Employees will develop and enhance skills thereby increasing experience and knowledge.

	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 enhanced?	Yes	

Enhancement:

» In order to maximise the positive impact, it is suggested that Eskom 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: » No residual risks are applicable.

Nature: *Positive impact on household income and improvement in standard of living* Employed individuals will increase the income of their respective households and therefore improve their standard of living.		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (75)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes	
Enhancement: » Employing locally will increase benefit to local households and the local area.		
Residual Impacts: » No residual risks are applicable.		

Nature: *Impact on Government Revenue* Government revenue will be derived from the proposed development.		
	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 enhanced?	No	
Enhancement: » None.		
Residual Impacts: » No residual risks are applicable.		

Nature: *Improvement in the energy generation sector* Improved energy security and energy sector will result due to the development of the Closed Cycle Power Plant.		
	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 enhanced?	No	
Enhancement: » None.		
Residual Impacts: » No residual risks are applicable.		

8.10.4 Implications for Project Implementation

Overall, the significance of the socio-economic impacts expected are largely positive and are High in both the construction and operation phase with enhancement measures. Negative impacts are however also expected in the construction phase, and are Low after mitigation. From the outcomes of the study undertaken, it is concluded that the RB CCPP facility can be developed, and the negative socio-economic impacts can be managed by taking the above-mentioned mitigation measures into consideration and implementation. Ultimately, however, the numerous positive socio-economic impacts are expected to outweigh the negative socio-economic impacts as a result of the CCPP.

8.11 Assessment of Impacts on Traffic

8.11.1 Results of the Traffic Impact Assessment

Potential traffic impacts and the relative significance of the impacts associated with the development of the RB CCPP are summarised below (refer to **Appendix M**).

8.11.2 Description of Traffic Impacts

Potential traffic impacts are mainly related to the proposed development access, trip generation and traffic impact on the existing affected road network.

8.11.3 Impact tables summarising the significance of impacts on traffic during the construction and operation phases (with and without mitigation)

Construction Phase Impacts

Nature: Traffic Impacts relating to the Construction Phase of the RB CCPP

During the construction phase (36 to 48 months) the road network surrounding the CCPP Plant will be affected. There will be an increase in traffic impacting on traffic volumes, congestion and road safety (light vehicles, buses, mini-vans (taxis) and as well as heavy construction vehicles), however the extent of the impact will be small and of a local nature. The traffic expected during the construction phase will temporarily add a relatively insignificant traffic volume to the intersection of John Ross Highway / Western Arterial.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (4)	Minor (3)
Probability	Definite (5)	Definite (5)
Significance	**Medium (35)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No, construction traffic will only occur during the construction phase.	No, construction traffic will only occur during the construction phase.
Can impacts be mitigated?	Yes, road safety can be enhanced.	

Mitigation:

- » All construction vehicles must be road worthy.
- » All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.
- » Heavy construction vehicles should be restricted to off-peak periods.
- » Abnormal load vehicles require specific permit for transporting loads, and require liaison with relevant road authorities to ensure route suitability.
- » Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during construction.
- » Provide flagmen at the access when accommodating abnormal load vehicles.
- » The site access road leading into the site should be hard surfaced for 40 m or more to reduce material carry into Western Arterial.
- » Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety.
- » On-site parking and safe turn-around facilities should be provided for private vehicles and for buses and mini-buses transporting workers to and from site.
- » Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting
- » The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met.

Residual Impacts:

- » Minor degradation of the local road network due to increased traffic volumes.

Operation Phase Impacts

Nature: *Traffic Impacts relating to the Operation of the RB CCPP*

There will be an insignificant increase in traffic impacting on traffic capacity and road safety at the site access intersection with Western Arterial and at the intersection of John Ross Highway / Western Arterial. The operation phase traffic will add a relatively insignificant traffic volume to the road network without any major traffic impact.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small (3)	Small (2)
Probability	Probable (5)	Probable (5)
Significance	**Medium (40)**	**Medium (35)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, road safety can be enhanced.	
Mitigation: » Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety. » On-site parking and safe turn-around facilities should be provided for private vehicles and for buses and mini-buses transporting workers to and from site. » Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting » The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met.		
Residual Impacts: » Minor degradation of the regional and local road network of the surrounding area.		

Decommissioning phase Impacts

Nature: *Traffic impacts relating to the Decommissioning of the RB CCPP* The road network surrounding the CCPP Power Station will be affected. There will be an increase in traffic impacting on traffic capacity and road safety at the intersection of John Ross Highway and Western Arterial. The traffic expected during the decommissioning phase will temporarily add an insignificant traffic volume to the road network.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (4)	Minor (3)
Probability	Probable (3)	Probable (3)
Significance	**Low (18)**	**Low (15)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, road safety can be enhanced.	
Mitigation: » All construction vehicles must be road worthy. » All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road. » Heavy vehicles should be restricted to off-peak periods. » Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during decommissioning.		
Residual Impacts: » Minor degradation of the regional and local road network.		

8.11.4 Implications for Project Implementation

Overall, the significance of the negative traffic impacts expected are Medium in both the construction and operation phase with mitigation measures. Negative impacts are also expected in the decommissioning phase, and are Low after mitigation. From the outcomes of the study undertaken, it is concluded that the RB CCPP facility can be developed, and the negative traffic impacts can be managed by taking the above-mentioned mitigation measures into consideration and implementation.

The following recommendations are also to be taken into consideration:

» The various mitigation measures contained in this report and as listed below, are implemented in the interests of road safety.
» All construction vehicles must be road worthy.
» All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.
» Heavy construction vehicles should be restricted to off-peak periods.
» Abnormal load vehicles require specific permit for transporting loads, and require liaison with relevant road authorities to ensure route suitability.
» Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during construction.
» Provide flagmen at the access when accommodating abnormal load vehicles.
» The site access road leading into the site should be hard surfaced for 40 m or more to reduce material carry into Western Arterial.
» Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety.
» On-site parking and safe turn-around facilities should be provided for private vehicles and for and mini-buses transporting workers to and from site.
» Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting
» The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met.
» The proposed CCPP access and parking layout (not yet designed) is to be submitted to the local authority for approval.

8.12 Quantitative Risk Assessment

Potential risk impacts and the relative significance of the impacts associated with the development of the RB CCPP are summarised below (refer to **Appendix N**).

8.12.1 Results of the Risk Assessment

This risk assessment included the consequences of fires and explosions as well as toxic releases at the **Error! Reference source not found.** facility in **Error! Reference source not found.**. A number of well-known sources of incident data were consulted and applied to determine the likelihood of an incident to occur.

The following installations were considered for analysis in the Qualitative Risk Assessment (QRA):

» Chlorine;
» Natural gas;
» Diesel;
» Hydrogen;
» LPG; and
» Ammonia.

Consequences for the installations were analysed and assessed, with several worst case scenarios having the potential to affect individuals located offsite. The largest of these was toxic vapour dispersion from the catastrophic rupture of a chlorine drum stored on-site. The likelihood of failure of these installations were assessed and the combination of consequence and likelihood being used to calculate the overall individual and societal risk. Overall individual and societal risk were found to be broadly acceptable according to the acceptability criteria for individual risk. Societal risk was found to be negligible and therefore also broadly acceptable.

8.12.2 Description of Risk Impacts

The following negative risk impacts have been identified and assessed for the RB CCPP:
» Catastrophic rupture of chlorine storage vessel; with subsequent dispersion of toxic vapours over the surrounding area;
» Full bore rupture of incoming natural gas line with flammable vapour dispersion, ignition and flash fire or explosive effects;
» Catastrophic diesel tank rupture with full bund fire and possible bund overtopping;
» Catastrophic rupture of hydrogen storage vessel leading to flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects;
» 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; and
» Catastrophic rupture of ammonia storage vessel with subsequent dispersion of toxic vapours over surrounding area.

8.12.3 Impact tables summarising the significance of impacts on risk during the operation phases (with and without mitigation)

Operation Phase Impacts

Nature: *Impact assessment of Chlorine Installation* Worst case loss of containment scenario – catastrophic rupture of chlorine storage vessel with subsequent dispersion of toxic vapours over surrounding area.		
	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 12**	**(Low) 9**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)

Can impacts be mitigated?	Yes
Mitigation: » Mitigation includes a regional (industrial area-wide) emergency response plan with involvement by the local authorities as well as alarms and communication systems which allow for fast and effective communication to neighbouring facilities such as the Mondi facility to the north. The area around the site is sparsely populated, so any impact would not be experienced by a large number of people.	
Residual Impacts: Even with mitigation, there is still possibility of human death as a result of prolonged exposure to chlorine vapour and as such, any impact could be irreversible (human death). However, the area over which impact would occur could experience up to a 1% fatality probability.	

Nature: *Impact Assessment of Natural Gas Installation* Worst case loss of containment scenario – full bore rupture of incoming natural gas line with flammable vapour dispersion, ignition and flash fire or explosive effects.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 11**	**(Low) 8**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	
Mitigation: » Mitigation would include sufficient emergency shut-down valving systems, gas detection, alarm and executive function systems to limit the amount of vapour that's released.		
Residual Impacts: Even with mitigation, there is still possibility of human death as a result of flash fire thermal radiation exposure, or vapour cloud explosion overpressure exposure. The area over which impacts occur could be limited, however, those caught up in an event could suffer death.		

Nature: *Impact Assessment of Diesel Installations* Worst case loss of containment scenario – catastrophic tank rupture with full bund fire and possible bund overtopping.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 11**	**(Low) 8**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	
Mitigation: » Mitigation would include emergency response arrangements and systems such as foam pourers, fire-fighting systems and cooperation with emergency responders. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment, 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 Impacts: Even with mitigation, there is still possibility of human death as a result of pool fire thermal radiation and smoke exposure. There is also possibility of contamination of ground and water systems from diesel spills and exposure to fire-fighting foam.

Nature: *Impact Assessment of the Hydrogen Installation* Worst case loss of containment scenario – catastrophic rupture of hydrogen storage vessel leading to flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 10**	**(Low) 8**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	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, 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 Impacts: With mitigation, correct muster and fire-fighting arrangements and execution, there should be limited residual risk.		

Nature: *Impact Assessment of Liquefied Purified Gas (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	Local (2)	Local (1)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 11**	**(Low) 8**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	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.
Residual Impacts: 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 Assessment of Ammonia Installations* Worst case loss of containment scenario – catastrophic rupture of ammonia storage vessel with subsequent dispersion of toxic vapours over surrounding area.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Very Short (1)	Very Short (1)
Magnitude	High (8)	Moderate (6)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**(Low) 11**	**(Low) 8**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes (human)	Yes (human)
Can impacts be mitigated?	Yes	
Mitigation: » Mitigation includes an effective emergency response plan with involvement by the local authorities as well as alarms and communication systems which allow for fast and effective communication for muster of employees. The area around the site is sparsely populated, so any impact would not be experienced by a large number of people.		
Residual Impacts: Even with mitigation, there is still possibility of human death as a result of prolonged exposure to ammonia vapour and as such, any impact could be irreversible (human death). However, the area over which impact would occur could experience up to a 1% fatality probability.		

8.12.4 Implications for Project Implementation

Overall, the significance of the negative risk impacts expected are Low for impacts during the operation phase, with mitigation measures. From the outcomes of the study undertaken, it is concluded that the RB CCPP facility can be developed, and the negative risk impacts can be managed by taking the above-mentioned mitigation measures into consideration and implementation.

The following recommendations are also to be taken into consideration:

» 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;
» 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;
   * Noting that codes such as IEC 61511 can be used to achieve these requirements;
» Demonstration by **Error! Reference source not found.** or their contractor that the final designs would reduce the risks posed by the installation to internationally acceptable guidelines;
» 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);
» Permission not being granted for increases to the product list or product inventories without redoing part of or the full EIA;
» Final acceptance of the facility risks with an MHI risk assessment that must be completed in accordance to the MHI regulations:
   * Basing such a risk assessment on the final design and including engineering mitigation

8.13 Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing RB CCPP. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of a CCPP facility.

a) Ecology

The project site falls within a High Impact Industry zone, with designated conservation areas present to the northwest and southeast. On a local scale, connectivity between natural habitats and ecosystems has already been severely compromised by high levels of infrastructural developments resulting in only small fragmented pockets of natural and/or semi-natural habitat remaining in most instances. Thus, from a biodiversity perspective, presently the connectivity of natural habitat (albeit of endangered and vulnerable conservation status) on the project site with natural habitats adjacent to the project site is poor. Furthermore, the current state of the vegetation of the project site comprises highly transformed habitats in the majority of the project site due to historical and current disturbances, coupled to its isolated nature with regards to adjacent vegetation communities. Should the proposed RB CCPP not proceed with development, the current state of the ecological environment will remain as is. It should however be noted that the project site falls within the Industrial Development Zone (IDZ) of Richards Bay where future developments are planned. Full restoration of the original environment and biota will thus not be feasible in the long term regardless of whether this project proceeds or not.

b) Land use and agriculture

The project area is approximately 71 ha in size with grazing/veld activities dominating the area. The wetland areas are 37.5 ha of the project area, with a small portion being infrastructure and the remaining area being

Veld (Grazing). Whilst the land capability of portions of the project site include for Class III (Moderate Cultivation) and Class IV (Light Cultivation/ Intensive Grazing) land capabilities, the project area is currently being utilised for grazing, and no cultivation is possible due to the shallow water table and the sandy nature of the soils present.

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current agricultural activities, losing out on the opportunity to generate energy (i.e. current agricultural activities would continue). Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use for the project site that has been designated for such use at a strategic level.

c) Socio-economic impact

Social: The impacts of pursuing the "no-go" alternative are both positive and negative as follows:

» The benefits would be that there is no demographic shifts due to influx of migrant labour, increase in housing demand and pressure on basic services, social facilities and economic infrastructure. The impact is therefore neutral.
» There would however also be an opportunity lost in terms of increase in production, increase in GDP, employment creation, skills development, increase in household income during the construction phase. In addition, and more importantly from a longevity perspective, is that there would also be a long term opportunity lost in terms of increase in production, increase in GDP, employment creation, skills development, increase in household income, increase in government revenue and energy security given the 25 year lifespan of the project.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of significant socio-economic benefits, when considering the current socio-economic conditions of the area.

Employment: The proposed power plant will create around 90 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 current labour participation rate is 58% in the City of uMhlathuze Municipality. The operations of the CCPP will therefore increase the number of employed working age individuals, thus slightly combating local unemployment. The electricity sector currently absorbs 0.3% (392 people) of the total employed in the area; therefore, the created employment opportunities at the CCPP will assist in increasing the electricity sector's labour absorption in the municipality.

In addition to the direct jobs created on site, the power plant will also stimulate the creation of 2 523 sustainable employment opportunities through production and consumption induced impacts. Overall, a total contribution of the project towards sustainable employment creation in South Africa will be 2 613 jobs that will be supported. Jobs created during operations through multiplier effects will be distributed among all economic sectors. The largest number of jobs will be created in the transport and storage, and trade and accommodation sectors. The employment created will be for a sustainable period of 25 years.

Given the above, the upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development:
The specialty of the CCPP requires and creates scarce skills that will be imperative in the long run if other CCPPs are developed as envisaged in policy. 90 jobs are planned to be created for the operations of the CCPP. From this, 30-40 jobs are to be filled by highly skilled employees, 40-45 jobs are meant for skilled workers and the remaining 10-15 are dedicated to semi-skilled or unskilled employees.

The employment opportunities are for a long-term period of 25 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. Ultimately, the plant's construction will lead to enhanced skills through training and experience in the wider national economy.

The above-mentioned skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

District and Local Planning goals:
From a District level, the Richards Bay Industrial Development Zone (RB IDZ) is identified as a catalytic project (uThungulu DM, 2016). The objective is to promote economic growth in the District and improve the socio-economic conditions of the residents. The Richards Bay CCPP will be located in the IDZ Phase 1D (Provincial Planning Commission, 2016), and is therefore considered to contribute to the achievement of the IDP's goals relating to economic growth and social upliftment through employment creation and skills development.

In addition to the above, the objective of the Integrated Development Plan (IDP) is to promote economic growth in the District and improve the socio-economic conditions of residents (uMhlathuze LM, 2016). 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. The development of the Richards Bay CCPP will assist with the 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.

Moreover, amongst other industrial efforts, the RB IDZ has assumed a role in stewarding the establishment of an energy production hub (Richards Bay IDZ SOC, 2016). In addition, energy is one of the economic comparative advantages and there are key opportunity areas for gas-to-power facilities, such as the project site (Phase 1D), which form part of the IDZ. There are on-going collaborations with the Department of Energy to ensure that the province of KwaZulu-Natal contributes significantly to the diversification of the energy mix and the supply of clean and affordable electricity. Furthermore, these efforts will produce diversified energy generation capacity. Through the development of the Richards Bay CCPP within the preferred project site (IDZ – Phase 1D), the establishment of energy production projects within the IDZ will be realised.

The no-go alternative will therefore result in the above energy security benefits and economic benefits not being realised, and a subsequent loss of income and opportunities to local people. From this perspective the no-go alternative is not preferred.

d) Regional scale impact

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of gas-to-power energy would not be realised. The RB CCPP is proposed to contribute a contracted capacity of 3 000MW to the grid capacity, which would assist in meeting the electricity demand and security supply issues throughout the country, and would also assist in meeting the government's goal for alternative energy generation in the energy mix. The generation of electricity from gas-to-power energy offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

- Increased energy security;
- Resource saving (i.e. fossil fuels and water);
- Pollution reduction;
- Support for international agreements;
- Employment creation;
- Acceptability to society; and
- Support to a new industry sector.

South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's gas-to-power energy potential largely untapped to date.

The Integrated Resource Plan (IRP) includes 9.6GW of nuclear, 6.2GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro and gas. The latest update of the IRP includes estimates[15] that 8.1GW of gas / diesel generated energy would be required by the end of 2030. This plan is yet to be finalised and promulgated. Nonetheless, the IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies. In response to the need for a supply of clean and modern forms of electricity at an affordable price, Eskom is proposing the construction of the Richards Bay CCPP.

The no-go alternative will therefore result in the above alternative energy generation sources and energy security benefits not being realised. From this perspective the no-go alternative is not preferred.

e) Conclusion

Although a number of impacts will result in High impacts
, no environmental fatal flaws were identified to be associated with RB CCPP through the specialist studies undertaken,. All impacts associated with the project can be mitigated to acceptable levels and with the

15 These figures reflect the new additional capacities within the Proposed Updated Plan for the period ending 2030.

implementation of a wetland offset plan. If the RB CCPP facility is not developed the following positive impacts will not be realised:

» Increase in production, increase in GDP, employment creation, skills development, increase in household income, increase in government revenue and energy security.
» Meeting of energy generation mix in a most economic and rapid manner.
» Provision of cleaner, gas-to-power energy (when compared with coal power generation) alternative supply.

The ‘do nothing’ alternative is therefore not preferred and not proposed to be implemented for the development of RB CCPP.

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the RB CCPP may have effects (positive and negative) on natural resources, the social environment and on the people living in the project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the RB CCPP only, not taking into account similar surrounding developments from a cumulative perspective. This chapter therefore considers the potential cumulative impacts associated with the development of the project.

Concerns are often raised in the environmental impact assessment process regarding long term environmental changes, not only as a result of a single action, activity or development project, but the combined effects of many actions over time. 'Cumulative impacts' or 'Cumulative effects' are commonly understood as the impacts operating over different temporal and spatial scales which combine from different projects or activities which result in significant change, which often exceeds the simple sum of all the individual impacts (DEAT, 2004). Cumulative effects generally occur under three typical scenarios:

» When impacts on the environment take place so frequently that the effects of individual impacts cannot be assimilated by the environment;
» When impacts occur so densely spatially that the effects of individual impacts cannot be assimilated by the environment; and
» When the impacts of one activity/project combine synergistically with those of another.

Each individual development, when assessed in isolation, may produce impacts that are environmentally and socially acceptable or insignificant, however, when the effects of the numerous single developments are considered in combination, these impacts may become 'cumulatively significant'. In recent years there has been a growing realisation that the process of evaluating the positive and negative environmental impacts of individual developments, which may be unobjectionable in themselves, do not adequately take into account the cumulative nature of individual impacts. The complicating factor is that the projects then need to be considered from the perspective of past, present and reasonably foreseeable future development. Put another way then, cumulative effects are "*…changes to the environment that are caused by an action in combination with other past, present and future human actions*" (DEAT, 2004).

This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with the other known projects within the area.

9.1 Approach taken to Assess Cumulative Impacts

The assessment of cumulative impacts requires a holistic view, interpretation and analysis of the biophysical, social and economic systems and is limited and constrained by the current methods used for identifying and analysing cumulative effects.

The following principles were used in describing and assessing cumulative impacts of the proposed development (after DEAT, 2004):

» Cumulative effects/impacts are caused by the aggregate of past, present, and reasonably foreseeable future actions;
» Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who has taken the action;

- It is not practical to analyse the cumulative effects of an action on every environmental receptor, and therefore the list of environmental effects must focus on those that are truly meaningful;
- Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries;
- Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects (repeated actions may cause effects to build up);
- Cumulative effects may last for years beyond the life of the action that caused the effects;
- Cumulative impacts can be characterised according to impact pathways (one pathway could be the persistent additions from one process and yet another pathway could be the compounding effect from one or more processes);
- Cumulative impacts can also occur when thresholds are passed or when interaction is antagonistic; and
- Each affected resource, ecosystem, and human community must be analysed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.

The cumulative impacts that have the potential to be compounded through the development of the power plant and its associated infrastructure in proximity to other developments include impacts such as those listed in Chapter 8. The role of the cumulative assessment is to test if such impacts are relevant to the gas to power project in the proposed location, that is, in the Richards Bay Industrial Development Zone (RBIDZ): Phase 1D, resulting in:

- Unacceptable loss of threatened or protected vegetation and wetland types or species through clearing, resulting in an impact on the conservation status of such flora or ecological functioning;
- Unacceptable impacts on water resources;
- Unacceptable loss of soils for agricultural potential use;
- Unacceptable impacts on hydrogeological resources;
- Unacceptable impacts on heritage resources;
- Unacceptable impacts with regards to climate change reduction targets;
- Complete or whole-scale change in sense of place and character of an area;
- Unacceptable increase in ambient air quality levels, resulting in an impact on the health of the occupants within the area and an increase in pollutants in the area;
- Unacceptable impacts on heritage resources;
- Unacceptable socio-economic impacts;
- Unacceptable traffic impacts; and
- Unacceptable risk potential impact to human safety and life.

Figure 9.1 indicates the location of the gas to power plant in relation to all other known developments in the RBIDZ: Phase 1D.

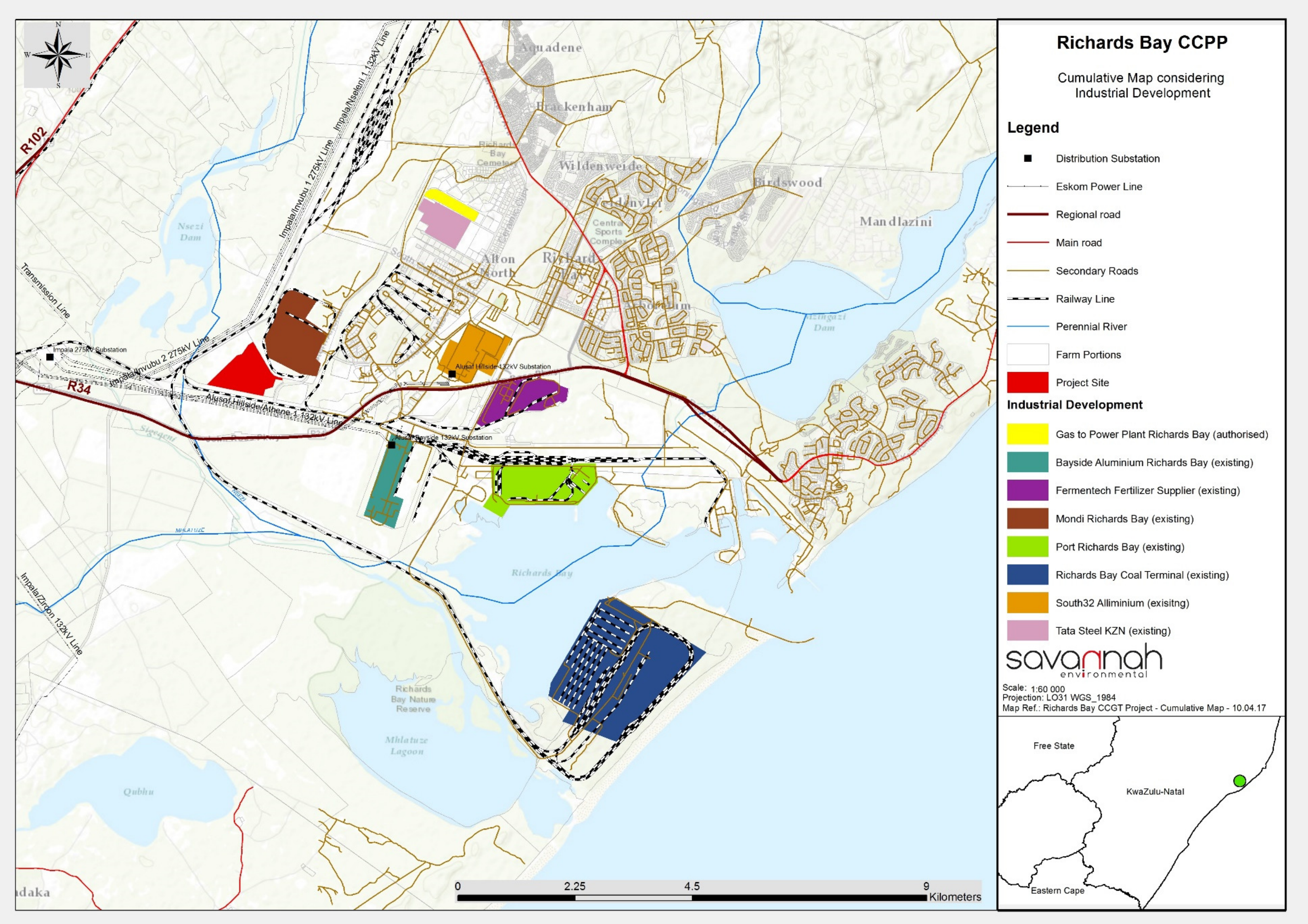

Figure 9.1: RBIDZ: Phase 1D Land Allocation, indicating planned developments within this phase and in the surrounding area

As can be seen from **Figure 9.1**, the RBIDZ: Phase 1D is planned to include the following zoning:

» Portion 1 of erf 11376 is zoned conservation;
» Portion 2 of erf 11376 is zoned high impact industry;
» Portion 3 of erf 11376 is zoned conservation (to be confirmed);
» Portion 4 of erf 11376 is zoned private road; and
» Erf 15410 is zoned general industry.

The Richards Bay IDZ and the City of uMhlathuze Municipality have, in the last two years, collaborated in taking the position as a conduit for the gas to power option. The City initially delineated eight portions to the RBIDZ, including phase 1D. According to the Land Use Manager of the City, though, Phase 1D was not accepted by the RBIDZ. Nonetheless, Phase 1D has been reserved by the City of uMhlathuze Municipality as part of the Industrial Development Zone (IDZ) to house industrialisation and other strategic projects such as gas to power projects.

The following table (**Table 9.1**) summarises the information gathered using both secondary and primary data sources with respect to land uses of the potentially directly and indirectly affected land portions (Urban-Econ, 2019).

Table 9.1: Landowner concerns and information

Land Portion	Land Owner	Orientation	Information
Portion 1 of erf 11376	City of uMhlathuze Municipality	Directly Adjacent land	» Conserved land
Portion 2 of erf 11376	City of uMhlathuze Municipality	Impacted land	» Reserved for industrial and high impact industry » Land not serviced » Current servitude has no impact
Portion 3 of erf 11376	City of uMhlathuze Municipality	Directly Adjacent land	» This land can be used for coverage and off-set purposes.
Portion 4 of erf 11376	City of uMhlathuze Municipality	Impacted land	» Land to be used as an access road » Land not serviced
Erf 15410	City of uMhlathuze Municipality	Adjacent land	» No activity taking place on land
Remainder of Erf 5333	Transnet	Directly Adjacent land	» Not developable » Currently a portion has a Truck area » Portion of land used for banana farming
Erf 2 of erf 6724	Unknown	Adjacent land	No information
Erf 3 of erf 6724	Unknown	Adjacent land	No information
Erf 5 of erf 6724	Unknown	Adjacent land	» Industrial activity taking place
Erf 6 of erf 6724	Unknown	Adjacent land	No information
Erf 7 of erf 6724	Mondi	Directly Adjacent land.	» Possible health threat to CCPP employees due to odorous gases emitted at Mondi » In support of the project » Road infrastructure is well maintained » Water scarcity is a concern » Skills shortage is a problem » Electrical lines not well maintained
Farm 15825	Transnet	Adjacent land	» Proposed development for land: toll gate for trucks

Land Portion	Land Owner	Orientation	Information
Erf 15424	City of uMhlathuze Municipality	Adjacent land	» Relatively high property value
Erf 16676	Unknown	Adjacent land	No information

The Mondi factory located directly north-east of the proposed project site is the biggest pulp factory in the country. The factory has facilities for wood chopping, a chemical plant, a power island, a bleaching plant, and a treatment facility. In addition, Mondi exports energy onto the grid, and completely generates its own power. The potential impact stated by the environmental manager of Mondi is the odorous gases that may be a nuisance to the CCPP employees.

The general overview of the zone of influence is agricultural activity co-existing with industrial activity. The proposed project is strongly supported by the City of uMhlathuze Municipality, as well as the adjacent land owners including Transnet and Mondi amongst others. The concerns raised, however, include water scarcity, skills shortage, and limited maintenance of powerlines.

In consideration of the information provided above, the potential for cumulative impacts are summarised in the sections which follow and have been considered within the detailed specialist studies, where applicable (refer to **Appendices D – N**).

With the surrounding portions of land for Phase 1D being zoned for conservation and due to the uncertainty of land use or planned development for Erf 15410, it is difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known developments in the broader area and the gas to power plant are therefore qualitatively assessed in this Chapter.

As these cumulative impacts are explored in more detail, the trade-offs between promoting fuel diversification (i.e. the gas industry) in the South African energy mix (and the associated benefits in terms of reduction in CO_2 emissions[16] – a national interest) versus the local and regional environmental and social impacts and benefits (i.e. impacts on ecology, the local economy, employment, ambient air quality, etc.) will become evident. It is only when these trade-offs are fully understood, that the true benefits of gas-produced energy can be assessed.

9.2 Cumulative Impacts on Ecological (fauna, flora and avifauna) Impacts

Cumulative impacts associated with RB CCPP and the associated infrastructure have been identified by the ecological specialist (refer to **Appendix D**).

Past ecological impacts include the following:

» The development of the Richards Bay Coal Railway line which borders the Biodiversity Offset area to the north, and the project site to the south. This railway line crosses three NFEPA wetlands, causing extensive

[16] Relative to equivalent energy from other fossil fuels and lower particulate emissions relative to coal during its operation.

fragmentation of these sensitive aquatic ecosystems. In addition to the fragmentation, land clearance to accommodate infrastructure resulted in the direct loss of indigenous vegetation and an increase in Invasive Alien Plants (IAPs) and weeds along the edges of this linear development, resulting in IAP and weed invasions on the adjacent properties.

» The deforestation of large woodland trees on the project site. This, together with the current grazing pressure probably contributed to the proliferation of the woody scrubs *Helichrysum kraussii* and *Dichrostachys cinerea*.
» A wetland on the project site has been fragmented by an informal gravel road.

Present ecological impacts include the following:

» Fragmentation of sensitive vegetation types and ecosystems as a result of industrial developments and infrastructure;
» Grassland/wetland habitat degradation through grazing by livestock;
» Fragmentation of sensitive aquatic ecosystems;
» Loss of threatened and protected fauna species;
» Loss of protected flora species;
» Hunting of wildlife on the project site; and
» IAP and weed proliferation and an increased source of regenerative/seed material.

Future development pressure and anticipated consequent ecological impacts include the following:
» The destruction of natural vegetation;
» The destruction of sensitive aquatic ecosystems;
» Habitat fragmentation;
» Post-disturbance proliferation of IAPs and weeds;
» Increase in noise and light pollution
» Soil pollution and sedimentation
» Soil erosion

In light of the above, the ecological impacts associated with RB CCPP will be of a High to Medium significance, depending on the cumulative impact being considered.

Nature: *Cumulative impacts on regional and municipal conservation targets* Most of the project site is located within the 'Endangered' Maputaland Wooded Grassland (Veg code CB 2) vegetation type, with small areas extending into the 'Vulnerable' Subtropical Freshwater wetland ecosystems (Veg code 76.1). Provincial conservation targets for the Maputaland Woodland Grassland vegetation type has been set at 25%, however, only 17% is protected within the province, with an estimated 37 % of the original extent of this vegetation type remaining (eKZNw: KZN Targets, statistics and conservation status October 2011). Thus, further loss of this vegetation type could potentially affect the ability to meet provincial conservation targets. Although vegetation on the project site within the Maputaland Wooded Grassland vegetation type is quite large (~ 65 ha), the area has been severely impacted on by past anthropogenic disturbance. The project site is effectively isolated from adjacent semi-natural patches by infrastructural developments such as roads and railway lines, and is therefore unlikely to contribute significantly to provincial conservation targets. The 'Vulnerable' wetland ecosystems on the project site are approximately 3,6 ha in extent. Similar to the Maputaland Wooded Grassland vegetation type, provincial conservation targets (24 %) for this vegetation type is not being met

(areas currently protected = 15.3 %). Similar to the Maputaland Wooded Grassland vegetation type, further loss of this vegetation type could potentially affect the ability to meet provincial conservation targets. Future developments within the Richards Bay Industrial Development Zone will further isolate the few natural/semi-natural areas still present. Although the Umhlathuze Land Use scheme has set aside several areas for conservation, these areas are relatively small in relation to current and anticipated developments, scattered across the landscape (such as those within the vicinity of the project site), with no corridors connecting several of the smaller conservation areas, thereby creating greater obstacles to migration and dispersal, and an increase in 'edge' effects. In urban areas, the main problems associated with an increase in edge effects includes the proliferation of IAPs and weeds, the presence of cats and dogs which may kill native birds, human damage such as litter, trampling or vandalism, and the diversion of rainwater. Consequently, these impacts may render the objective of conservation areas moot.		
	Overall impact of the proposed project considered in isolation (without mitigation)	**Cumulative impact of the project and other projects in the area (with mitigation)**
Extent	Local (2)	Local (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	High (8)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**(Medium) 44**	**(High) 64**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Given the extent of current habitat transformation within these vegetation types, mitigation would be extremely difficult.	
Mitigation: » It is strongly recommended that the appropriate regional and local authorities undertake a more strategic assessment to understand the cumulative impact of future industrial and other development on the sensitive biodiversity of the Maputaland Wooded Grassland and Subtropical Freshwater vegetation types. In this way the potential cumulative impacts can be identified and proactively managed at the appropriate planning level. » Mitigation measures such as the implementation of corridors that connect conservation areas might be considered. Strategically, the Richards Bay authorities should maintain corridors of remnant natural vegetation in the landscape which new developments must avoid and which would provide for increased ecosystem resilience.		

Nature: Loss of Species of Conservation Concern (SCC) fauna and flora species The clearance of natural vegetation to accommodate infrastructure could lead to the destruction of SCC fauna and flora species. Not only are several SCC fauna and flora species confirmed to be present on the project site, similar studies within the Richards Bay Industrial Development Zone have confirmed the presence of several SCC flora species. Flora species such as *Crinum delagoense* (Declining), *Ledebouria ovatifolia* (SA endemic), *Boophane disticha, Hypoxis hemerocallidae, Eulophia speciosa* (all listed as Declining) and *Barringtonia racemose* (protected under the National Forest Act; Eco-Pulse, 2016, Exigent, 2017) could be affected. Within the broader RBIDZ, these and potentially other SCC fauna and flora species could be lost to future developments.		
	Overall impact of the proposed project considered in isolation (without mitigation)	**Cumulative impact of the project and other projects in the area (with mitigation)**
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	**Medium (30)**	**Medium (51)**

Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Likely	Likely
Can impacts be mitigated?	The loss of Threatened fauna species is irreversible, but can be mitigated depending on specific circumstances. Loss of certain SCC flora species can be mitigated to an extent, depending on the life form of the plant.	

Mitigation:

» Candidate biodiversity offset sites with similar habitat structure and ecological functioning are currently being investigated to fully compensate for the loss of wetland habitat on the project site. Finalisation of candidate biodiversity offset areas prior to vegetation clearance and construction are required.
» Mitigation measures such as ongoing education of employees on the value of biodiversity conservation.
» All new developments should be subjected to a rigorous environmental impact assessment, where applicable.

9.3 Cumulative Impacts on Water Resources

Cumulative impacts from a water resource perspective include loss of wetland habitat, and subsequent loss of ecological goods and services provided by these systems.

The following overview is provided in light of the above:

» The Richards Bay Coal Railway line has caused fragmentation of the water resources, specifically the wetland areas which are traversed by the railway line. Further development of the area, including an informal gravel access road has also contributed further fragmentation of the water resources. These developments have resulted in the direct loss of wetland areas.
» The development of the project area and surrounds has resulted in a loss of catchment area, and altered surface flow hydrodynamics. Catchment areas have not only been reduced, but surface flow has been impeded and diverted through culvert systems, reducing the potential for infiltration.
» The historical and current land uses have impacted on the wetland and riverine systems both directly and indirectly. The deforestation of the area has resulted in wetland areas being partially cleared to accommodate access. The current land use of livestock farming has resulted in the wetland areas being trampled and overgrazed. As the greater area is developed, livestock farming can be expected on remaining areas due to the limited area available for this land use. These disturbances have also resulted in the onset and establishment of alien vegetation in the wetland systems.

The cumulative water resource impacts, considering the development of RB CCPP within the surrounding area will be of High significance. However, a wetland offset plan (**Appendix E**) has been compiled in consultation with the local conservation authority (Ezemvelo KZN Wildlife). The wetland offset plan offers a long-term conservation solution to conserve other wetlands in the region through offsetting the significant residual impacts to wetlands on the project site. This provides a potential opportunity to conserve other wetland areas due to the loss of wetlands to the proposed development on this site due to the future planned use for industry according to the uMhlatuze Local Municipality land use planning scheme.

Nature: *Cumulative Wetland Impact*
The project area is located within the Richards Bay Industrial Development Zone, an area earmarked for the future development of various industries. Impacts associated with these developments will probably be similar to impacts expected from the currently proposed project.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Regional (4)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very high (10)	Very high (10)
Probability	Definite (5)	Definite (5)
Significance	**(High) 95**	**(High) 90**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Definite	Definite
Can impacts be mitigated?	No	
Mitigation: » Taking into consideration the nature of the proposed project, resulting in the loss and modifications to water resources, and also the historical loss / impacts of water resources, mitigation for this loss is highly unlikely. » A wetland offset plan must be compiled for the expectant loss of wetland area. The plan should not only consider the expected loss of wetland for this project, but rather a cumulative loss for the larger catchment areas.		

9.4 Cumulative Impacts on Land Use, Soil and Agricultural Potential

The major impact associated with industrial developments is the disturbance of natural occurring soil profiles consisting of layers or soil horizons. Soil formation is determined by a combination of five interacting main soil formation factors. These factors are time, climate, slope, organisms and parent material. Soil formation is an extremely slow process and soil can therefore be considered as a non-renewable resource.

Cumulative impacts from a soil perspective for the RB CCPP project is related to the loss of agricultural (i.e. grazing) land. The impact on soil is high because natural soil layers are stripped and stockpiled during development. In addition, soil fertility is impacted because stripped and stockpiled soil layers are usually thicker than the defined topsoil layer. The topsoil layer is the layer where most plant roots are found and is generally 0.30 m thick. Once soil resources or agricultural land has been lost it is increasingly difficult to replace. Therefore, the impacts on a site specific and cumulative basis remains High.

Nature: Cumulative impact on loss of agricultural land Agricultural land is threatened in South Africa from various sectors and the protection of these resources are of utmost importance to ensure food security.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very High (10)	Very High (10)
Probability	Definite (5)	Definite (5)
Significance	**(High) 95**	**(High) 95**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Definite	Definite
Can impacts be mitigated?	No	No
Mitigation: » No mitigation.		

9.5 Cumulative Impacts on Geohydrology

No cumulative impacts were identified for Geohydrology.

9.6 Cumulative Impacts on Heritage Resources

No cumulative impacts were identified for Heritage.

9.7 Cumulative Impacts on Air Quality

No cumulative impacts were identified for air quality.

Nature: *Cumulative impact of the proposed facility and ambient air pollutant concentrations* The normal operation of the proposed combined cycle power station will result in emission of gaseous and particulate pollutants including: SO2, NOX, VOCs, and to a lesser extent PM and H2S. Increased ambient concentrations of these pollutants may result in negative human health impacts, and nuisance odours. Increased nuisance dustfall is likely because of vehicle entrainment of particulates along access roads. If the facility normally operates at emissions rates approximating those calculated for natural gas, which is inherently very low in sulfur, it is improbable that the facility would approach the emission limits. Under normal operating conditions, off-site exceedances of the SO2 NAAQS are unlikely.		
	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)	Low (4)
Probability	Probabie (3)	Highly Probable (4)
Significance	**(Low) 21**	**(Medium) 48**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Unlikely	No
Can impacts be mitigated?	Yes, to some extent	Yes, to some extent
Mitigation: » Only with large cooperative effort from local government, industry, and residents. Although the extent of impact of mitigation is uncertain.		

9.8 Cumulative Climate Change Impacts

In terms of the national inventory, there will be cumulative climate change impacts when considering the emissions from the project with the emissions from other fossil fuel power plants and other sources. Similarly, the onset of climate change is induced by greenhouse gas emissions accumulated in the atmosphere from all sources over time. The onset of climate change is likely to be accelerated and sustained as emissions accumulate in the atmosphere. However, in the event that the operation of the CCPP plant provides load following capacity to mitigate grid stability for the introduction of intermittent renewable energy, it will enable increased renewable energy penetration on the South African grid as the load following capacity is able to balance shortfalls in supply from the variable renewable sources. The enabled renewable energy development will more than offset the emissions from this project and will assist South Africa in addressing climate change issues associated with energy generation.

9.9 Cumulative Visual Impacts

As the proposed development will occur within an area that has been industrialised and where further heavy industrial development is planned, the power plant will largely be viewed against the background of other heavy industrial development. As a result of this, the development of the RB CCPP is unlikely to significantly increase the extent of industrial development that is obvious from most key viewpoints. It will also not influence views over existing rural areas.

The proposed power plant has therefore been assessed as likely to have low contribution to industrialisation of the landscape as viewed from sensitive receptors.

9.10 Cumulative Socio-economic Impacts

A number of existing and planned developments could be identified that will create the conditions for cumulative effects. These existing and planned developments of industrial nature will contribute to the cumulative impact of the proposed development.

The manner in which a proposed project will affect the zone of influence is also dependent on the baseline conditions of that environment, which includes other proposed projects. Such projects, depending on their timing in relation to the project which is subject of this EIA, may influence the manifestation and significance of socio-economic impacts that could result from the current project. As such, knowledge of such projects is required in order to accurately predict and rate socio-economic impacts. High Voltage (HV) power lines run through the south and west of the proposed project site. The proposed project will augment the current infrastructure. **Table 9.2** below provides additional recent and planned energy projects.

Table 9.2: Socio-economic impacts identified to be associated with the other projects in the zone of influence of the facility under review (Urban-Econ, 2019)

Socio- Economic Parameter	Description/Impact	Rating by Specialist	Identified Importance
Health risks	**Richards Bay Wind Energy Project** Health risks due to pollutants during construction (Coastal and Environmental Sciences, 2014)	Moderate negative	Moderate Negative
	Floating power-plant Health due to air emissions (IPPP, 2015)	-	
	Mondi Factory Possibility of health effects on employees in surrounding industry due to air pollutants.	-	
Increased noise levels	**Richards Bay Wind Energy Project** Noise impacts during construction (Coastal and Environmental Sciences, 2014).	Low negative	Low negative
	Floating power-plant Possible noise due to equipment and machinery operations (IPPP, 2015).	-	
Demographic shifts	**Floating power plant** Increase in population due to influx of migrant labor and job seekers (IPPP, 2015).	-	Medium Negative
	Closed Cycle Power Plant (CCPP) Increase in population due to influx of migrant labor and job seekers.	Medium negative	

The Richards Bay Wind Energy Facility is located towards the north west of the project site (Coastal and Environmental Services, 2014). In addition, a floating power plant is envisaged to be located within the Port of Richards Bay. From the information available on existing and planned developments, the common and significant socio-economic impacts that have been identified and analysed in respective impact assessment studies or referred to in other public documents, are noted in the impact rating tables below.

Nature: *Cumulative Production and Employment Opportunities* An increase in production and creation of employment opportunities.		
	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	
Mitigation: » No mitigation measures are required.		

Nature: *Cumulative Health Risks* Potential health risks due to cumulative air emissions of existing industry and planned projects.		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (39)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Adhere to air specialist's recommendations (See **Section 9.7**).		

Nature: *Cumulative Influx of Migrant Labour and Job Seeker Impacts* 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	
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, where easily possible, 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.		

9.11 Cumulative Traffic Impacts

Cumulative impacts from a traffic perspective is due to increased traffic volumes and resultant congestion on the road network. The road network surrounding the CCPP Power Station will be affected by increased traffic volumes from the proposed facility during both the construction and operation phases. The traffic however is expected to have little impact and can be well accommodated on the existing road network. The impact of similar developments in close proximity to the site should also be considered, to determine their cumulative impact on the road network capacity and on traffic safety. With regards to this, the following is relevant:

» There are no developments of a similar nature in close proximity to the subject site, and consequently no cumulative impacts, apart from normal traffic growth, are relevant.
» The critical construction period (of intense / peak traffic) assessment of the development with background traffic growth, and analysis shows ample spare capacity at the John Ross / Western Arterial intersection, as well as at the site access on Western Arterial.
» Abundant spare intersection capacity means that further substantial development could still be accommodated in the vicinity of the subject site.

From a residual impact perspective, minor degradation of the regional and local road network of the surrounding area can be expected due to increased traffic.

The cumulative traffic impact, considering the development of RB CCPP within the surrounding area, will be of Low significance.

9.12 Cumulative Risk Impacts

The major cumulative risk impacts associated with RB CCPP project as a whole relates to the Potential impact on surrounding human populations including the possibility of serious injury or death as a result of major industrial accidents from hazardous materials used on-site. The specific cumulative impacts will be of Low significance.

Nature: *Cumulative risk impact of the RB CCPP Project as a whole* 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 considered in isolation	**Cumulative impact of the project and other projects in the area**

Extent	Low (1)	Low (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	High (8)
Probability	Very improbable (1)	Very improbable (1)
Significance	**(Low) 10**	**(Low) 10**
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 includes an effective emergency response plan with involvement by the local authorities as well as neighbouring facilities, especially Mondi in the north and others in the general area. Emergency drills must be undertaken together with neighbours and authorities to increase the effectiveness and speed of response to emergency situations – this would avoid or reduce the number of casualties in an emergency. » The implementation of effective [process] safety management systems would act as a mitigation measure.		

9.13 Conclusion regarding Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of the gas to power plant as well as other planned developments in the RBIDZ Phase 1D. The confidence in the degree of significance of these cumulative impacts is moderate as a result of uncertainties regarding other developments proceeding in the area. The current study assesses the cumulative impacts on the basis of current and best available information, with precautionary assumptions taken into account.

The cumulative impacts that have the potential to be compounded through the development of the gas to power plant and its associated infrastructure in proximity to other developments include impacts related to ecology, water resources, land use, soils and agricultural potential, climate change, visual, socio-economic, air quality, traffic, heritage sites and risk. The role of the cumulative assessment is to test if such impacts are relevant to the gas to power project in the proposed location.

Considering the findings of the specialist assessments undertaken for the project, the cumulative impacts for the proposed Gas to Power Plant will be acceptable and the majority are rated as being of **High, Medium and Low significance** (depending on the impact considered) with the implementation of appropriate mitigation were feasible. On this basis, the following can be concluded considering the RB CCPP:

» The construction of the project will not result in the unacceptable loss of threatened or protected plant species as the site proposed for development has already been largely transformed through past and current land use practices. The proposed development is acceptable from an ecological perspective.
» The construction of the project will not result in the unacceptable loss of water resources provided that a suitable wetland and biodiversity offset plan is adopted and implemented, as is being investigated for the project. Opportunities for Eskom to be involved in conservation of other wetland areas in the region which could otherwise be impacted by development must be realised through this offset plan. The proposed development is acceptable from a water resources perspective should the recommended wetland offset plan be implemented.
» The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion. This is due to the

largely industrial nature of the area surrounding the project site, as well as the zoning of the site for industrial development.

- » The project will not significantly increase the negative impact on the socio-economic environment provided that appropriate mitigation measures are implemented. In contrast, there will be numerous positive impacts that can be expected as a result of the proposed RB CCPP in terms of production and employment benefits.
- » The project as a whole will contribute towards a reduction in greenhouse gas emissions in general resulting from an alternative energy generation perspective (when compared to coal energy generation), and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.
- » The project will not contribute significantly to traffic volumes and can be well accommodated on the existing road network.
- » The project will not contribute to the loss of heritage sites as no heritage sites of significance will be affected by the proposed development.
- » The project will not contribute significantly to the 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) and is considered Low significance.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed RB CCPP and other development within the RBIDZ: Phase 1D are considered to be acceptable. The limited potential for cumulative impacts and risks makes the location of this project within the RBIDZ: Phase 1D a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

Eskom Holdings SOC Ltd (Eskom) are proposing to develop a Combined Cycle Power Plant (CCPP) and associated infrastructure, with an installed generating capacity of up to 3 000MW. The proposed project will be fuelled using natural gas as the main fuel resource and diesel as a back-up resource. The project site is on Portion 2 and Portion 4 of Erf 11376. The site is located in the Richards Bay Industrial Development Zone (IDZ) Phase 1D, approximately 6km south west of Richards Bay, and 4km south west of Alton, which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province.

The main infrastructure associated with the facility includes the following:

» Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
» HRSG to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
» Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
» Bypass stacks associated with each gas turbine.
» Dirty Water Retention Dams and Clean Water Dams
» Storm water channels
» Waste storage facilities (general and hazardous).
» Exhaust stacks for the discharge of combustion gases into the atmosphere.
» A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
» Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (to be supplied by the Local Municipality).
» Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
» Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
» A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process
» Diesel off-loading facility and storage tanks.
» Ancillary infrastructure including access roads, emergency access road warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
» A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process.

After a site selection and environmental screening assessment, the project site was considered to be feasible from a technical perspective due to its location in relation to the Port of Richards Bay (where the fuel supply is expected to be available), access to the grid, extent of the property, i.e. 71ha, and access from the surrounding area. It was therefore concluded that this site be taken forward for detailed investigation through the EIA process.

A summary of the recommendations and conclusions for the proposed project as determined through the EIA process is provided in this Chapter.

10.1. Evaluation of RB CCPP

The preceding chapters of this report together with the specialist studies contained within **Appendices D-N** provide a detailed assessment of the potential impacts that may result from the development of RB CCPP. This chapter concludes the environmental assessment of the RB CCPP facility by providing a summary of the results and conclusions of the assessment of both the project site and alternatives proposed for the RB CCPP. 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, provided that the recommended mitigation measures and wetland offset plan are implemented, as specified by the specialists.

The potential environmental impacts associated with the RB CCPP identified and assessed through the EIA process include:

» Impacts on ecology, flora, fauna and avifauna.
» Impacts on surface water resources.
» Impacts to soils, land-use and agricultural potential.
» Impacts on geohydrology.
» Impacts on heritage resources, including archaeology and palaeontology.
» Impacts on air quality.
» Impacts on climate change.
» Visual impacts on the area imposed by the components of the facility.
» Positive and negative socio- economic impacts.
» Traffic impacts.

As the project could pose risks to the communities in the area (as a result of fires or possible explosions), a quantitative risk assessment was undertaken.

10.1.1. Impacts on Ecology (fauna, flora and avifauna)

The Ecological Impact Assessment assessed the impact of the RB CCPP on the sensitive ecological features present within the project site for the life-cycle of the project.

From a vegetation perspective, the project site is not regarded as being particularly sensitive. Reasons for this include the following:
» Extensive developments on surrounding areas have effectively isolated this site from similar plant communities. As a result, plant populations were subdivided and reduced, thereby increasing their probability of extinction (Collinge *et al*., 1996).
» Large areas on the project site showed population increases in *Helichrysum kraussii* and *Dichrostachys cinerea* plants, an indication of past disturbance.

» Deforestation of large woodland tree species particularly within the *Helichrysum kraussii – Parinari capensis*, and to a lesser extent in the *Imperata cylindrica – Syzygium cordatum* vegetation communities.
» In terms of land use planning, the project site falls within a zone intended for the development of High Impact Industry and is not recognised as an area earmarked for conservation.
» The project site falls within the Industrial Development Zone (IDZ) of Richards Bay where future developments are planned. Full restoration of the original environment and biota will thus not be feasible in the long term.
» A number of provincially protected and flora endemic species are present on the project site. However, these species are not restricted to the project site. Threatened plant species that could potentially be present include species such as geophytes and herbs that can be easily translocated.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss of sensitive terrestrial ecosystems, loss of critical biodiversity areas (CBAs), loss of sensitive aquatic ecosystems, loss of natural vegetation, loss / disturbance of local fauna populations, noise and artificial light disturbances, soil erosion and sedimentation, pollution of soils and habitat. Due to the relatively disturbed nature of the site, the significance of the construction phase impacts ranges from medium to low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include introduction and spread of alien invasive plant species and weeds, disturbance of local fauna communities, noise and artificial light disturbance, pollution of soils and habitat. The significance of the impacts for the operation phase are low, following the implementation of the recommended mitigation measures by the specialist.

From the findings of the Ecological Impact Assessment (**Appendix D**) it can be concluded that ecological impacts of medium to low significance can be expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be appropriate and acceptable from an ecological perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

10.1.2. Impacts on Surface Water Resources

The Surface Water Resources Impact Assessment assessed the impact of the RB CCPP on the sensitive water resources present within the project site for the life-cycle of the project. Approximately 91 ha of wetlands have been delineated for the project, with approximately 38ha and 53ha being delineated for the project area and biodiversity offset area to the north of the site, respectively.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss / degradation of wetlands, spread of / or establishment of alien and / or invasive plant species, sedimentation and erosion of watercourses, impaired water quality and alteration of the hydrological regime. The significance of the construction phase impacts ranges from high to medium to low, following the implementation of the recommended mitigation measures by the specialist. Importantly, the impact of high significance relates to the loss of wetlands as a result of the proposed development. In this respect, avoidance, mitigation and rehabilitation options are not possible due to the extent of the proposed development, and therefore a wetland offset plan was deemed required (**Appendix E**) in line with the mitigation hierarchy to offset the significant residual impacts associated with the proposed loss of the wetlands on the project site (See **Section 10.3.6** below for more details).

During the operation phase, the anticipated impacts include impaired water quality and alterations in the hydrological regime. The significance of the impacts for the operation phase are medium, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Surface Water Resources Impact Assessment (**Appendix E**) it can be concluded that ecological impacts of high to medium to low significance are expected as a result of the proposed RB CCPP. As mentioned above, a wetland offset plan was deemed required (**Appendix E**) in line with the mitigation hierarchy to offset the significant residual impacts associated with the proposed loss of the wetlands on the project site. This plan has been developed and is under a consultation process with all affected stakeholders.

The proposed development is considered to be acceptable from a surface water resources perspective. The specialist has, therefore, indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures and careful consideration with regards to the requirements of a wetland offset plan.

10.1.3. Impacts on Land Use, Soil and Agricultural Potential

The Soil and Agricultural Potential Impact Assessment assessed the impact of the RB CCPP on the soils present within the project site for the life-cycle of the project.

The soils in the project area are dominated by sandy alluvial soils. the areas with accumulated windblown sands were classified as Namib soils, which accounted for 27.6 ha (38.8 %) of the project area. The areas with moisture at depths greater than 30cm were classified as the Longlands soil form, which accounted for 3.3 ha (4.6 %) of the project area. The soil forms with moisture at or near the surface were classified as Katspruit / Westleigh soil forms, which accounted for 37.5 ha (52.8 %) of the area.

In terms of agricultural potential, the project area is currently being utilised for grazing, no agriculture is possible due to the shallow water table and the sandy nature of the soils present. There are extensive pans across the site and the vegetation is sparse in places. in terms of land potential, the land capability classes were rated to have the following land potentials:

» Class III = L2 (High Potential);
» Class IV = L3 (Good Potential);
» Class V = Vlei (Wetland); and
» Class VIII = L8 (Very Low Potential).

As the development site has been reserved by the City of uMhlathuze Municipality as part of the Industrial Development Zone (IDZ) to house industrialisation and other strategic projects such as gas to power projects, it is not likely that the site would be used for agriculture in the future.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include loss of agricultural potential and loss of soil resources. The significance of the construction phase impacts ranges from high to medium, following the implementation of the mitigation measures recommended by the specialist. These impacts can be reduced by keeping the footprints minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites.

From the findings of the Soil and Agricultural Potential Impact Assessment (**Appendix F**) it can be concluded that soil and agricultural potential impacts of high to medium significance are expected as a result of the proposed RB CCPP. The proposed development is considered to be appropriate and acceptable from a soils perspective where mitigation is applied and the soil is handled correctly. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

10.1.4. Impacts on Geohydrology

The Geohydrology Impact Assessment assessed the impact of the RB CCPP on the sensitive geohydrological features associated with the project site for the life-cycle of the project. According to the 1:500 000 scale hydrogeological map series (Vryheid, Map sheet 2730) and from available hydrogeological information, Richards Bay groundwater occurs within the inter-granular primary aquifer in the semi consolidated and unconsolidated materials deposited during the Tertiary and Quaternary periods. According to Golder (2014) the depths of boreholes measured within the Richards Bay area varies from 30 to 45 metres below ground level (mbgl) and the aquifer testing conducted indicated the hydraulic conductivity ranging from 0.5 to 5 m/d.

The geohydrological data obtained during the Hydrocensus survey in February 2018 indicated that there are two types of aquifers underlying the site including a shallow primary aquifer and a deep fractured aquifer. The current site groundwater level within the shallow primary aquifer varies from 0.64 to 3.89 mbgl. It is anticipated that a fractured aquifer underlying the site is likely to be located at more than 11 mbgl.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include potential impact on groundwater flow direction and groundwater level due to dewatering to facilitate erection of building foundations, potential impact on surface water bodies and groundwater due to on-site accidental fuel spills and leaks/leachate and infiltration of dirty water. The significance of the construction phase impacts ranges from medium to low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include potential impact on local groundwater and surface water bodies due to possible leakage of diesel from storage facilities and/or pipelines and Emergency backup generators, potential impact on groundwater and surface water bodies due to waste water and solid waste discharges. The significance of the impacts for the operation phase are low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Geohydrology Impact Assessment (**Appendix G**) it can be concluded that geohydrological impacts of low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be acceptable from a geohydrological perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

10.1.5. Impacts on Heritage (including archaeology and palaeontology)

The Heritage Impact Assessment assessed the impact of the RB CCPP on the sensitive heritage features present within the project site for the life-cycle of the project. No heritage sites of significance (archaeological, palaeontological, cultural or built heritage) were identified within the proposed development site.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include impacts to archaeological, palaeontological or cultural heritage resources which may be unearthed during excavations on the site. The significance of the construction phase impact is low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures. A Chance Find Procedure is to be implemented however for the project should any sites be identified during the construction process.

No potential impacts were identified for the operation phase.

From the findings of the Heritage Impact Assessment (**Appendix H**) it can be concluded that heritage impacts of low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be acceptable from a heritage perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

10.1.6. Impacts on Air Quality

The Air Quality Impact Assessment assessed the impact of the RB CCPP on the air quality associated with the project site and surrounding area for the life-cycle of the project.

The RBCAA operates 12 ambient monitoring stations, measuring meteorological parameters and ambient SO_2, total reduced sulphur, and PM_{10} concentrations. Annual average PM_{10} concentrations were compliant with the NAAQS at all stations and similarity between years at each station is noted. Annual average SO_2 at all stations was compliant with the NAAQS with a slight trend towards improvement (lower SO_2 concentrations) at all stations.

The assessment identified impacts within the construction and operation phases of the project.

During the construction phase, the impacts expected to occur include emissions from particulate and gaseous pollutants. The significance of the construction phase impact is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include sulphur dioxide emissions and other atmospheric pollutant emissions. The significance of the impacts for the operation phase range from medium to low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Air Quality Impact Assessment (**Appendix I**) it can be concluded that air quality impacts of medium to low significance are expected as a result of the proposed RB CCPP. The proposed development is therefore considered to be appropriate and acceptable from an air quality perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures and on condition that:

» Emissions due to construction activities be mitigated using good practise guidelines.
» Maintain SO_2 and NO_X emissions near the emission factor estimates.
» To limit the possibility of off-site SO_2 exceedances during emergency events, it is suggested that Emergency 2-type events be avoided as far as practically possible, by using low sulphur (50 ppm) diesel only, when diesel is used as energy source.

10.1.7. Impacts on Climate Change

The Climate Change Impact Assessment assessed the impact of the RB CCPP on the climate change. The assessment only identified that the relevant impacts associated with the project is in the operation phase of the project.

During the operation phase, the impacts expected to occur include climate change impacts of the estimated Greenhouse Gas Emissions from the proposed RB CCPP. The significance of the operation phase impact is high, following the implementation of the recommended mitigation measures by the specialist. The impact of these emissions is considered as high, due to the impact on the national inventory from a single source (i.e. the RB CCPP project site). The proposed project has options to mitigate its carbon emissions. These options include the switching to alternative fuels such as biogas or biodiesel as well as carbon capture and storage where possible. Implementing these technologies will enable the proposed power plant to greatly reduce its greenhouse gas emissions. As such it is advisable that the design of the project takes into account these options to enable the potential retrofit and implementation during the plant's operation phase. Such mitigation actions will help the proposed plant to take on a shared responsibility for climate change mitigation. In addition, it must be noted that, the most important feature of the proposed CCPP power plant is its potential role in enabling a greater uptake of renewable energy onto the South African grid. The load following capacity that it could offer would enable the national grid to accommodate greater proportions of variable renewable energy, such as solar power and wind energy. This would assist in decarbonising the national grid and reduce emissions within South Africa's national greenhouse gas inventory. This will be a positive contribution to the national commitment to mitigate global climate change.

From the findings of the Climate Change Impact Assessment (**Appendix J**) it can be concluded that climate change impacts of high significance are expected as a result of the proposed RB CCPP. However, it is suggested by the climate change specialist that the proposed CCPP plant load-following capability of the plant be used to maximise the uptake of intermittent renewable energy in the South African grid if possible. In this light, it is the view of specialist that the proposed CCPP power plant is the best technology option, and will not materially result in any direct local climate change impacts, subject to the implementation of appropriate mitigation measures as far as possible.

The proposed development is therefore considered to be acceptable from a climate change perspective.

10.1.8. Visual Impacts

The Visual Impact Assessment assessed the impact of the RB CCPP on the sensitive visual receptors associated with the project site for the life-cycle of the project. The proposed development will occur within an area that has been industrialised and where further heavy industrial development is planned, the power plant will largely be viewed against the background of other heavy industrial development. As a result of this, the development of the RB CCPP is unlikely to significantly increase the extent of industrial development that is obvious from most key viewpoints. It will also not influence views over existing rural areas.

The assessment identified impacts within the construction and operation phases of the project.

During the construction, operation and decommissioning phases, the impacts expected to occur include industrialisation of views from Urban areas, protected areas, roads, homesteads, views as seen from the N2 service station, recreational uses on the northern side of the port could be negatively impacted by further Industrialisation of the landscape. The significance of the identified impacts is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Visual Impact Assessment (**Appendix K**) it can be concluded that visual impacts of low significance are expected as a result of the proposed RB CCPP.

The proposed development is therefore considered to be appropriate and acceptable from a visual perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures.

10.1.9. Socio-economic Impacts

The Socio-economic Impact Assessment assessed the impact of the RB CCPP on the socio-economic baseline environment associated with the project site for the life-cycle of the project. The assessment identified both positive and negative impacts within the construction and operation phases of the project.

During the construction phase, the positive impacts expected to occur include increase in economic production, impact on Gross Domestic Product (GDP), employment creation, skills development and household income and improved standard of living. The significance of the positive construction phase impacts ranges from high to medium, following the implementation of the recommended mitigation measures by the specialist. The impacts of a high and medium significance identified for the project, after implementation of mitigation measures, are notable from a positive perspective.

During the construction phase, the negative impacts are also however expected to occur, which include demographic shift due to influx of migrant labour, increase in demand for housing and pressure on basic services, social facilities and economic infrastructure. The significance of the negative construction phase impacts is low, following the implementation of the mitigation measures recommended by the specialist. No negative impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, only positive impacts are expected and include impact on production, impact on GDP, employment creation, skills development, household income and improved standard of living, government revenue and improvement in energy generation sector. The significance of the impacts for the operation phase are high, following the implementation of the recommended mitigation measures by the specialist. Again, the impacts of a high significance identified for the project, after implementation of mitigation measures, are notable from a positive perspective.

From the findings of the Socio-economic Impact Assessment (**Appendix L**) it can be concluded that the negative socio-economic impacts of low significance are expected as a result of the proposed RB CCPP, whilst mainly positive impacts of high to medium significance were also identified. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation and enhancement measures.

10.1.10. Impacts on Traffic

The Traffic Impact Assessment assessed the impact of the RB CCPP on the traffic volumes and capacity of the road network to accommodate the project site for the life-cycle of the project. The assessment identified impacts within the construction, operation and decommissioning phases of the project. Potential traffic impacts are mainly related to the proposed development access, trip generation and traffic impact on the existing affected road network.

During the construction phase, the impacts expected to occur include traffic impacts during the construction of the RB CCPP. The significance of the construction phase impact is medium following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the operation phase, the anticipated impacts include traffic impacts during the operation of the RB CCPP. The significance of the impacts for the operation phase are medium, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

During the decommissioning phase, the impacts expected to occur include traffic impacts during the decommissioning of the RB CCPP. The significance of the construction phase impact is low, following the implementation of the mitigation measures recommended by the specialist. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

From the findings of the Traffic Impact Assessment (**Appendix M**) it can be concluded that traffic impacts of medium to low significance are expected as a result of the proposed RB CCPP.

The proposed development is therefore considered to be appropriate and acceptable from a traffic perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the approval of the access and parking layout by the local authority and implementation of the recommended mitigation measures.

10.1.11. Project Risks

The Quantitative Risk Assessment assessed the risk impacts of the RB CCPP associated with the project site for the life-cycle of the project. The following installations were considered for analysis in the Qualitative Risk Assessment (QRA):

» Chlorine;
» Natural gas;
» Diesel;
» Hydrogen;
» LPG; and
» Ammonia.

Consequences for the installations were analysed and assessed, with several worst-case scenarios having the potential to affect individuals located offsite.

During the operation phase, the anticipated impacts include catastrophic rupture of chlorine storage vessel; with subsequent dispersion of toxic vapours over the surrounding area, full bore rupture of incoming natural gas line with flammable vapour dispersion, ignition and flash fire or explosive effects, catastrophic diesel tank rupture with full bund fire and possible bund overtopping, catastrophic rupture of hydrogen storage vessel leading to flammable vapour dispersion and ignition leading to flash fire thermal radiation effects and/or vapour cloud explosion overpressure effects, 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, and catastrophic rupture of ammonia storage vessel with subsequent dispersion of toxic vapours over surrounding area. The significance of the impacts for the operation phase are low, following the implementation of the recommended mitigation measures. No impacts of a high significance were identified for the project, after implementation of mitigation measures.

The proposed development is therefore considered to be acceptable from a risk perspective. The specialist has therefore indicated that the development may be authorised, constructed and operated, subject to the implementation of the recommended mitigation measures as well as compliance with all statutory requirements and 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.

10.1.12. Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of other known projects within the area. The alignment of energy developments with South Africa's National Energy Response Plan and the global drive to reduce greenhouse gas emissions per unit of power generated is, undoubtedly, positive. The economic benefits of the CCPP at a local, regional and national level has the potential to be significant.

The cumulative impacts associated with the RB CCPP have been assessed to be acceptable, with no unacceptable loss or risk expected (refer to **Table 10.1** and **Chapter 9**).

Table 10.1: Summary of the cumulative impact significance for RB CCPP

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**
Ecology (Construction Phase)	Medium	High to Medium (depending on the impact being considered)
Water Resources (Construction Phase)	High	High
Land use, soil and agricultural potential (Construction Phase)	High	High
Geohydrology	None	None
Heritage	None	None
Air Quality	None	None
Visual	Low	Low
Socio-Economic (Construction and Operation Phases)	Medium	Medium
Traffic (Construction and Operation Phases)	Low	Low
Risk (Operation Phase)	Low	Low

Based on the specialist cumulative assessment and findings regarding the development of the RB CCPP and its contribution to the overall impact in the area with consideration to cumulative impacts in isolation of the proposed RB CCPP and other known planned developments in the area, it can be concluded that RB CCPP cumulative impacts will be of medium to high significance in the construction phase and low to medium in the operation phase. On this basis, the following can be concluded considering the RB CCPP:

» The construction of the project will not result in the unacceptable loss of threatened or protected plant species as the site proposed for development has already been largely transformed through past and current land use practices. The proposed development is acceptable from an ecological perspective.
» The construction of the project will not result in the unacceptable loss of water resources provided that the proposed wetland and biodiversity offset plan is adopted and implemented. Opportunities for Eskom to be involved in conservation of other wetland areas in the region which could otherwise be impacted by development must be realised through this offset plan. The proposed development is acceptable from a water resources perspective.
» The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion. This is due to the largely industrial nature of the area surrounding the project site, as well as the zoning of the site for industrial development.
» The project will not significantly increase the negative impact on the socio-economic environment provided that appropriate mitigation measures are implemented. In contrast, there will be numerous positive impacts that can be expected as a result of the proposed RB CCPP in terms of production and employment benefits.

- The project will contribute towards a reduction in greenhouse gas emissions resulting from an alternative energy generation perspective (when compared to coal energy generation), and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.
- The project will not contribute significantly to traffic volumes and can be well accommodated on the existing road network.
- The project will not contribute to the loss of heritage sites as no heritage sites of significance will be affected by the proposed development.
- The project will not contribute significantly to the 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) and is considered Low significance.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed RB CCPP and other development within the RBIDZ: Phase 1D are considered to be acceptable. The limited potential for cumulative impacts and risks makes the location of this project within the RBIDZ: Phase 1D a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

10.2. Environmental Sensitivity Mapping

From the specialist investigations undertaken for the RB CCPP, the following sensitive areas/environmental features have been identified and delineated within the project site (refer to **Figures 10.1**, **Figure 10.2** and **Appendix B**):

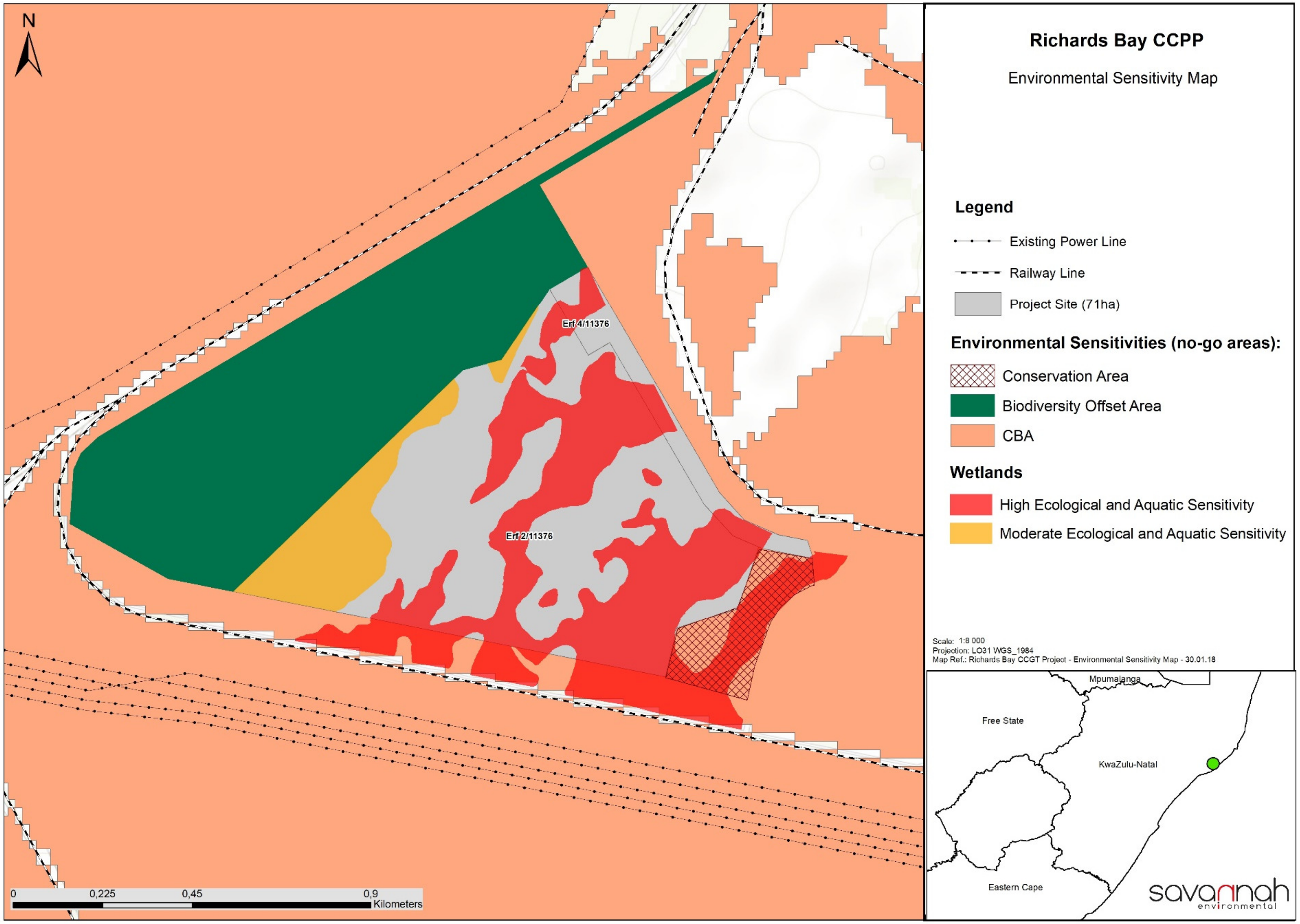

Figure 10.1: Environmental sensitivity map of the proposed RB CCPP project site (**Appendix B**)

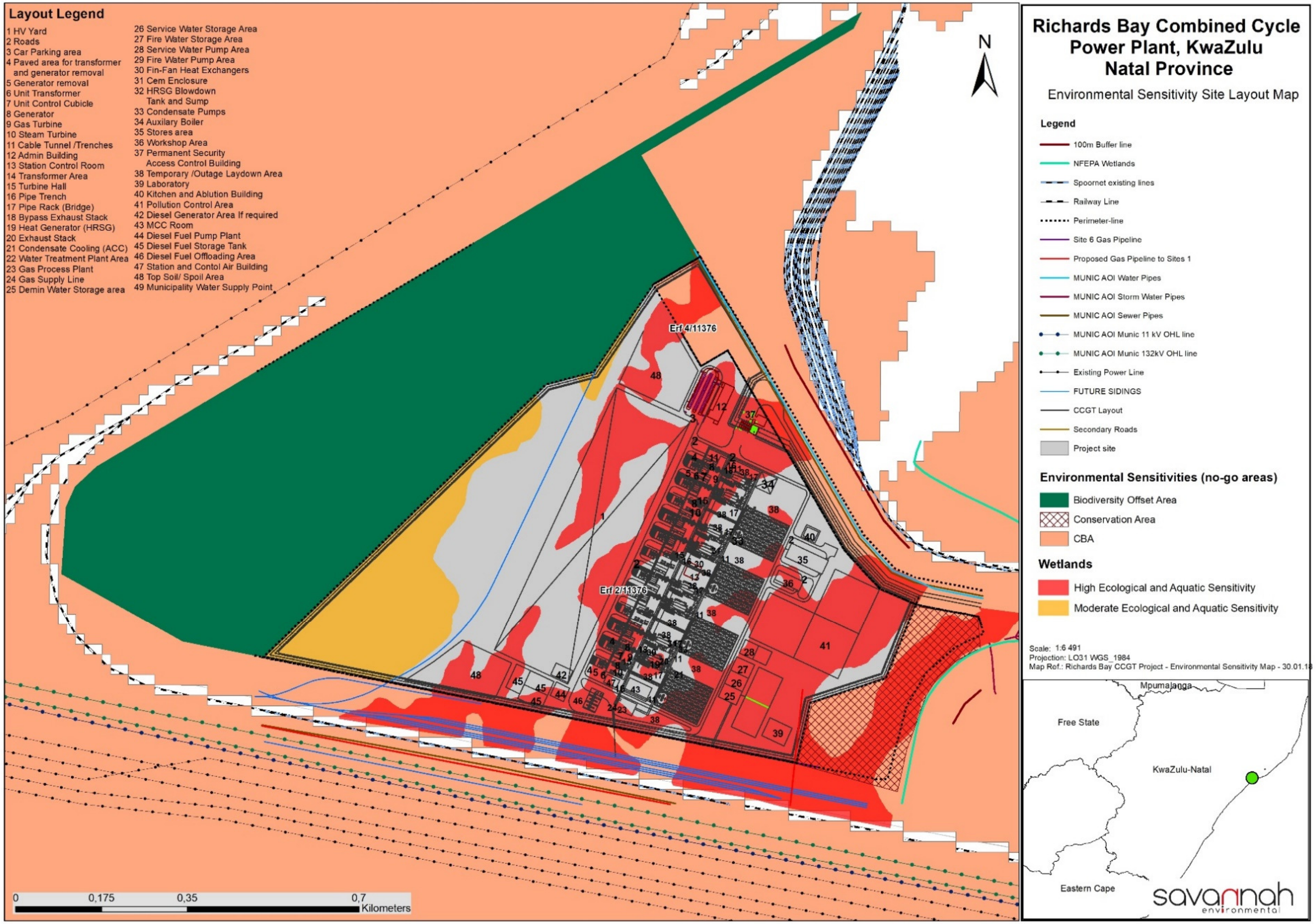

Figure 10.2: The proposed layout of the RB CCPP overlain on the identified environmental sensitive features (**Appendix B**).

» **Ecology** – The wetland areas within the site provide habitat to threatened fauna species and should be regarded as of **High Sensitivity**. The biodiversity offset area and conservation area located to the north and south beyond the project site, as well as CBA: irreplaceable areas surrounding the project site should be regarded as no-go areas. From a vegetation perspective, the project site is not regarded as being particularly sensitive due to historical and current disturbance.

»

» **Surface Water Resources** – From a vegetation perspective the sensitivities relating to the proposed development are the presence of:

iv. Provincially protected species, endemic species and species protected under the Natural Forest Act. Removal/destruction of tree species would require permit authorization;

v. The potential presence of several Threatened flora species;

vi. Wetland vegetation over certain parts of the study area.

* From a fauna perspective, the sensitivities relating to the proposed development are the presence of:

iv. *C. mariquensis* (Near Threatened) and *Hemisus guttatus* (Vulnerable) in wetland areas;

v. The potential presence of *Balearica regulorum* (EN);

vi. The presence of provincially protected bird species.

* The EIS of the wetland systems was determined to be High (Class B) and Moderate (Class C) for the project area and biodiversity offset area respectively.

10.3 Assessment of Alternatives and the Identification of the Preferred Alternatives

In accordance with the requirements outlined in Appendix 3 of the EIA Regulations 2014, the consideration of alternatives including site, activity, technology, as well as the "do-nothing" alternative should be undertaken. Thus, the identification of alternatives is a key aspect of the success of the EIA process. In relation to a proposed activity "Alternatives" means different ways of meeting the general purposes and requirements of the proposed activity. The following sections address this requirement.

10.3.1 *Site Alternatives*

The proposed gas to power plant is to be located on a site within the Richards Bay IDZ Phase 1D within the uMhlathuze Local Municipality, which falls under the jurisdiction of the uThungulu District Municipality in the Kwazulu-Natal Province. The site has been zoned for IDZ industrial development as part of the planning for the RB IDZ area.

The erven on which the proposed facility is planned has been earmarked by the uMhlatuze Local Municipality for the development of a gas to power facility. Moreover, the site was identified as the most appropriate site in consideration of the environmental screening assessment and site selection study undertaken prior to this EIA (refer to Chapter 3 of this EIA Report). Eskom Holdings SOC Ltd considers this area, and specifically the demarcated site, to be highly preferred for the development of a gas to power project from a technical perspective as detailed in **Section 3.2.1** of this EIA Report.

10.3.2 *Technology Alternatives*

iii) Power Generation Technology

The development of the CCPP has been identified by Eskom as the most feasible technology alternative for the generation of electricity within the Richards Bay area due to the available energy source?. The use of this technology has been included in the IRP, 2010, and has been considered as a necessity to be developed within South Africa by 2030 to meet the electricity supply demands and to ensure the significant inclusion of natural gas as an energy resource within the national grid, therefore promoting a diversified energy mix. Eskom is also considering this particular technology alternative in an effort to reduce their own carbon footprint per unit of electricity produced, as power plants using natural gas emit approximately half of the amount of carbon when compared with equivalent coal-fired power plants whilst using considerably less water, thereby supporting Government's commitment to reduce carbon emissions and water usage. Finally, the specific site is also earmarked for the proposed development of gas-to-power within Phase 1D the Richards Bay IDZ (IDZ, 2018). As such, no power generation technology alternatives are being considered for this development within the Richards Bay area.

iv) Cooling Technology

Combined Cycle Gas Turbine (CCGT) Power Plants are designed to use water for cooling at the back-end of the thermal cycle. Dry cooled technology is the cooling technology that is preferred for the development of the Richards Bay CCPP, due to the location of the site which will not be able to house the extensive piping required for once-through cooling. This is also consistent with the Department of Water and Sanitation requirements, which require a reduction in use of water. Therefore, no alternative technology is considered.

10.3.3 *Layout Alternatives*

It is proposed that the Richards Bay CCPP will occupy the entire site in order for the project to be feasible. Layout alternatives are therefore not applicable for the type of development and components proposed for the Richards Bay CCPP within the identified site. Therefore, no layout alternatives are considered in this EIA report. It must be noted, however, that, for construction purposes, Eskom will contract with a Construction Company, who may configure the layout differently from the layout in the EIA report. Despite any layout configurations within site, it is anticipated that there will not be any additional impacts that have not been assessed in this EIR.

10.3.4 *Operation Alternatives*

The proposed Richards Bay CCPP is operation specific and therefore this type of alternative not applicable to the proposed development. Therefore, operation alternatives are not considered in this EIA report. The Richards CCPP will be designed and constructed to operate via all operating modes e.g. peaking, mid-merit or baseload. Mid-merit was the chosen as the operating mode due to the high fuel cost and will provide the best returns.

10.3.5 *The 'Do-Nothing' Alternative*

The 'do-nothing' alternative is the option of not constructing the Richards Bay CCPP on Portion 2 and Portion 4 of Erf 11376. The 'do-nothing' alternative would mean that the current status quo of the site would remain as is at present, including existing impacts and the current baseline environment. The assessment of the 'do-nothing' alternative in **Chapter 8** showed that from the specialist studies undertaken, although a number of impacts of high significance will result from the project development even with mitigation, no environmental fatal flaws were identified to be associated with RB CCPP. All impacts associated with the project can be mitigated to acceptable levels and with the implementation of a wetland offset plan. However, if the RB CCPP facility is not developed the following positive impacts will not be realised:

» Increase in economic production, increase in GDP, employment creation, skills development, increase in household income, increase in government revenue and energy security.
» Meeting of energy generation mix in a most economic and rapid manner.
» Provision of cleaner, gas-to-power energy (when compared with coal power generation) alternative supply.

The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of RB CCPP.

10. 4. Mitigation Hierarchy

Through the initial environmental screening and site selection assessment, a site was selected and proposed for the RB CCPP as provided herein. With detailed specialist assessments undertaken, it was identified from an ecological and water resources perspective that significant residual impacts would affect the wetlands on the proposed site as a result of the proposed RB CCPP. As such, the mitigation hierarchy was taken into consideration in light of the high impacts identified.

The mitigation hierarchy (**Figure 10.3**) consists of steps to be considered to adequately mitigate environmental impacts associated with proposed developments.

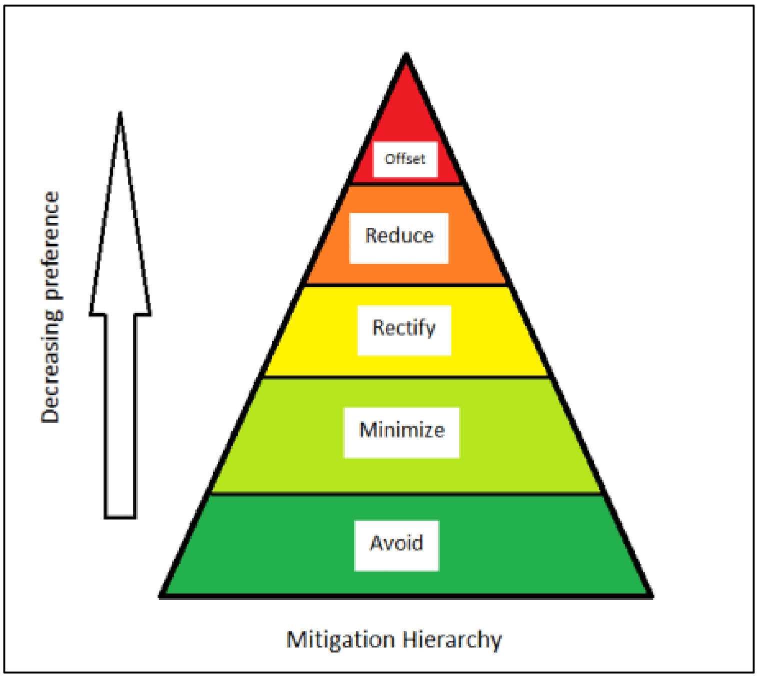

Figure 10.3: Mitigation Hierarchy

The first step is to avoid potential impacts. Through avoidance, a potential impact can be prevented from taking place, thereby ensuring no environmental impact at all. The second step, should avoidance not be possible, is to minimise any identified potential impacts. The type, severity and significance of potential impacts are typically predicted, to which mitigation measures are formulated to minimise the anticipated potential impacts before the actual impact takes place. The third step is to rectify any potential impact. Rectification takes place usually where an impact has already taken place which has not been allowed. In such circumstances, it is then necessary to control the damage that has been created or correct the action which has caused the impact. Fourthly, where rectification cannot take place, reduction in the extent of an impact through management practices or change in methodology is to be considered. Where reduction is not possible, and once all steps to mitigate the potential impacts of a proposed development have been considered, offsetting can be considered. This is the last step available and ideally, should be avoided as far as possible unless left with no other choice. Therefore, the mitigation hierarchy decreases in terms of preference from the first step (avoidance) to the last step (offset).

10.4.1 *Avoidance of Impacts*

In the context of the proposed RB CCPP, through the environmental screening and site selection process, the proposed project site was identified as the most appropriate site as mentioned in **Section 10.3.1**. However, despite the environmental screening and site selection assessment, the avoidance of significant residual impacts to the wetlands and ecological processes on the proposed project site are unavoidable. This option is therefore not possible to implement.

10.4.2 *Minimise Impacts*

In this EIA, a suite of specialist studies has been undertaken to identify potential impacts that may result due to the proposed RB CCPP. The assessment of impacts is included in **Chapter 8** and **Section 10.1** of this chapter. Ultimately, a number of potential impacts were identified which ranged from high to medium to low. In light of this, mitigation measures have been proposed and are included in the Environmental

Management Programme (EMPr) which is included in **Appendix O**. The EMPr has been compiled to manage and minimise the identified impacts as far as possible such that the level of impacts is mitigated to acceptable levels. However, despite the specialist assessments and stipulated mitigation measures proposed, the minimisation of significant residual impacts to the wetlands on the proposed project site are not possible. While effective at managing impacts on other aspects of the environment, this option is not possible for impacts on surface water resources.

10.4.3 *Rectification of Impacts*

As the proposed development is only in the planning stages and has yet to be undertaken, the option to rectify the predicted potential impacts which have not yet occurred makes this option redundant. However, the EMPr provides measures to rectify potential impacts. However, this would only be following project execution.

10.4.4 *Reduction of the Extent of Impacts*

As the proposed project site has already been earmarked for the proposed development of a gas to power facility in terms of the IDZ planning, impacts as predicted in this report are highly likely to occur regardless of whether or not the proposed RB CCPP proceeds, when a different development is executed in the same area. As the proposed RB CCPP will include the disturbance of the entire extent of the property, the extent of the proposed impacts cannot be reduced. This option therefore cannot be implemented.

10.4.5 *Offset Impacts*

Given that all the aforementioned steps in the mitigation hierarchy could not be undertaken to fully address the significant residual impacts expected to affect the wetlands and ecological processes on the proposed project site, a wetland offset plan (**Appendix E**) was compiled to offer a conceptual solution for an offset for the project. The wetland offset plan was undertaken in consultation with the uMhlatuze Local Municipality and Ezemvelo KZN Wildlife. Additional feedback from other Key Stakeholders will be integrated into the wetland offset plan following the public participation process.

Two wetland offset options were investigated which included the following:

1. Utilise the wetlands within the Memorandum of Agreement (MoA)[17] biodiversity offset area (Erf 1/11376) for the purpose of wetland offset;

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[17] The offset area (Erf 1/11376) adjacent to the project was previously proposed as a biodiversity offset area in the Memorandum of Agreement (MoA) between the Municipality and Ezemvelo dated August 2006. The biodiversity offset was based on the 1 hectare loss of the KwaMbonambi Grassland System due to the Pulp United proposed development at the time. The offset would be a consolidated 10 hectares of new area to be rehabilitated that would result in a viable KwaMbonambi grassland system so as to achieve no net loss in quality and quantity of these critically endangered grasslands. The proposed development was however never undertaken, although the principles of the biodiversity offset that had been established in the MoA still have relevance and need to be considered as provided for herein.

2. Proclamation of wetlands within three proposed stewardship areas (Lake Nsezi, Mhlatuse Estuary (Southern Sanctuary) and Lake Mzingazi).

Option 1 was found to be inadequate to meet the minimum requirements for the all components of the wetland offset targets for the wetland systems to be lost. The reasons why this option is considered unsuitable are as follows:

» There is too large a deficit between the minimum offset requirements and offset contributions for the Water Resources and Ecosystem Services offset target associated with the project.
» The proposed offset area is adjacent to the project area. Although proximity is favoured, given the nature of the project and expected loss of wetlands, the wetland proposed for an offset may be continuously at risk from altered hydrology, impacts from on-going activities of the CCPP and potential residual impacts from minimal disturbances.
» The offset area is in a separate watershed to the project area, which is already more extensively developed (and altered) when compared to the watershed associated with the project area. This will hamper rehabilitation initiatives for the wetland offset.
» To protect the offset wetlands, a minimum buffer of 200m would be required around the wetlands. The buffer is not feasible due to the proposed project activities and the land uses that surround the project area. Furthermore, Eskom would need to either purchase land within the 200m buffer or make land management agreements to ensure the protection of the MoA area offset wetlands.
» The species of conservation concern affected within the project area were not recorded in the MoA offset area, and it is likely the area does not accommodate these species.
» Given the large deficit in the functionality target, additional offset wetland areas would need to be identified, assessed and placed under the management of the client to ensure protection. This would incur additional costs to the client.

This was therefore discarded as a suitable solution.

Option 2 was found to more than meet the offset targets to compensate for the loss of the wetlands on the project site. More specifically, the three areas considered for the KZN Ezemvelo Stewardship cover a combined approximate area of 2531 ha of which 1924 ha (76%) is water resources (wetland). It is understood that KZN Ezemvelo wants to place the areas under their stewardship which would in turn place these areas under protection and, more importantly, under the management of the nature conservation body. As a result of the proposed stewardship, 1924 ha of wetland would be available to offset the expectant loss of wetlands through the development of the Richards Bay CCPP. This offset option would result in a net-gain of 361.4 ha of wetland in terms of Water Resources and Ecosystem Services and 1910.1 ha of wetland in terms of the ecosystem conservation. It is therefore recommended that the KZN Ezemvelo Stewardship Programme offset option be considered further by Eskom as not only will wetland loss be outweighed by wetland gains be offset, the option would offer wetland conservation and protection at a catchment level and contribute to the national requirements for water resource conservation.

In light of the above, and from consultations undertaken with Ezemvelo KZN Wildlife, the wetland offset is deemed suitable for decision making in terms of the environmental authorisation of the proposed RB CCPP. However, consensus on the suitability of the wetland offset options will ultimately be determined in the public participation process through feedback from Key Stakeholders.

10.5. Environmental Costs of the RB CCPP Facility versus Benefits of the RB CCPP Facility

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures and the wetland offset plan as outlined in the EIA report and the EMPr are implemented and adhered to. No fatal flaws have been identified. The environmental costs could include:

» *A loss of biodiversity, habitats, flora and fauna due to the clearing of land for the construction and utilisation of land for the RB CCPP facility* – Vegetation on the site is not considered to be of high sensitivity due to historical and current disturbance. The cost of loss of biodiversity is considered to be high for the wetlands on the project site. However, a wetland offset plan is proposed to offer a suitable solution to mitigate the loss of these wetlands as a result of the proposed RB CCPP. This provides a potential opportunity to conserve wetland areas which would otherwise have been lost to development.
» *A loss of soils of agricultural potential* – The proposed RB CCPP project is expected to have a high and medium impact significance on the agricultural potential and soils of the site, respectively. However, as the site has been earmarked for industrial development through the land use planning for the IDZ, it is unlikely that the site would be used for agriculture in the future. This environmental cost can therefore not be attributed to the project alone.

Benefits of the RB CCPP could include the following:
» The project will result in numerous important socio-economic benefits through increase of economic production, impact on GDP, employment creation, skills development, household income and improved standard of living, contribution to government revenue and improvement in the energy generation sector. These will persist during the preconstruction, construction, operation and decommissioning phases of the project and will occur at a local and regional scale.
» The project contributes towards the National, Provincial and Local goals for the development of gas to power energy as outlined in the IRP and respective municipal IDPs.
» The project serves to diversify the economy and electricity generation mix of South Africa through the addition of gas to power energy development.
» South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The emissions from the proposed CCPP plant will significantly contribute to the national greenhouse gas inventory as the extent of the project's greenhouse emissions is considered to be very large (national). The environmental cost is therefore expected to be high in this respect. However, in the event that the operation of the CCPP plant provides load following capacity to mitigate grid stability for the introduction of intermittent renewable energy, it will enable increased renewable energy penetration on the South African grid as the load following capacity is able to balance shortfalls in supply from the variable renewable sources. The enabled renewable energy development will more than offset the emissions from this project. The RB CCPP will therefore contribute to achieving goals for implementation of gas to power energy and the reduction of greenhouse gas emissions when compared with coal power generation.

The benefits of RB CCPP are expected to occur at an international, national, regional and local level. As the costs to the environment have been largely limited through appropriate mitigation measures and offset options, the benefits of the project are expected to outweigh the environmental costs of the RB CCPP facility.

10.6. Overall Conclusion (Impact Statement)

The construction and operation of a CCPP facility with an installed capacity of up to 3 000MW on a project site located on Phase 1D of the RB IDZ which falls within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, has been proposed by Eskom Holdings SOC Ltd. A technically viable project site and development footprint was proposed and assessed as part of the EIA process. The 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 specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of RB CCPP within the project site. Eskom has proposed a technically viable and suitable design and layout for the project site and associated infrastructure, which have been assessed as part of the independent specialist studies. All impacts associated with the proposed layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. However, as impacts on wetlands cannot be avoided, approval of a wetland offset plan will be required to be undertaken prior to construction of the proposed RB CCPP facility. The proposed layout map (including the details of the project) is included as **Figure 10.4.** The proposed layout overlain with the environmental sensitivities is included as **Figure 10.2**.

Through the assessment of the development of the RB CCPP within the project site it can be concluded that the development of the CCPP facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures and the wetland offset plan).

10.5. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by Eskom, the potential to further minimise the impacts to acceptable levels through mitigation and the implementation of the proposed wetland offset plan, it is the reasoned opinion of the EAP that the development of RB CCPP is acceptable within the landscape and can reasonably be authorised for the identified proposed layout (**Figure 10.4**).

The following project components would be included within an authorisation issued for the project:

» Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
» HRSG to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
» Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
» Bypass stacks associated with each gas turbine.
» Dirty Water Retention Dams and Clean Water Dams.
» Storm water channels.
» Waste (general and hazardous) storage facilities.
» Exhaust stacks for the discharge of combustion gases into the atmosphere.
» A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
» Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (potable water is to be supplied by the Local Municipality).

- Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
- Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
- Diesel off-loading facility and storage tanks.
- Ancillary infrastructure including access roads, warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.

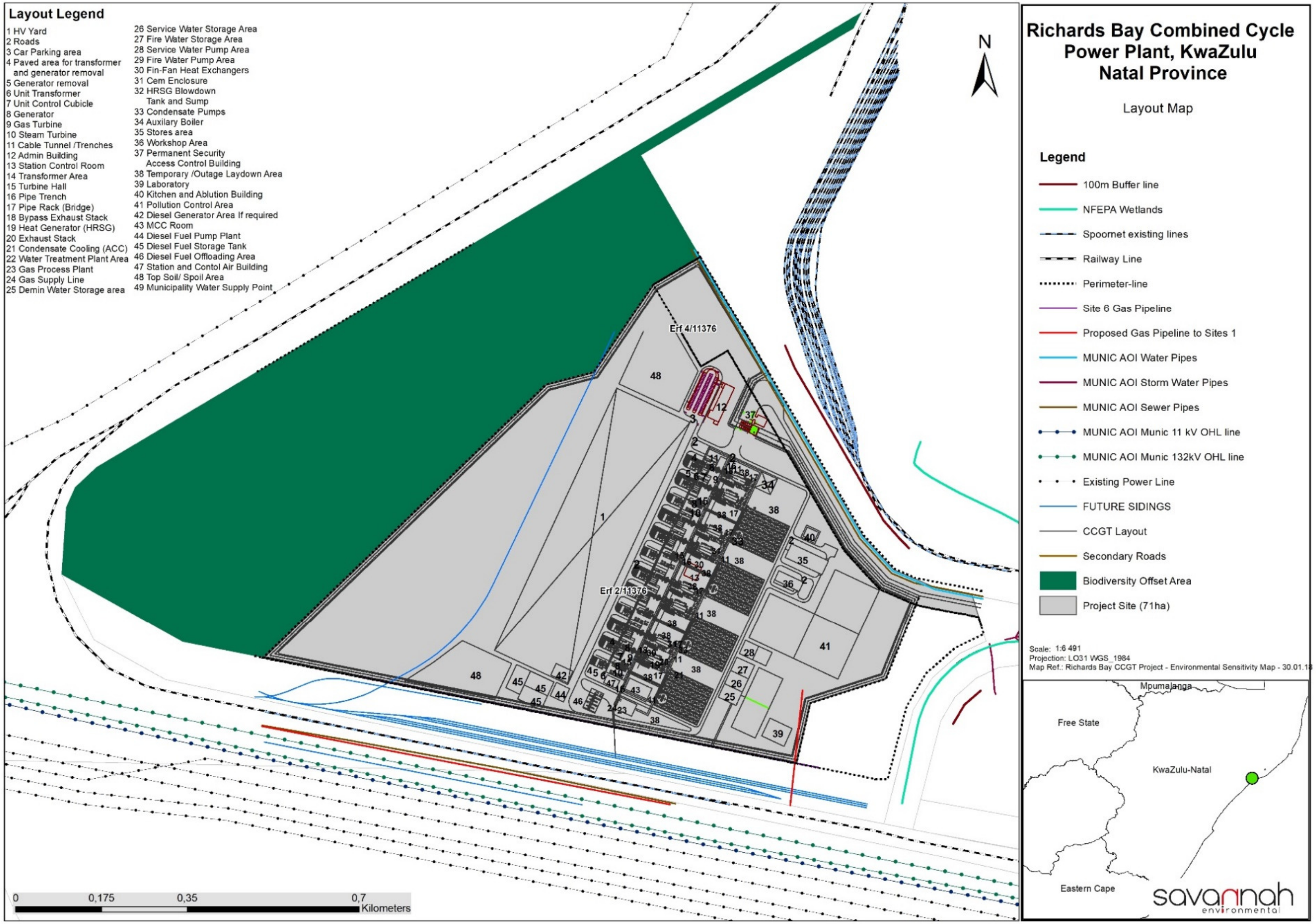

Figure 10.4: Final proposed layout map of the RB CCPP, as was assessed as part of the EIA process (A3 map included in **Appendix B**).

The following key conditions would be required to be included within an authorisation issued RB CCPP:

- » The RB CCPP must be located on Portion 2 and Portion 4 of Erf 11376, and is located within the Richards Bay Industrial Development Zone (IDZ) Phase 1D.
- » All mitigation measures detailed within this EIA Report, the EMPr, as well as the specialist reports contained within **Appendices D to N**, are to be implemented.
- » The EMPr as contained within **Appendix O** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the RB CCPP facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of RB CCPP is considered key in achieving the appropriate environmental management standards as detailed for this project.
- » Following the final design of RB CCPP, the final layout must be submitted to DEA for review and approval prior to commencing with construction.
- » The wetland offset plan is to be approved in principal by the Department of Environmental Affairs. However, the final wetland offset plan must be submitted for approval prior to its implementation to the Department of Environmental Affairs and Department of Water and Sanitation.
- » The biodiversity offset area, conservation area and CBA: Irreplaceable areas surrounding the project site must be considered as no-go areas. CBA areas outside of the development footprint must be clearly demarcated and considered as no-go areas.
- » Prior to vegetation clearance, the development footprint and the 200 m of adjoining areas must be scanned for the presence of protected and threatened flora species, by a suitably qualified Botanist/Ecologist.
- » A search and rescue operation must be undertaken to translocate protected species within the development footprint. Affected plant specimens should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. All plants requiring translocations must be translocated by following the plant rescue and translocation guidelines provided in the Ecological Impact Assessment (**Appendix D**).
- » The necessary permits for the removal or destruction of protected species must be obtained from Ezemvelo KZN Wildlife or the Department of Agriculture Forestry and Fisheries (DAFF), before vegetation clearance starts.
- » Prior to construction and vegetation clearance a suitably qualified Zoologist should closely examine the project site for the presence of any animal burrows, rock crevices, under logs/stumps and in trees, and relocate any affected non-Red Listed/Protected animals to appropriate habitat away from the project site.
- » A qualified Zoologist must conduct a pre-construction survey of all potential special-status bird nesting habitat in the vicinity of the project site, and on the project site.
- » Prior to vegetation clearance and construction, all trees will be subject to assessment by means of walk-through surveys for the location of potential bat roosts. This must be done by a bat specialist and/or the Bat Interest Group of KwaZulu-Natal.
- » The following must be developed for the site and implemented as appropriate throughout the project life-cycle:
  - ∗ A stormwater management plan for the project site. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the water resources and that the discharge of water will not result in scouring and erosion of the receiving systems.

  * An IAP Control and Eradication Programme.
  * A groundwater monitoring plan.
  * A carbon emissions management plan.
  * A chance find procedure, including procedures to follow in the case where the proposed development activities bring archaeological or palaeontological materials to the surface.
  * A recognised process hazard analysis (such as a HAZOP study) on the proposed facility prior to construction to ensure design and operational hazards have been identified and adequate mitigation put in place.
- Signature of all terminal designs must be undertaken by a professional engineer registered in South Africa in accordance with the Professional Engineers Act.
  * A Major Hazardous Installation (MHI) Risk Assessment compiled in accordance with MHI regulations.
  * An emergency preparedness and response document for on-site and off-site scenarios prior to initiating the MHI risk assessment.
- The proposed CCPP access and parking layout (not yet designed) is to be submitted to the local authority for approval.
- Measures with which to minimise the project's water requirements must be investigated by the project developer.
- Obtain all other environmental permits for the project, as required.

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