Applications for an Environmental Authorisation (EA) and a Waste Management Licence (WML) for the proposed 80 000 tonne per annum (tpa) TiO_2 Plant in the Richard's Bay Industrial Development Zone, KwaZulu Natal

Draft Environmental Impact Assessment Report (Draft EIR)

KZN EDTEA Ref: DC28/0010/2022

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Report Prepared for

Nyanza Light Metals (Pty) Ltd

Report Number 585503/ Draft EIR

Report Prepared by

January 2023

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SRK Project Number 585503/Draft EIR

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Executive Summary

Introduction

Who is conducting the EIA/EMPr?

SRK Consulting (SA) (Pty) Ltd (SRK) has been appointed by Nyanza Light Metals (Pty) Ltd (Nyanza) as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Authorisation (EA), Waste Management Licence (WML), Atmospheric Emission License (AEL), and Water Use License (WUL) application processes for the proposed construction and operation of an 80 000 tonne per annum (tpa) Titanium Dioxide (TiO_2) Pigment Plant in Phase 1F of the Richard's Bay Industrial Development Zone (RBIDZ).

The reports and documentation for the EA and WML application processes will be compiled and finalised for submission to the KwaZulu-Natal Department of Economic Development, Tourism, and Environmental Affairs (KZN EDTEA) and the Department of Forestry, Fisheries, and the Environment, (DFFE), respectively, for consideration and decision making. Where required, the KZN EDTEA and DFFE will consult with other government authorities as required in terms of Section 24(K) of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA).

Who will evaluate the EIA/EMPr?

Before the proposed development can proceed, approval (EA & WML) has to be obtained from the KZN EDTEA and DFFE. The proposed project triggers activities listed in terms of:

- Listing Notices 1 (Activity 25) and
- Listing Notice 2 (Activities 1, 4, and 6) and
- Listing Notice 3 (Activities 2 and 14)

of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) (as amended) and will require an EA from the KZN EDTEA.

In addition, the proposed project triggers activities listed in Government Notice Regulation (GNR) 921 of the National Environmental Management: Waste Act, 2008 (Act 58 of 2008) (NEM: WA) (Category B Activities 3, 4, and 10 and Category C Activity 2) and will require a WML from DFFE. Since the project triggers activities in Listing Notice 2 of the NEMA and category B of the NEM: WA, a full Environmental Impact Assessment (EIA) including Scoping and Impact Assessment will be followed as stipulated in GNR 326 of the NEMA, as amended.

The Final Scoping Report was submitted to the KZN EDTEA and DFFE for review and the DFFE approved the Scoping Report and associated Plan of Study on the 06th of September 2022, whereas EDTEA approved the Scoping Report and associated Plan of Study on the 28th of September 2022. In the approval, the Competent Authorities stated that the EAP may proceed with undertaking the impact assessment phase of the project in accordance with the tasks outlined in the plan of study for environmental impact assessment. The current impact assessment phase entails detailed specialist investigations, reporting and further stakeholder involvement. Only once a Final Environmental Impact Assessment Report (EIR) and Environmental Management Programme (EMPr) have been submitted to KZN EDTEA and DFFE, can a decision be taken as to whether the project EA and WML will be granted, and the project may proceed or not.

Nyanza will also apply for an AEL which will be submitted to the King Cetshwayo District Municipality and a WUL which will be submitted to Department of Water and Sanitation (DWS).

Description of the Proposed Development

The Project will produce 80 000 tpa titanium dioxide (TiO_2) pigment. The expected life of plant is 60 years. Feedstock will be ilmenite (design is based on typical Tellnes ilmenite) and/or conventional sulfatable slag (design is based on typical Richards Bay Mineral slag) and a waste slag from the erstwhile Highveld Steel plant – referred to as Highveld Steel Slag (HSS). The design is making provision for a blend of any proportion of these feedstocks.

The plant will be operated on a 24 hour, 365 days per year basis. Considering unplanned production outages and planned maintenance shuts, the design assumption is that plant on-line time will be 85%. Redundancy provision and emergency power provision is made on all critical abatement equipment to ensure 100% on-line time.

The manufacture of TiO_2 via the sulfate process consists of the manufacture of the pure untreated TiO_2 (referred to as Calciner Discharge or 'CD') and the deaggregated and surface treatment of the CD (referred to as 'Finishing').

The key stages in the manufacture of CD through sulfate technology are:

- Milling of the feedstock to the optimal size fraction;
- Digestion of the TiO_2 feedstock with sulfuric acid (H_2SO_4);
- Reduction of the ferric iron, Fe_3^+ in the titanyl sulfate solution ('black liquor') to Fe_2^+ with iron (Fe) if needed;
- Formation of adequate titanium irons (Ti_3^+) in the black liquor by further reduction with Fe if needed;
- Oxidation of excess Ti3+ in the black liquor if needed;
- Separation of solid impurities from the black liquor;
- Removal of excess Fe from the black liquor and/or removal of excess aluminium from the black liquor and re-concentration of the black liquor (if necessary);
- Preparation of seed crystals ('nuclei') for precipitation in hydrolysis and rutilisation in the calciner;
- Hydrolysis of the titanyl sulfate to form an insoluble hydrous TiO_2 precipitate;
- Washing and bleaching of remaining impurities;
- Conditioning of the hydrous TiO_2 precipitate prior to calcination; and
- Calcination to drive off water and acid and to grow the TiO_2 crystals, yielding pure dry TiO_2.

The TiO_2 that emerges from the calciner will be deaggregated, coated with oxides or hydroxides of aluminium, silicon, phosphorous and/or zirconium and then washed, dried and deagglomerated before packing as a final product.

Ancillary process units included in the scope of the project are:

- scrubbing of digestion and calciner off-gas;
- recovery of titanyl sulfate solution from digester solid residues and neutralisation of the digester solid residues;
- re-concentration of strong waste acid for recycle to the main process;
- neutralisation of remaining waste acid;

- dewatering of gypsum;
- preparation of the surface treatment and calciner additioning chemicals; and
- buffer storage facilities in the main TiO_2 plant for copperas and ammonium aluminium sulfate and handling facilities for loading and dispatch of these.

Other process units included in the scope of the project are:

- a sulfur-burning sulfuric acid plant (also supplying steam to the main TiO_2 plant);
- a water demineralisation plant;
- a compressed air plant for plant air and instrument air;
- vacuum generation plant;
- a lime slaking plant;
- water cooling plant(s); and
- a steam boiler(s).

Project Need and Desirability

Then environmental right is contained in the Constitution of the Republic of South Africa, Act 108 of 1996 (hereafter referred to as "The Constitution"). Section 24 of the Constitution enshrines environmental rights in South Africa, which are interpreted to have a two-fold purpose. The first part guarantees a healthy environment to every person. The second part mandates the State to ensure compliance with the first part. The State is prohibited from infringing on the right to environmental protection and is further required to provide protection against any harmful conduct towards the environment.

More than 90% of the rutile and ilmenite TiO_2 feedstock are used for the manufacturing of TiO_2 pigments that are used in industrial paints, coatings, paper, cosmetics, plastics, etc. Currently, Africa imports 130 000 tonnes of TiO_2 pigment per year, while South Africa consumes about 35 000 tonnes (Global Africa Network, 2017). Nyanza will contribute 80 000 tonnes of TiO_2 pigment per annum. The largest quantity will be sold locally, while the remainder will be exported to other countries in Africa and the Middle East.

A technology partnership between Avertana of New Zealand and Nyanza will result in the construction of the 80 000 tpa TiO_2 Pigment Plant in Richards Bay. TiO_2 will be produced from stockpiled waste steel slag to create the pigment. This is the white pigment use most widely across the world (Global Africa Network, 2017).

The 80 000 tpa TiO_2 Pigment Plant will be situated within the Richards Bay Industrial Development Zone (RBIDZ) Phase 1F. Zoning for the RBIDZ is classified as general industrial and the project is in line with the mandate of the RBIDZ to be a purpose-built and secure industrial estate developed specifically to manufacture goods and to produce services to enhance beneficiation, investments, economic growth, job creation, and developing skills (ZO, 2021). This project will bring new technology to South Africa as well, aid the industrialisation programme of the government, and add value to mineral and mining processing value chain of the country (Global Africa Network, 2017).

Construction of the 80 000 tpa TiO_2 Pigment Plant strengthened the purpose to rebuild the economy of KwaZulu-Natal (KZN) after the Covid-19 outbreak caused delays. The destruction of the economy was left in the pandemic's track, resulting in thousands of job losses and companies closing down. Following its mandate, the economic recovery initiatives from the government and with the leadership of Member of Executive Council (MEC) Pillay, the RBIDZ in now required to speed up energies reserved to create job opportunities for people in the KZN province (ZO, 2021).

Commencing with the construction of investment projects and the persistent partnership between Nyanza and the RBIDZ, will contribute to stimulating and restoring the KZN economy. Local and provincial government parties along with Nyanza and the RBIDZ are pleased by this momentous project which will enhance the position of Richards Bay as the African Continent's Titanium and Minerals Beneficiation Capital (ZO, 2021).

It is expected that the project will lead to the creation of about 1200 jobs during its construction phase and 550 job during its operational phase. Approximately 680 of these jobs will be for skilled labourers, while 1 070 of these jobs will be for unskilled labourers. People from the Richards Bay area will be given preference for employment as this will be the most economically viable option. Should the project not proceed, a large negative socio-economic loss will be a consequence for the region.

Alternatives Considered

The alternatives considered include:

- Site Alternatives: Two feasible site alternatives were assessed, considering proximity to main feedstock, which is near Witbank in Mpumalanga Province, transportation infrastructure / proximity to a port for bulk export of titanium products, availability and suitability of industrial land, infrastructure, services, and utilities as well as proximity to key raw materials. The site alternatives considered were:
    - Alternative 1: Middleburg as a location was the closest to Highveld Steel and Vanadium resulting in the slag not having to be transported as far; however, the final Titanium product would still have to be transported via railway to Richards Bay Port as this is the closest port. Although there were acceptable transportation options, namely the railway line from Witbank to Richards Bay, Nyanza would still have to install all supporting infrastructure, services, and utilities. Furthermore, the sulfuric acid which is required to produce the final Titanium product would have to be transported just under 400 km to the plant, resulting in much higher transportation costs. For these reasons, the Middleburg alternative was discarded.
    - Alternative 2 (preferred alternative): Richards Bay Richards Bay was the second furthest from Highveld Steel and Vanadium, however it was one of the closest to a port for bulk export of the final titanium product. In addition, a portion of land within Phase 1F of the RBIDZ, where key supporting infrastructure has already been established and services and utilities are available. Furthermore, the sulfuric acid, required for the production of titanium pigment would be sourced from nearby facilities like Foskor which is also located in Richards Bay. For the above reasons, the Richards Bay site was the most suitable site alternative, and thus this is where Phase 1, the Product Testing and Development Centre was developed. Due to the fact that Phase 1 is now already developed, there are no further site alternatives being pursued.
- Technology Alternatives: The alternatives considered were as follows:
    - Four beneficiation options of the discard furnace slag from EVRAZ Highveld were evaluated: smelting, physical upgrading, chlorination, and sulfuric acid leaching process. The evaluation of the various typical titanium beneficiation processes revealed that smelting, physical upgrading, and chlorination processes are unsuitable due to the high levels of metal impurities (Calcium, Magnesium etc.) in the slag. As a result, the hydrometallurgical sulfuric acid leaching process route, commonly referred

to as the "sulfate" process, was selected as the technically viable processing route for the study. The study was largely based on patents developed for Highveld slag specifically, with enhancements and additions as derived from test work.

  - In the technology selection phase various processing options were evaluated based on the possible processing routes, the proprietary information and confidentiality regarding certain processing routes, and accessibility to required reagents, technical know-how and operating skills requirements. Uncoated [1]anatase was initially identified as a relatively simple titanium pigment product to produce, possibly at the lower ranges of typical production costs. Conceptual process engineering and costing continued on this basis, up to and including financial analyses of two different processing routes. Following the outcomes of the titanium pigment market study conducted by TZ Minerals International Pty Ltd (TZMI), however, the decision was made to target coated rutile as product. This required the incorporation of a rutile nuclei production step as well as a pigment finishing unit operation. The decision to change from uncoated anatase to coated rutile as final product was prompted by the limited and diminishing market for uncoated anatase. These additional process areas were incorporated into the design, and added to the cost estimates and resultant financial analyses"

- Operational Options: With respect to the use of sulfuric acid in the plant, there were 2 options considered, viz buying the sulfuric acid from other suppliers, and making own acid on site. A decision was made to rather manufacture the sulfuric acid on site to reduce risks related to transportation as well as to reduce costs.

- The "no-go" option: The no-go alternative would entail not implementing the proposed 80 000 tpa TiO_2 Pigment Plant. The proposed plant will be located with the RBIDZ, and the no-go option would mean that development of the section of the RBIDZ 1F affected by the proposed project will not continue. The negative environmental impacts associated with the proposed project including loss of wetland systems, loss of biodiversity etc may not occur and the area will remain in its existing condition for a limited timeframe, barring the impacts that have occurred due to the existing Nyanza TiO_2 Product Development and Testing Centre (PTDC). However, it must be noted that since the RBIDZ was developed for the sole purpose of attracting development, it is expected that the site will eventually be used by another industry, which will still impact on some, if not all of the environmental aspects affected by the Nyanza project.

  Not implementing the project will impact the job creation, economic growth, income distribution to low-income households, and SMME simulation development. A socio-economic assessment of the development undertaken in 2014 found that the development would have a net positive value of R6.4 billion. The macroeconomic impact analyses for the RBIDZ indicated that developing Phase 1F will add about R23.8 billion to South Africa's Gross Domestic Product (GDP) and will create 110 000 new jobs, of which 23 000 will be jobs for workers that are unskilled. Households will also benefit to an additional R15.6 billion in household income, R2.6 billion which will expand to low-income households. The no-go option will result in a loss of the socio-economic benefits (NEMAI Consulting, 2016)

  Currently, Africa imports 130 000 tonnes of TiO_2 pigment per year, while South Africa consumes about 35 000 tonnes (Global Africa Network, 2017). Nyanza will contribute 80 000

[1] There are two crystalline modifications of titanium dioxide: rutile and anatase. Only the anatase variety finds its use as a color additive for foodstuffs.

tonnes of TiO_2 pigment per annum. The largest quantity will be sold locally, while the remainder will be exported to other countries in Africa and the Middle East.

By not implementing this project approximately 1 750 potential jobs associated with the project will not be created, the local economic opportunities and revenue which could potentially have benefitted the local, regional, and national economy would be lost. Not implementing the project will also result in loss opportunities in foreign exchange for South Africa will be incurred as the potential to sell the TiO_2 pigment internationally will be lost.

In addition, not implementing the project means that the waste product which will be used as the primary resource will not be used and will remain at Highveld Steel and Vanadium.

Environmental Assessment Process

Approach to the Environmental Impact Assessment

An EIA seeks to identify the environmental consequences of a proposed project from the beginning and helps to ensure that the project will be environmentally acceptable over its life cycle and integrated into the surrounding environment in a sustainable way. The project triggers activities listed in GNR325 (Listing Notice 2) of the NEMA and requires that a full EIA (scoping and impact assessment phases) be conducted.

Similar to the scoping phase of the process, two parallel processes were followed during the impact assessment phase being the technical assessment process and stakeholder engagement process. A summary of this process is shown in Figure ES-1.

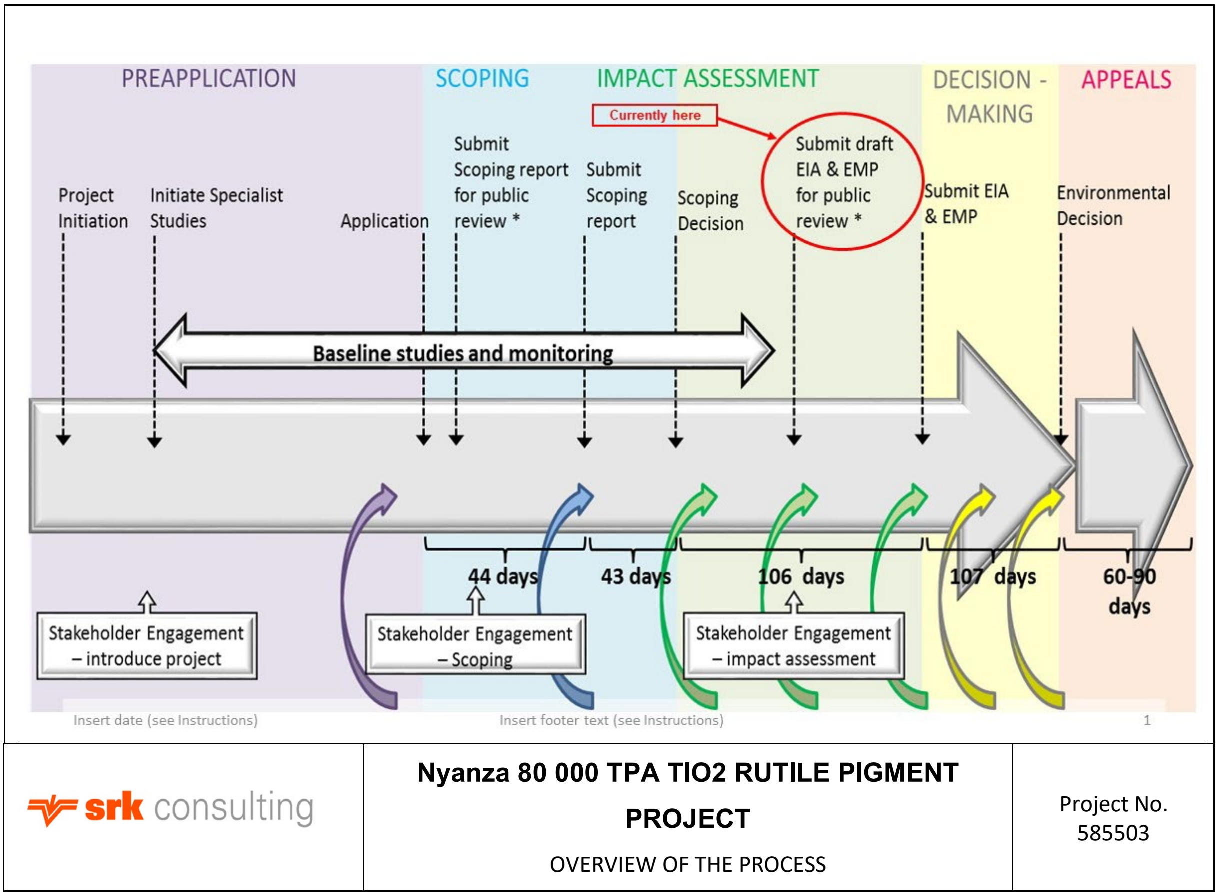

Figure ES-1: Illustration of the EIA process being followed

Stakeholder Engagement Process

Scoping Phase Public Participation

The process commenced with pre-application consultation meetings that were held with the KZN EDTEA on 2 February 2022 and the DFFE on 21 February 2022 to discuss the proposed project, required authorisations and the EIA process to be followed.

Activities that have been undertaken for the public involvement process during the pre-application process are:

- Development of a stakeholder database: The stakeholder database comprises a variety of stakeholders identified from previous projects in the area, newly identified stakeholders through the initial registering process of this project.
- The opportunity to participate in the EIA and to register as an Interested and Affected Party (I&AP) was announced in April 2022 through the following means:
    - Letter of invitations to register were sent to I&APs on 20 April 2022;
    - Media advertisements in English and IsiZulu were placed in the Zulu Observer on 22 April 2022;
    - Site notices were erected at several places in and around the proposed study area on 7 April 2022;
    - Collation of comments received into a Comments and Responses Register (CRR); and
    - Obtaining and documenting registration and comment sheets.

In addition, the EAP made a project introductory presentation to the Richards Bay Environmental Review Committee (ERC) on a11 August 2022.

The Draft Scoping Report was made available for a 30-day commenting period from 13 July 2022 to 12 August 2022. All issues, comments and suggestions received from stakeholders were reviewed and collated into a CRR. Where necessary, comments from stakeholders have also been incorporated into the Final Scoping Report submitted to the KZN EDTEA and DFFE for decision-making on the EA and WML applications respectively.

The Scoping Report was submitted to the KZN EDTEA and DFFE for review and decision making. The DFFE approved the Scoping Report and associated Plan of Study (PoS) on the 6 September 2022 and KZN EDTEA approved the Scoping Report and associated Plan of Study on the 28 September 2022.

Draft EIA Phase Public Participation

During the EIA phase, stakeholder engagement entailed:

- Notification of the availability of the Draft EIR for review and comment:
- The 30-day review and comments period between 25 January 2023 and 24 February 2023;
- Public Meeting and key stakeholder meeting with the Richard’s Bay ERC; and
- Updating of the CRR.

Profile of the receiving Environment

A summary of the main baseline aspects is included in Table ES-2, with more detail included in Section 10of the report.

Table ES – 2: Summary of the Profile of the Receiving Environment

Aspect	Description
Climate	The Richards Bay area is located on a coastal plain. According to the Köppen-Geiger climate classification, the climate is considered to be 2Cfa (humid subtropical climate). Temperatures peak from December to February at approximately 35 °C with a minimum of 18 °C, dropping to daytime heights of approximately 28 °C and a minimum of 12 °C from June to August. The relative humidity is high, ranging from a high of 95% in the summer to a low of 28% in the winter. The wind most often blows from the South, South-East, and East, but shifts to North-East in the summer. Mean wind speeds range between 16 km/h and 24 km/h, only dropping below 10 km/h rarely. Mean annual rainfall was around 620 mm in 2017, 2018, and 2019 and the long-term average rainfall was approximately 1 200 mm, which was particularly low. Months with the highest rainfall are May, and November and December, although May, August, and October have the highest precipitation per hour. that rainfall is more-or-less evenly spread during different times of the day for most months but are slightly more during evening and night-time in October, November, and December.
Topography	The terrain is generally very flat with some gradual slopes towards the South at about 0.4% and some large pans. On the northern portion of the site, there is a sand dune and a high lying area. The site is approximately 67 m above sea level in the North and about 42 m to 44 m above sea level in the South. The area's topography has three broad landforms. The coastal area is made up of Neogene marine and coastal aeolian sediments, to the inland, a broad, curving band running parallel to the coastal sediments include areas North of Empangeni, comprising of post-African surfaces (partly planed). The area South of Empangeni comprises of dissected landforms of various ages.
Geology	The site is situated on the Maputaland Coastal Belt (a generally flat landscape). This landscape comprises of quaternary sediments of marine origin that is about 18 000 years old. These sediments are yellowish in colour. Argillaceous redistributed sand of the Berea and Muzi Formations also forms part of the Maputaland Coastal Belt. The soils have very poor nutrition and is well leached, except in the interdune depressions where soils are rich in organics.
Geotechnical	According to the geological investigation that was undertaken for the project, the site is underlain by medium dense soils, grading from approximately 1.0 m into silty to clean sands that is compressible, or sandy clays that is fully expanded with low shear strengths causing poor foundation conditions because of its lowered bearing capacity and increased settlement potential.
Soils, land use, and land capability	The City of uMhlathuze Local Municipality zoned the RBIDZ Phase 1F as noxious industry. The proposed land use is permissible as a free entry (primary right). The IDZ provides for industries of lower impact to be developed. Soil underlying the study area can be described as Q: Moderate to deep, sandy, and flat. The Department of Agriculture, Land Reform and Rural Development (DALRRD)

[2] The Köppen climate classification divides climates into five main climate groups, with each group being divided based on seasonal precipitation and temperature patterns. The five main groups are *A* (tropical), *B* (dry), *C* (temperate), *D* (continental), and *E* (polar). Each group and subgroup is represented by a letter. All climates are assigned a main group (the first letter). All climates except for those in the *E* group are assigned a seasonal precipitation subgroup (the second letter). For example, *Af* indicates a tropical rainforest climate. The system assigns a temperature subgroup for all groups other than those in the *A* group, indicated by the third letter for climates in *B*, *C*, and *D*, and the second letter for climates in *E*. For example, *Cfb* indicates an oceanic climate with warm summers as indicated by the ending *b*. Climates are classified based on specific criteria unique to each climate type.[8]

Aspect	Description
	Soil Classes information shows that the site occurs on imperfectly drained sandy soils, with favourable water-holding properties. These soils are usually highly erodible. According to the DALRRD land capability Geographical Information System (GIS) information RBIDZ 1F occurs in area of moderate potential arable land.
Air Quality	The larger area surrounding the project site includes many different commercial, and light and heavy industrial activities which includes two Aluminium smelters, a phosphoric acid fertilizer plant, kraft process paper mill, etc. The proximity of some important industries to residential areas are a cause for concern. The project area's current air quality is largely influenced by industrial activities located within the RBIDZ, as well as by farming activities, residential fuel burning, domestic fires, dust entrained by vehicles, and vehicle exhaust emissions. These sources of emissions vary from activities generating course airborne particulates (e.g., dust from roads when farmland is prepared) to fine particulate matter (e.g., vehicle exhausts). There are a number of air quality receptors around the project site. The air quality baseline characterisation found the following: • The measured number of Particulate Matter (PM) $PM_{2.5}$ and PM_{10} exceedances of the 24-hour National Ambient Air Quality Standards (NAAQS) (40 µg/m^3 and 75 µg/m^3) were below the maximum allowable limit of 4 per an annum across all monitoring stations for the period 2019 – 2021. • The number of SO_2 exceedances of the 1-hour NAAQS (350 µg/m^3) at the Scorpio monitoring station was above the maximum allowable limit of 88 in 2020. • The number of SO_2 exceedances of the 24-hour NAAQS (125 µg/m^3) at the Brackenham, Arboretum and Scorpio monitoring stations was above the maximum allowable limit of 4 in 2020. The Scorpio monitoring station also measured an SO_2 exceedances of the 24-hour NAAQS in 2021. • Total Reduced Sulphur (TRS) 24-hour concentrations were below the WHO guideline of 150 µg/m^3 at the Central Business District (CBD) stations in 2019, 2020 and 2021. Proposed emissions inventory: • PM_{10}, SO_2, SO_3, NO_2, CO and HCL emissions from the processing plant as well as vehicles travelling along paved roads were considered. • Nyanza has employed multiple abatement technologies to reduce air pollution emissions. Technologies such as sophisticated scrubber systems and baghouses at storage bunkers were considered in the emissions inventory calculations.
Noise	A detailed inventory of potential noise sources and their associated sound power levels (PWLs) was developed for the proposed operations. Environmental acoustic modelling was conducted using the internationally accredited noise modelling software. A number of noise receptors were identified around the project site. According to the noise specialist study, • The average daytime sound levels ranged from 47.4 dB(A) (M4) to 67.6 dB(A) (M6). All measured sound levels were below the respective South African National Standards (SANS) 10103 (2008) rating level, with the exception of monitoring points M5 and M6.

Aspect	Description
	• Night-time sound levels range between 41.7 dB(A) (M2) and 66.9 dB(A) (M5). The average night-time sound levels measured were below the respective SANS 10103 (2008) rating level, with the exception of monitoring points M5 and M6. • Key sources of noise at the monitoring locations include vehicle traffic and industrial noises from existing business.
Visual	The project development is not expected to negatively impact the aesthetical value as the site is surrounded by other industries and vacant land. During the project's construction phase, the storage of equipment and material might result in potential visual impact. The EMPr provides mitigation measures for impacts related to construction.
Surface Water	According to the 2017 South African National Biodiversity Institute (Biodiversity Geographical Information System (SANBI BGIS) Strategic Water Source Areas (SWSAs) database, the project area is considered strategically important for economic and water security at a national level because it is located in both the Richards Bay ground water-fed estuary SWSA and the Zululand Coast surface water (Hatch, 2019). The project site falls within quaternary catchment area W12F, in the Pongola-Mtamvuna Water Management Area (WMA). This WMA includes the following large rivers: Pongola, Mhlathuze, Mkuze, Thukela, Mvoti, and Umgeni amongst others. Main water resources in the uMhlathuze Catchment are the Nseleni and uMhlathuze rivers, Goedertrouw dam, and irrigation dams and impoundments, lakes, and pans (like the Nsezi, Mzingazi, Lake-Cubhu, and Nhlabane Lake), riparian areas, hillslope seepages, valley bottom wetland systems, and Mhlathuze River Floodplain and Estuary. The Qhubu, Mzingazi, and Nhlabane Lake, Mhlatuze Floodplain, Mhlatuze Estuary and associated valley bottom wetland, and Mountainous seeps in the Mhlatuze River's upper reaches are the most important wetland systems (KZN PPC, 2016). The catchment's water resources were awarded a PES rating of C (moderately modified) (DWS, 2019). There are no rivers or streams located on the affected property. There are three main stormwater drainage channels in Alton, of which two traverse the RBIDZ's 1F Estate. The proposed project site is located west of the central drainage line (Hatch, 2019).
Geohydrology	The Nyanza Metals site is underlain by an unconsolidated aquifer that is vulnerable to contamination. Groundwater levels are shallow, ranging from 0.8 to 2.97 mbgl and contribute to the wetlands in the area. A clay unit separates the sandy aquifers at Nyanza. The deeper sands are highly permeable (approx. K is 21.3 m/day), whilst the shallower sandy unit has a lower hydraulic conductivity of 0.3 m/d to 2.1 m/day. Hence any contaminant entering the sub-surface could migrate and impact the aquatic environment in the wetland.
Wetlands	A wetlands delineation and assessment undertaken identified a number of wetlands located on the site which, due to their location and/or topographic position in the landscape are potentially at risk from the proposed infrastructure and therefore assessed further as part of this study. These wetlands were classified as follows: • A depression wetland – This wetland is located along the western boundary of the study area; • Wetland flats – Three wetland flats were identified located within the central to the eastern boundary of the study area; and

Aspect	Description
	• Seep wetlands – Two seep wetlands were identified along the eastern boundary of the study area.
Areas of conservation concern	The site for the 80 000 tpa 80000 tpa TiO2 Pigment Plant of Nyanza is not situated within a Marine Protected Environment or South African Protected Area, but is, however, located in a Critical Biodiversity Area (areas that are required to meet biodiversity targets for species, ecosystems, or ecological processes).
Biodiversity	The Nyanza project location is situated on Maputaland Wooded Grassland extending across a large portion of the study area. The extent of the threatened ecosystem that remains on the study area, namely Kwambonambi Hygrophilous Grasslands, are still extensive. Furthermore, the study area is within 4 km of the Enseleni Nature Reserve and within 8 km of the Richards Bay Game Reserve which is classified as national protected and conservation areas. The Richard's Bay Game Reserve is also classified as an important birds and biodiversity area. The study area contains a large portion that is of critical biodiversity importance (Area 3: Optimal). In relation to water sources the area is located within the Zululand Coast and is considered to be within a strategic Water Source Area. The vegetation type associated with the site is the Maputaland Wood Grassland (endangered). The study area consists of freshwater wetlands, KwaZulu-Natal Coastal Forests, and Maputaland Wooded Grassland. Five broad habitat units were identified as (1) Degraded Hygrophilous Grassland, (2) Degraded Coastal Forest, (3) Thicket Habitat, (4) Freshwater Habitat, and (5) Transformed Habitat ranging in protection importance. Permits to remove the species *Boophone disticha, Crinum macowanii, Eulophia speciosa,* and *Hypoxis hemerocallidea* were obtained by the RBIDZ during Phase 1F from the Ezemvelo KZN Wildlife Permits Office (OP 836/2022). Permitted species were relocated as stipulated in the permit to where no future infrastructure is planned for the study area. Degraded Hygrophilous Grassland has moderately low floral sensitivity and intermediate faunal sensitivity. Degraded Coastal Forest has moderately high floral sensitivity and moderately high faunal sensitivity. The Thicket Habitat has moderately low floral sensitivity and intermediate faunal sensitivity. Freshwater Habitat Depression Wetlands have moderately high floral sensitivity and moderately high faunal sensitivity. Degraded Hygrophilous Grassland has moderately low floral sensitivity and intermediate faunal sensitivity. Freshwater Habitat: Wetland Flats and Earth Canal has intermediate floral sensitivity and intermediate faunal sensitivity. The Transformed Habitat has low floral sensitivity and low faunal sensitivity.
Socio-Economy	The City of uMhlathuze Local Municipality is the third most important area in KZN in terms of primary manufacturing of economic production. The City of uMhlathuze Local Municipality houses some of the world's industrial giants. The concentration of industries is supported by activities and output of important development nodes. Most of the commercial and industrial activities are located in Richards Bay, Empangeni, and Felixton. The area is the third most important in KZN in terms of economic production which contributes 5.5% of total formal employment and 7.6% of the total gross geographic product. Port facility development has promoted and initiated the development of manufacturing activities through the years. The RBIDZ and nearby port are import assets that can exploit opportunities to export to the world's vast markets. Policies

Aspect	Description
	were created to encourage investment and promote industrial growth, prioritising projects on the basis of job creation contributions. Interventions and strategies revolve around primary industrial development promotion, while creating entry into the market for Small, Medium and Micro Enterprises (SMMEs), the informal sector, and emerging businesses. The local economy is imperative to national and international economies. A large number of importing and exporting industries like Aluminium smelters, Richards Bay Minerals, Mondi Kraft, Exxaro KwaZulu-Natal Sands, Bell Equipment, Foskor, Richards Bay Coal Terminal, the port of Richards Bay, and cane and timber agricultural activity means that the region's welfare is influenced by national and international market movements. 95% of economic activities are located in Felixton, Empangeni, and Richards Bay. The City of uMhlathuze Local Municipality consists of a population of approximately 410 465 people with 103 915 households. The highest levels of employment are among the employable youth (16 – 35 years). Unemployment levels are at 75.4%. This implies that the City of uMhlathuze Local Municipality has a high economic growth potential and should endeavour to speed up the provision and development of skill through initiatives. The current dependency ratio is 48.2, indicating high dependency from the youth on those that are economically active. The key issues are thus high unemployment rates, a lack of skills, and slow economic growth.
Heritage and Cultural Aspects	No heritage resources were identified on site. A tree species indicative of old graves was identified on the site, and Nyanza will be required to be on the lookout during construction. Should any heritage resources and graves be identified, Nyanza will implement the chance find protocol .

Anticipated Impacts

Anticipated impacts that have been identified by the project team are summarised in Table ES-3.

Table ES – 3: Anticipated Impacts

Element of Environment	Potential Impact Descriptions
Socio-Economic	Possible job and business opportunities during all phases of the project.
Hydrogeology	Possible groundwater contamination from hydrocarbons leaking from construction vehicles, chemicals and materials handled on site.
Surface water	Possible surface water contamination from hydrocarbons leaking from construction vehicles, chemicals and materials handled on site.
Air Quality	Possible impact on air quality in the area.
Noise	Possible generation of noise during the construction, operation, and decommissioning of the 80 000 tpa TiO_2 Pigment Plant.
Heritage Resources	Possible impact on heritage resources.
Visual	Possible visual impacts due to the construction and operation of the plant
Soils/Land Use/Land Capability	Localised loss of soil resource and change in land capability and land use due to the clearance of vegetation is expected.
Traffic	Possible impacts on traffic due to transportation of construction material
Biodiversity	Loss of biodiversity due to vegetation clearance for construction.
Aquatic Biodiversity Impact Assessment	Possible impacts on the wetlands on the project site.

Element of Environment	Potential Impact Descriptions
Traffic	Possible impact on traffic during all phases of the project

Specialist Studies

The DFFE environmental screening tool classified the area as being an area of high biodiversity value. The following specialist studies were conducted as part of the EIA:

- Terrestrial Biodiversity Impact Assessment;
- Aquatic Biodiversity Impact Assessment;
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Hydrology and Stormwater Management;
- Geotechnical;
- Traffic Impact Assessment;
- Hydropedology;
- Geohydrology Impact Assessment; and
- Heritage Impact Assessment.

The generic terms of reference (ToR) for each specialist study were to:

- Describe the existing baseline characteristics of the study area and place this in a regional context;
- Identify and assess potential impacts resulting from the project (including impacts associated with the construction and operation of the project), using SRK's prescribed impact rating methodology;
- Identify and describe potential cumulative impacts resulting from the proposed development in relation to proposed and existing developments in the surrounding area;
- Incorporate IFC TOR for ESIA;
- Recommend mitigation measures to avoid or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring programme, if applicable.

Other specialist studies including Air Quality, Noise, Hydrology, and Groundwater included modelling.

Certain impacts that are anticipated to be of limited or lower significance, either by virtue of the scale of the impacts, their short duration (e.g., construction phase only), disturbed nature of the receiving environment and/or distance to communities, have been assessed by the EAP Team and reported directly into the EIR.

Summary of Findings from Quantitative Impact Assessment

The potential impacts evident from the detailed impact assessment of the proposed project are both positive and negative in nature. The identified and assessed negative impacts can be managed to acceptable levels.

The impacts associated with the project include the loss of the forest that is located on the site. This impact has however been dealt with in the IDZ's approved 2016 EIA and EMPr and the IDZ is currently applying for a deforestation permit from Ezemvelo. The habitats within the study area provide suitable habitat to sustain viable populations of floral Species of Conservation Concern (SCC). A Floral walkdown of the study area was conducted in 2015 and permits granted for the relocation of *Boophone disticha* and *Crinum macowanii* species within the study area. These species were recently relocated; however, additional species were identified on site during 2022 that were not previously identified and as such no relocation of this species has occurred. Furthermore, habitat to support other SCC is available within the habitats located on the property. During the biodiversity assessment, it was impossible to identify all the individual SCC that will be impacted by the proposed development. However, the assessment undertaken was sufficient for the specialist to undertake the impact assessment and formulate mitigation measures required to avoid and/or minimise potential biodiversity impacts. Should the proposed development be authorised, a thorough walkdown of all the footprint areas will be required to identify and mark all floral SCC for possible relocation to suitable habitat outside the direct footprint (as far as is feasible). Permits from Ezemvelo will be required for the possible relocation, removal, or destruction of this species prior to commencement of vegetation clearing activities. The proposed project will also have a positive impact, albeit (of low significance) on biodiversity as it will result in removal of Alien Invasive Plant Species currently on the property.

There are a number of wetlands located on the site that will be lost through infilling for the establishment of the plant. It must be noted that authorization has previously been granted to the IDZ for infilling of the wetlands within the study area, except for the depression wetland and associated 30m buffer, which has been designated as a conservation area within the RBIDZ area. The layout plan of the plant is in such a way that the depression wetland and associated buffer are not directly affected by the plant, however this wetland feature is still subject to edge effect impacts from the associated development activities. The wetlands impact assessment was therefore undertaken, and mitigation measures identified to ensure that potential edge effects are managed in-line with the mitigation hierarchy.

Most of the negative impacts identified i.e. impacts of particulate mobilisation, increased nuisance noise, visibility due to dust plumes, potential soil, and groundwater pollution due to chemicals, oil and diesel will take place during all phases of the project. The main receptors that may be impacted by contaminated groundwater is the conservation wetland located close to the site. However, the impacts are expected to be of low and medium ;low significance and the periods of the majority of the impacts will be of short duration.

Particulate mobilisation is easily and effectively controlled by dust suppression and the potential for soil and groundwater pollution will be mitigated by taking due care to prevent spillages of chemicals, oil, and diesel and to clean up any spillages that might occur. In addition, the design of the facility includes oil sumps which will be lined to avoid and/limit contamination of water resources during the operation of the facility. A Stormwater Management Plan (SWMP) that has been incorporated into the plant design will also be implemented to ensure that clean and dirty water is separated and that water resources are protected.

To keep working areas safe during construction and infrastructure safe during plant operation, it may be necessary to dewater and lower the water table locally. The extent and necessity of dewatering required will be dependent on final construction and operational requirements. At this junction, it is anticipated 19 m^3/hr will be pumped out from sub-surface drains to maintain the water table at 2 mbgl. The abstracted water could be directed to the plant for use or to the wetland. The abstraction of groundwater has potential to result in groundwater drawdown that may impact the conservation wetland The significance of the impact has been classified as low and can be mitigated to be insignificant.

The noise impact assessment found that the proposed project will not result in any of the respective SANS limits. Potential sources of air pollution were identified and assessed. The identified pollutants of concern include PM_{10}, SO_2, SO_3, NO_2, CO and HCL emissions from the processing plant as well as vehicles travelling along paved roads were considered. Nyanza has employed multiple abatement technologies to reduce air pollution emissions. Technologies such as sophisticated scrubber systems and baghouses at storage bunkers were considered in the emissions inventory calculations. The impact assessment found that the plant will not result in exceedances of the NAAQS.

All the identified cumulative impacts are expected to be of low significance and implementation of mitigation measures will render the potential cumulative impacts negligible.

The main positive impacts of the proposed project will be that it will allow Nyanza to make use of the HSS, which will result in the reduction in waste at Highveld Steel. The project will result in the creation of employment, approximately 1750 jobs will be created during the construction and operational phases of the project. In addition to the direct job creation, the proposed project will lead to the upliftment of businesses around the project area, through provision of services that will be required at the plant. One of the proposed plants is for the air to water installation plant. Nyanza will partner with a local entrepreneur.

The TiO_2 pigment plant will also result in an improvement to the local and national GDP through sales that are earmarked for international markets, bringing foreign currency into the country.

The mitigation measures in the EMPr are deemed adequate to avoid and/or minimise further degradation of the environment. In the long term, effective implementation of mitigation measures (as recommended in the EMPr) may also result in positive impacts in terms of control of alien vegetation.

The summary of the quantitative impact assessment can be found in Table ES- 4.

Table ES- 4: Summary of potential Impacts for construction and operation

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
Pre-Application	Impact on Floral Habitat & Diversity across the habitats: Degradation and modification of the receiving environment, loss of floral habitat and species diversity resulting from: • Inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an Alien Invasive Plant (AIP) control and management plan, and/or erosion or stormwater control plan or poor infrastructure design leading to increased risk of hazardous chemical leakage into surrounding areas.	HIGH	MEDIUM
	Impact on SCC across the habitats: loss of floral SCC and/or habitat because of: • Failure to conduct an additional site walkdown for additional SCC observed during the 2022 field assessment; and • Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate floral SCC to suitable habitat outside of the surface infrastructure footprint.	HIGH	MEDIUM
	Impact on Faunal Habitat & Diversity across the habitats: loss of faunal habitat and diversity because of inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an AIP control and management plan, and/or erosion control plan	VERY HIGH	MEDIUM
	Impact on SCC across the habitats: Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate faunal SCC to suitable habitat outside of the surface infrastructure footprint.	VERY HIGH	MEDIUM
	Potential impacts associated with site clearing prior to commencement of construction activities related to the proposed infrastructure: • Vehicular transport and access to the site, site clearing; • Removal of vegetation and associated disturbances to soils; • Miscellaneous activities by construction personnel.	LOW	INSIGNIFICANT
Construction	Possible boost in short term employment and local small business opportunities.	MEDIUM	MEDIUM
	Potential impact on safety and security because of theft, the occurrence of additional trucks on the roads, uncontrolled lighting of fires on site, littering and driving irresponsibly.	INSIGNIFICANT	INSIGNIFICANT
	Health and safety risk because of the movement of vehicles increasing the risk of accidents	INSIGNIFICANT	INSIGNIFICANT
	Potential influx and unlawful occupation of the area by job seekers and workers	INSIGNIFICANT	INSIGNIFICANT
	Possible groundwater contamination from hydrocarbons from vehicles during the construction and operation phase	MEDIUM	VERY LOW
	Potential deterioration in water quality due to accidental spillages of hazardous substances such as hydrocarbons from vehicles and machinery used during construction.	MEDIUM	INSIGNIFICANT
	Possible contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality	MEDIUM	INSIGNIFICANT
	Poor stormwater management leading to runoff from stockpiled material removed causing pollution of the water resources.	MEDIUM	INSIGNIFICANT
	Possible increase in dust generation, PM10 and PM2.5, because of earthworks, operation of heavy machinery, and vehicle movement.	VERY LOW	VERY LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Emissions of Green House Gases (GHGs) because of the use of vehicles and machinery used during the construction activities.	VERY LOW	INSIGNIFICANT
	Possible production of odours due to improper handling, storage, and management of waste of sit	VERY LOW	VERY LOW
	The use of the steel fabrication plant, construction vehicles and machinery during the construction phase may generate nuisance noise in the immediate vicinity	VERY LOW	INSIGNIFICANT
	Possible production of odours due to improper handling, storage, and management of waste of site	VERY LOW	INSIGNIFICANT
	The use of the steel fabrication plant, construction vehicles and machinery during the construction phase may generate nuisance noise in the immediate vicinity	VERY LOW	INSIGNIFICANT
	Visual intrusion because of the movement of machinery and the establishment of the required infrastructure.	LOW	INSIGNIFICANT
	Indirect visual impact due to dust generation because of the movement of vehicles and materials, to and from the site area.	VERY LOW	INSIGNIFICANT
	Localised chemical pollution of soils as a result of vehicle hydrocarbon spillages and compaction.	LOW	INSIGNIFICANT
	Localised clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	LOW	INSIGNIFICANT
	Removal of local geology as a result of construction activities.	LOW	INSIGNIFICANT
	Potential impacts on Stone Tools	LOW	LOW
	Potential impacts on human graves.	MEDIUM	MEDIUM
	Potential impacts on the depression wetland associated with vegetation clearing of vegetation within the footprint of the proposed infrastructure including: • Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and • Potential continued proliferation of alien and invasive vegetation species due to disturbance.	MEDIUM	INSIGNIFICANT
	Potential wetlands impacts associated with excavation and concrete works associated with the proposed infrastructure (processing plant, ground-mounted solar panels, and non-process water buildings such as offices and workshops and storerooms including: • Removal of vegetation and associated disturbance to soil within the construction footprint; • Increased likelihood of dust generation; • The movement of construction machinery, personnel, and equipment directly; • Mixing and casting of concrete to facilitate construction; and • Proliferation of alien and invasive vegetation species within the footprint areas associated with the proposed infrastructure.	HIGH	MEDIUM
	Potential wetland impacts from clearing of vegetation and soil specifically within the footprint of the proposed infrastructure including:	HIGH	LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	• Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and • Potential continued proliferation of alien and invasive vegetation species due to disturbance.		
	Increase in traffic volumes due to transportation of materials may lead to an increase in traffic congestion on roads around the project area increasing the chances of road accidents.	MEDIUM	VERY LOW
	The increase in vehicles results in an increased potential for road degradation of the road network in the vicinity of the project.	MEDIUM	INSIGNIFICANT
	Impact on SCC on the project site: • Vegetation clearing leads to the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	MEDIUM	MEDIUM
	Impact on habitat diversity within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in: • Edge effects e.g., dumping of cleared vegetation or construction rubble and/or the AIP spread which will result in the replacement of native flora, the reduction in floral habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions; and • Compaction and degradation of soils which have a higher probability of erosion.	HIGH	MEDIUM
	Impact on Habitat Diversity within the freshwater habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in: • Edge effects e.g., dumping of cleared vegetation or construction rubble and/or the AIP spread which will result in the replacement of native flora, the reduction in floral habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions; and • Compaction and degradation of soils which have a higher probability of erosion.	HIGH	MEDIUM
	Impact on SCC within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in • The loss of floral SCC and SCC habitat (e.g., in the case of vegetation cutting and/or rubble from construction activities that are dumped in the Wetland and/or associated buffer); and • The spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	HIGH	MEDIUM
	Impact on the (1) faunal habitat and diversity, and (2) faunal SCC for the proposed development activities: Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion and sedimentation of Freshwater Habitat.	HIGH	VERY LOW
	Impact on SCC: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	MEDIUM	INSIGNIFICANT
	Impact on habitat diversity within the freshwater habitat: Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well	HIGH	MEDIUM

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	as loss of significant and specialised habitat conditions. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion.		
	Impact on SCC within the Freshwater Habitat: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	HIGH	MEDIUM
	Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
	Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.	MEDIUM	INSIGNIFICANT
	Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
Operational	Possible boost in long term employment and local small business opportunities.	MEDIUM	MEDIUM
	Potential impact on safety and security because of theft, the occurrence of additional vehicles transporting raw material, waste and products on the roads and driving irresponsibly.	MEDIUM	INSIGNIFICANT
	Health and safety risk because of the movement of vehicles increasing the risk of accidents	INSIGNIFICANT	INSIGNIFICANT
	Potential influx and unlawful occupation of the area by job seekers and influx of workers	INSIGNIFICANT	INSIGNIFICANT
	Groundwater and surface water impacts from improper storage and handling of feedstock	HIGH	INSIGNIFICANT
	Groundwater and surface water impacts from improper storage, transportation, and handling of products, raw materials, and waste (including sludge)	HIGH	VERY LOW
	Groundwater and surface water impacts from improper storage, transportation, and handling of spent acid	LOW	INSIGNIFICANT
	Potential groundwater and surface water impacts from liquid bulk storage and transportation	MEDIUM	VERY LOW
	Potential groundwater levels impact from dewatering for safe plant construction and operation	VERY LOW	INSIGNIFICANT
	PM, SO_2, SO_3, NO_2, CO and HCL Emissions potentially resulting in nuisance and Health Effects on Nearby Receptors	MEDIUM	LOW
	Possible production of odours due to improper handling, storage and management of waste of site	VERY LOW	VERY LOW
	Emissions of Green House Gases because of the use of vehicles and machinery used during the operational activities.	VERY LOW	VERY LOW
	Ambient noise generated from Nyanza operations.	MEDIUM	LOW
	Visual intrusion because of the plant buildings and infrastructure.	LOW	INSIGNIFICANT
	Visual impacts from use of lighting at night.	VERY LOW	INSIGNIFICANT
	Visual impact from movement of vehicles transporting raw materials and products to and from site	VERY LOW	INSIGNIFICANT

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Visual impact from the solar panels glint and glare	VERY LOW	INSIGNIFICANT
	Road and Intersection Capacity	LOW	VERY LOW
	Road Safety	VERY LOW	INSIGNIFICANT
	Impact on Floral Habitat & Diversity across the habitats: loss of floral habitat and diversity because of: • Ineffective or malfunctioning of storage facilities that store hazardous chemicals, resulting in chemical leaks and/or spills that contaminate the receiving environment; • Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas; • An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint; and • Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	MEDIUM	LOW
	Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of: • Failure to monitor the success of relocated floral SCC; • The increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area; • Loss of SCC may occur because of the increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection of SCC; and An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint.	MEDIUM	LOW
	Impact on Floral Habitat & Diversity the Depression Wetland: loss of floral habitat and diversity because of: • Ineffective or malfunctioning of storage facilities that store hazardous chemical, resulting in chemical leaks and/or spills that contaminate the receiving environment, including the Depression Wetland; • Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas; • An increased risk of fire frequency impacting on floral communities within the Depression Wetland and outside of the development footprint; and • Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas as well as the continued fragmentation and degradation of remaining forest patches in the surrounding areas.	MEDIUM	LOW
	Impact on Floral SCC for the Depression Wetland: Ineffective edge effect management leading to: • Failure to monitor the success of relocated floral SCC (where applicable); • AIP control and erosion that can lead to the loss of SCC habitat and availability.	MEDIUM	LOW
	Impact on Faunal Habitat & Diversity across the habitats: Loss of faunal habitat and diversity because of • ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas, and / or ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	HIGH	VERY LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of failure to monitor the success of relocated faunal SCC as well as the increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management program, leading to ongoing displacement of natural vegetation outside of the footprint area. Further loss of SCC may occur because of the increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection, the persecution of fauna in the adjacent natural habitat, or an increased risk of fire frequency impacting on fauna and faunal communities outside of the development footprint.	LOW	VERY LOW
	Impact on faunal habitat & diversity the depression wetland: Loss of faunal habitat and diversity because of i) ineffective rehabilitation of exposed and impacted areas in the surrounding areas, increasing erosion and sedimentation risk and AIP proliferation within the surrounding areas, and / or ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	HIGH	VERY LOW
	Impact on faunal SCC for the depression wetland: Ineffective edge effect management (e.g., AIP control and erosion plans) that can lead to the loss of SCC habitat and availability.	HIGH	VERY LOW
	Potential impacts associated with the operation of the plant and associated service buildings include: • Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc; • Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure; • Potential effects of TiO_2 nanoparticles on the aquatic ecosystems; and • Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.	MEDIUM	LOW
	Potential impacts associated with the operation and maintenance of the ground solar panels: • Potential indiscriminate movement of maintenance vehicles along wetland situated in close proximity to the Solar panels; and • Potential maintenance activities such as cutting of grass and cleaning of surface area underneath the solar panels.	MEDIUM	INSIGNIFICANT
	Potential impacts associated with the operation of the plant and associated service buildings include: • Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc; • Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure; and • Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.	LOW	INSIGNIFICANT
	Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
	Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.	MEDIUM	INSIGNIFICANT
	Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT

Environmental Management Programme

An EMPr was compiled in accordance with Appendix 4 of GNR 326 of the NEMA. The EMPr provides effective management and mitigation measure pertaining to the proposed development relating to the identified environmental impacts. The management and mitigation measures in the EMPr are deemed adequate to minimise and/avoid the negative impacts of the proposed development and to enhance the positive impacts.

Conclusion and Recommendations

SRK has undertaken the EIA for the proposed 80 000 tpa TiO_2 Rutile Pigment Plant in accordance with the requirements of the NEMA and NEM: WA. This has included a comprehensive stakeholder engagement process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in the project process and guide technical investigations that have taken place as part of the impact assessment phase of this study.

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements.

Following the overarching EA issued to the RBIDZ where permission was given that “some” wetlands may be infilled in turn for the preservation of a wetland which was identified for conservation purposes, the proposed project will result in the infilling of wetlands located on the property (with the exception of the conservation wetland and associated 30m buffer area). The Nyanza plant has been designed in such a way that there will be no infrastructure located within the conservation wetland and the associated 30m buffer area. Furthermore, the RBIDZ EA allows for the destruction of the forest thicket located on the property once the required permit shave been acquired. The RBIDZ is currently undertaking the application for a deforestation permit for the destruction of the forest thicket. There are offset arrangements that were made as part of the RBIDZ EIA process.

There were SCC that were identified during the 2016 EIA which have been relocated to the conservation area. There are however additional species that were identified which will require relocation. Nyanza and / or the IDZ will apply for the required permits and relocate the remaining species to the conservation area.

The findings of the impact assessment have shown that the proposed project will have negative impacts on the receiving environment, including:

- The loss of wetland habitat and ecoservices through infilling of the wetlands on the site;
- Loss and fragmentation of habitat of faunal SCC and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;
- Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the site;
- Groundwater drawdown due to the abstraction of groundwater for the creation of safe working conditions; and
- Air quality impacts, nuisance noise, dust, and visual impacts;

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium-high to low significance, including:

- Stormwater management plan was incorporated into the plant design and will be implemented;

- The plant design includes multiple abatement technologies such as sophisticated scrubber systems and baghouses at storage bunkers to reduce air pollution emissions;
- Re-vegetation of the rehabilitated areas with indigenous species;
- Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project;
- Develop and implement a biodiversity management plan; and
- Monitoring plans, which should be implemented throughout the life of the plant, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

Furthermore, the indirect impacts from the proposed development could cause negative impacts on the surrounding natural sensitive environment, unless this is also managed and monitored in order to address adverse impacts immediately. Rehabilitation must be implemented based on best practice principles and the KZN EDTEA, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed project.

With the correct and effective mitigation and management measures, including the protection of conservation wetland located outside the plant footprint, the project could be feasible.

An EMPr has also been developed as part of this EIA to ensure the mitigation of these impacts as far as practicable. It is anticipated that it will be possible to successfully mitigate the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented. The EMPr is considered adequate to assist the project in striving towards the principles of the NEMA.

The project team believes that the EIA undertaken for the proposed 80 000 tpa TiO_2 Rutile Pigment Plant fulfils the process requirements of the NEMA and NEM:WA. The impact assessment was tested against IFC standards and for the stage of the process was found to be in compliance with the requirements of the IFC. Where required, the process identified areas of improvement in terms of the IFC requirements. It is recommended that the proposed project be allowed to proceed under duty of care and must be in accordance with the recommendations that were included in this EIR and the accompanying EMPr.

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YOUR COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)

This Draft EIR will be available for comment for a period of 30 days from 25 January 2023 to 24 February 2023. Copies of the EIR have been made available at the following public places for review:

Public Place	Locality	Telephone
Richards Bay Public Library	Richards Bay Central, Richards Bay, 3900	035 907 5840
SRK Website	www.srk.co.za	(012) 361 9821

An electronic copy will also be available on CD on request from the stakeholder engagement officers. I&APs are requested to provide comments and information on the following aspects of the proposed project:

1. Information on how I&AP's consider that the proposed activities will impact on them or their socio-economic conditions;
2. Written responses stating their suggestions to mitigate the anticipated impacts of each activity;
3. Information on current land uses and their location within the area under consideration;
4. Information on the location of environmental features on site to make proposals as to how and to what standard the impacts on site can be remedied; and
5. How to mitigate the potential impacts on their socio-economic conditions and to make proposals as to how the potential impacts on their infrastructure can be managed avoided or remedied.

DUE DATE FOR COMMENT

24 February 2023

Please submit comments to the stakeholder engagement officers:

Vusi Masango / Anthoneth Matlala
SRK Consulting
P O Box 35290, Menlo Park, 0102
Phone: (012) 361 9821
Fax: (086) 231 3497
Email: vmasango@srk.co.za/amatlala@srk.co.za

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by Nyanza Light Metals (Pty) Ltd (Nyanza).The opinions in this Report are provided in response to a specific request from Nyanza to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features, as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

ADU	Animal Demography Unit
AEL	Atmospheric Emission License
AIP	Alien Invasive Plant
AMAFA	KwaZulu-Natal Amafa and Research Institute
AQA	Air Quality Act
ARC	Agricultural Research Council
BA	Basic Assessment
BAR	Basic Assessment Report
BAS	Best Attainable State
BEE	Black Economic Empowerment
BGIS	Biodiversity Geographical Information System
BH	Borehole
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Areas
CBD	Central Business District
CD	Calciner Discharge
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_3	Carbon Trioxide
COGTA	Department of Cooperative Governance and Traditional Affairs
CR	Critically Endangered
CRR	Comments and Responses Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries, and the Environment
DHSWS	Department of Human Settlements, Water and Sanitation
DWAF	Department of Water Affairs and Forestry

DWS	Department of Water and Sanitation
E&S	Environmental and Social
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
ESMS	Environmental and Sustainability Management System
EC	Electrical Conductivity
ECA	Epidemiologic Catchment Area
ECO	Environmental Control Officer
EHS	Environment, Health & safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Ecological Importance & Sensitivity
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMF	Environmental Management Framework
EMP	Environmental Management Programme
EN	Endangered
ERC	Environmental Review Committee
EPRP	Emergency Preparedness Response Plan
ESA	Ecological Support Area
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
GHGs	Green House Gases
GIS	Geographical Information System
GNR	Government Notice Regulation
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GVA	Gross Value Added
H_2O	Water
H_2S	Hydrogen Sulfide

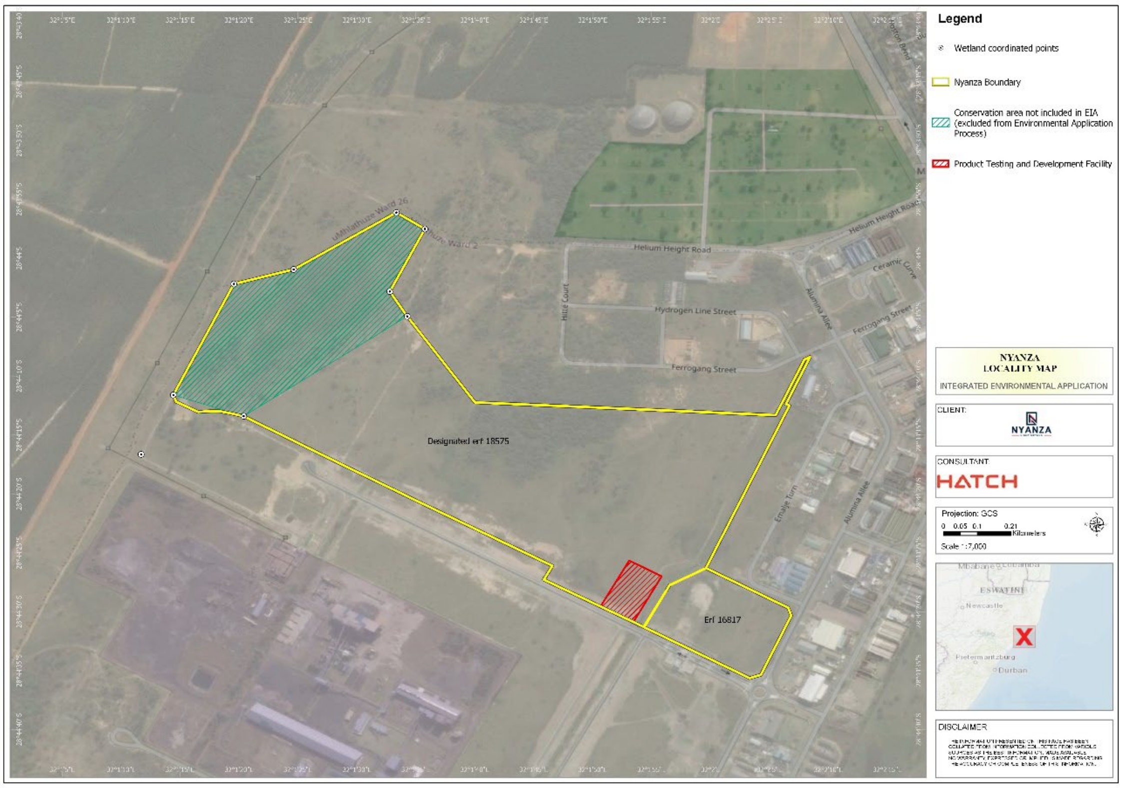
H_2SO_4	Sulfuric acid
HAZOP	Hazard and Operability
HCL	Hydrochloric acid
HDPE	High-density polyethylene
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
HR	Human Resources
HMV	High Mobility Vehicle
HSS	Highveld Steel Slag
I&APs	Interested and Affected Parties
ICT	Information and Communications Technology
IDP	Integrated Development Plans
IDZ	Industrial Development Zone
IFC	International Finance Corporation
ISO	International Organization for Standardization
IWRM	Integrated Water Resource Management
IWWMP	Integrated Water and Water Management Plan
KZN	KwaZulu-Natal
KZN-EDTEA	KZN Department of Economic Development, Tourism and Environmental Affairs
KZNARI	KwaZulu-Natal Archaeological Research Institute
KZNNCMA	KwaZulu-Natal Nature Conservation Management Act
KZNSCP	KwaZulu-Natal Systemic Conservation Plan
LC	Least Concern
LDV	Light-Duty Vehicle
MAP	Mean Annual Precipitation
MEC	Member Executive Council
mPVC	Microcellular Polyvinyl Chloride
MSDS	Material Safety Data Sheets
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act (Act No. 107 of 1998)

NEM:AQA	National Environment Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act 2008 (Act No. 59 of 2008)
NFA	National Forestry Act, 1998 (Act No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act, 1999(Act No 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PAIA	Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)
PDC	Plant Design Criteria
PES	Present Ecological Status
PM	Particulate Matter
PPE	Personal Protective Equipment
PPP	Public Participation Process
PoS	Plan of Study
PTDC	Product Development and Testing Centre
PWLs	Power Levels
RBIDZ	Richards Bay Industrial Development Zone
RBM	Richards Bay Minerals
REC	Recommended Ecological Category
RMO	Recommended. Management Objective
RMP	Risk Management Plan
RSA	Republic of South Africa
SABS	South African Bureau of Standards
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African National Heritage Resources Agency
SANAS	South African National Accreditation System
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAPS	South African Police Service

SAS	Statistical Analysis System
SAWIC	South African Waste Information Centre
S&EIA	Scoping and Environmental Impact Assessment
SCC	Species of Conservation Concern
SDF	Strategic Development Framework
SHE	Health and Safety Officer
SMME	Small, Medium and Micro Enterprises
SWMP	Stormwater Management Plan
SWSA	Strategic Water Source Areas
SWSA-sw	SWSA for surface water
TIO2	Titanium Dioxide
ToR	Terms of Reference
TRS	Total Reduced Sulphur
TSC	Technical Services Centre
TZMI	TZ Minerals International Pty Ltd
uPVC	Unplasticised Polyvinyl Chloride
VU	Vulnerable
WMA	Water Management Area
WML	Waste Management License
WSAs	Water Source Areas
WUL	Water Use License
WULA	Water Use License Application

1 Introduction and Background

Nyanza Light Metals (Pty) Ltd (Nyanza) is proposing to construct and operate a plant that will produce 80 000 tonnes per annum (tpa) of Titanium Dioxide (TiO_2) pigment. The project will be located within Zone 1F of the Richard's Bay Industrial Development Zone (RBIDZ) in Alton, Richards Bay (Figure 1-1).



srk consulting	**NYANZA DRAFT EIA REPORT** Project Location	Project No. 585503

Figure 1-1: Project Location

Feedstock will be ilmenite (design is based on typical Tellnes ilmenite) and/or conventional sulfate (Richards Bay Minerals (RBM)) slag and a waste slag from the erstwhile Highveld Steel plant – referred to as Highveld Steel Slag (HSS). Design provision is made for a blend of any proportion of these feedstocks (TCSG, 2022). The expected life of the proposed plant is 60 years.

The total area of the Nyanza site is about 69 ha and includes sections:

- 15825 – a wetland area and not to be developed
- 16786 – largely wetland off-set area not to be developed
- 16787
- 16788
- 16789 – which has a stormwater servitude of 30m on the eastern side; and
- 16817 – east of the stormwater servitude and is to be developed as a 'green industry' area.

The proposed project triggers activities listed in terms of:

- Listing Notices 1 (Activities 13 and 25),

- Listing Notice 2 (Activities 2, 4 and 6)
- Listing Notice 3 (Activities 2 and 14) of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) (as amended) and will require an Environmental Authorisation (EA) from the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA).

In addition, the proposed project triggers activities listed in Government Notice Regulation (GNR) 921 of the National Environmental Management: Waste Act, 2008 (Act 58 of 2008) (Category B Activities 3, 4 and 10 and Category C Activity 2) and will require a Waste Management Licence (WML) from the Department of Forestry, Fisheries, and the Environment (DFFE). Since the project triggers activities in Listing Notice 2 of the NEMA and category B of the NEM: WA, a full Environmental Impact Assessment (EIA) including Scoping and Impact Assessment will be followed as stipulated in GNR 326 of the NEMA, as amended.

SRK Consulting (SA) (Pty) Ltd (SRK) has been appointed by Nyanza as the independent Environmental Assessment Practitioner (EAP) to conduct the EA, WML, and Air Emissions Licence (AEL) and Water Use Licences (WUL) application processes for the project. The reports and documentation for the EA and WML application processes will be compiled and finalised for submission to the KZN EDTEA and DFFE for consideration and decision making. Where required, the EDTEA and DFFE will consult with other government authorities as required in terms of Section 24(K) of the NEMA.

The applications for an AEL and WUL will be submitted to the King Cetshwayo District Municipality and Department of Water and Sanitation (DWS) respectively.

2 Purpose of this Study

2.1 The objectives of this Report

The objectives of the Environmental Impact Report (EIR) are to:

- Identify and assess the environmental (biophysical, socio-economic, and cultural) impacts of the pre-construction, construction, and operation, impacts of the proposed project. The cumulative impacts of the proposed development were also identified and evaluated;
- Identify and evaluate potential management and mitigation measures that will reduce the negative impacts of the proposed development and enhance the positive impacts;
- Compile monitoring, management, mitigation, and training needs in the EMPr; and
- Provide the KZN EDTEA and DFFE with sufficient and accurate information in order to make a sound decision on the proposed development.

This EIR will be submitted to interested and affected parties (I&APs) for a 30-day review and comment period. Comments received from the I&APs will be incorporated into the final EIR and will be submitted to the KZN EDTEA and DFFE for review and decision making.

2.2 Report Index in Relation to the NEMA Regulations

Regulation 2, Appendix 3 of GNR 982 (as amended in 2017) published in terms of NEMA stipulates the minimal requirements and issues that need to be addressed in the EIR. This report strives to address all these requirements as per regulations. Table 2-1 indicates the regulations that have been addressed and the section of the EIR where these requirements can be found.

Table 2-1: Requirements of Appendix 3 of Regulation 2 of GNR 982

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIR	Section
Appendix 3 (a)	Details of – (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae.	Section 2.3.2 Appendix A
Appendix 3 (b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties.	Section 4
Appendix 3 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Table 4-1
Appendix 3 (d)	A description of the scope of the proposed activity, including – (i) all listed and specified activities triggered and being applied for; and	Section 7

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIR	Section
	(ii) a description of the associated structures and infrastructure related to the development.	Section 5
Appendix 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.	Section 7
Appendix 3 (f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Section 8
Appendix 3 (g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Section 16
Appendix 3 (h)	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:	
	(i) details of the development footprint alternatives considered;	Section 6
	(ii) details of the public participation process undertaken in terms of regulation 41 of the regulations, including copies of the supporting documents and inputs;	Section 11
	(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;	Section 11.7
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 10
	(v) the impacts and risks identified including the nature, significance, consequences, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated.	Section 12
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 9.3
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 12
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 12
	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Not Applicable
	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Section 20

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIR	Section
Appendix 3 (i)	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- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 9
Appendix 3 (j)	An assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated.	Section 12
Appendix 3 (k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Section 10 Section 12
Appendix 3 (l)	An environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 20
Appendix 3 (m)	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.	Section 12 Section 19
Appendix 3 (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Section 6
Appendix 3 (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 19
Appendix 3 (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 13
Appendix 3 (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 19

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIR	Section
Appendix 3 (r)	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.	Section 16
Appendix 3 (s)	An undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	Section 21
Appendix 3 (u)	An indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation.	Not Applicable
Appendix 3(v)	Any specific information that may be required by the competent authority.	Not Applicable
Appendix 3(w)	Any other matters required in terms of Section 24(4)(a) and (b) of the Act.	Not Applicable

2.3 Contact Details

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Nyanza as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation process and associated stakeholder engagement process to meet the requirements of the NEMA.

2.3.1 Applicant

Table 2-2 presents the details of the applicant and facility owner's representative.

Table 2-2: Applicant Contact Details

Contact details of the Applicant:
Nyanza Light Metals (Pty) Ltd Physical Address: 5th floor, Hogan Lovells Building, 140 West Street, Sandton, 2057 Postal Address: PostNet, Suite 510/Private Bag X1, Melrose Arch, Melrose North, 2076 Contact Person: Nolwazi Tetyana Tel: 011 684 1286 or 082 304 2772 E mail: Nolwazi.Tetyana@nyanzametals.com

2.3.2 Environmental Assessment Practitioner

SRK was established in 1974 and has since undertaken a large variety of environmental studies. SRK is a South African founded international organisation of professionals providing a comprehensive range of consulting services to natural resource industries and organisations. South African offices are staffed with over 350 professional consultants in nine offices, operating in a range of disciplines, mainly related to the environment, water, social, and mining sectors. Back-up and peripheral expertise are available within these offices for all environmental projects.

SRK has been appointed by Nyanza as the EAP. The EAPs involved in the compilation of this EIR, and their contact details are provided in Table 2-3.

Table 2-3: EAP Contact Details

EAP Name	Contact Number	Email Address
Ndomupei Masawi	012 361 9827	nmasawi@srk.co.za
Manda Hinsch	012 361 9815	mhinsch@srk.co.za
Vusi Masango	012 361 9822	vmasango@srk.co.za
Anthoneth Matlala	012 361 9808	amatlala@srk.co.za
Marissa Swart	012 361 9823	mswart@srk.co.za

Ndomupei Masawi is a registered Professional Natural Scientist (SACNASP Reg Number 400045/14) with an MSc Degree in Geo-Information for Environmental Management and an MSc Degree in Integrated Water Resource Management (IWRM). She has more than 15 years of Integrated Environmental Management and project management experience. Her experience includes compiling Environmental Management Programmes, undertaking Public Participation Processes, providing GIS Services, and undertaking the processes and assessments to support applications for Environmental Authorisations, WULs, Waste Management Licences and Air Emission Licences, for steel galvanizing, roads, railway lines, power stations, airports, dams, housing developments, schools in South Africa, Tanzania, Botswana, Lesotho, Zimbabwe, and Uganda.

Manda Hinsch is a Partner within SRK and is registered Professional Natural Scientist (SACNASP Reg Number 400164/09) and she has a Hons, degree in Water Utilisation and more than 35 years' experience in the water and waste fields, both nationally and internationally. She has been working for more than 15 years a regulator for the Department of Water and Sanitation in developing water quality management policy and overseeing the implementation there of. The recent 15 years has Manda been a consultant in the wider environmental field for SRK. Being on both side of the water industry has given her a very balanced overview of what is required to comply with legislation but simultaneously be very pragmatic in applying the legislation. She is therefore well placed to be the Project Manager on this project.

Vusi Masango has been involved in the field of Disaster Management and Environmental Impact Assessments (EIAs) for the past 7 years. He has been involved in various Environmental Impact Assessments and Disaster risk assessment & asset management projects, currently employed by SRK Consulting as a Junior Scientist in the Pretoria office in the Environmental Department. Vusi has completed a National Diploma in Agricultural Science at Tshwane University of Technology in 2012 and is busy with his Bachelor of Arts in Environmental Management in Unisa. Vusi also attended the following courses (Report Writing, Microsoft word level 1 and Microsoft Excel level).

Anthoneth Matlala is an Environmental Scientist, with a BSc (Honours) Degree in Environmental Management. She is registered as a Candidate Natural Scientist (SACNASP Reg Number 121047) and a Candidate EAP (EAPASA Reg Number 2020/1161). She has over 3 years of experience in integrated environmental management and project management. Her experience includes compiling environmental management programmes, undertaking public participation processes, providing basic geographic information system (GIS) services, undertaking Environmental Compliance Audits, and undertaking the processes and assessments to support applications for environmental authorisations, water use licences, waste management licences and air emission licences, for hospital incinerators, roads, power lines, power stations, dams, housing developments, and schools through several provinces of South Africa.

Marissa Swart holds an Honours degree in Geography and Environmental Science and is busy completing her master's degree in Environmental Management. Ms Swart is a newly appointed Junior Environmental Scientist at SRK Consulting (South Africa) (Pty) Ltd and is eager to gain experience in the Environmental Management field.

The Curriculum Vitae and declaration of interest of the EAP team and the background on experience gained by SRK in the field of Environmental Impact Assessments is provided in Appendix A and Appendix B respectively.

2.3.3 Competent Authority Details

The details of the competent authorities are provided in Table 2-4.

Table 2-4: Competent Authority Details

Department	Contact Person	Contact Details	
KZN EDTEA	Mr Muziwandile Mdamba	Tel	035 780 0300 / 082 822 2582
		Email	muziwandile.mdamba@kznedtea.gov.za
DFFE	Ms Mahlageng Pertunia Ramaila	Tel	012 399 9910
		Email	MPRamaila@dffe.gov.za
	Mr Lukas Mahlangu	Tel	012 399 9791
		Email	lmahlangu@environment.gov.za

2.3.4 Local Authority Details

The project area is located in the RBIDZ in Alton, Richards Bay in the City of uMhlathuze Local Municipality within the King Cetshwayo District Municipality, KwaZulu-Natal Province.

Details of the relevant municipality are provided in Table 2-5.

Table 2-5: Local and District Municipality details

Department	Contact Person	Contact Details	
King Cetshwayo District Municipality	**Ntombezinhle Buthelezi**: Air Quality Licensing Officer	Tel	035 787 2682
		Email	buthelezint@kingcetshwayo.gov.za
King Cetshwayo District Municipality	**Sandile Xaba**: Air Quality Enforcement Officer	Tel	
		Email	xabasa@kingcetshwayo.gov.za
City of uMhlathuze Local Municipality	**Sharin Govender** Environmental Manager	Tel	035 907 5174
		Email	sharin.govender@umhlathuze.gov.za

Figure 2-1 provides an illustration of the relevant district and local municipalities surrounding the proposed project.

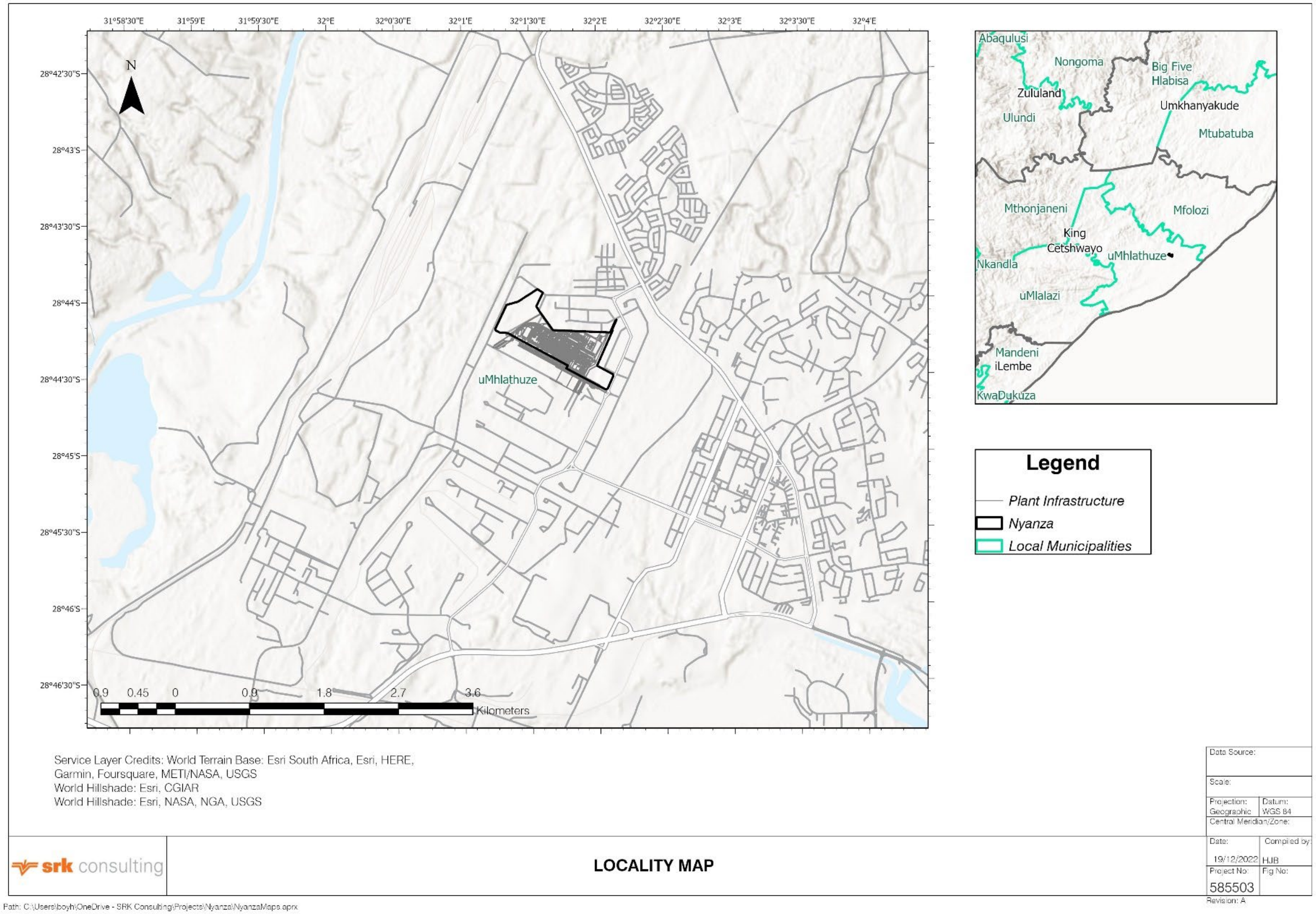


Figure 2-1: Relevant District and Local Municipality

3 Environmental Authorisation Application Process

The project triggers activities listed in Listing Notice 1, 2, and 3 of the NEMA and requires that a full EIA (Scoping and impact assessment phases) process be followed as part of the EA application process. The first phase of the EA application process was the Scoping Phase, which included a Plan of Study (PoS) which informed the Impact Assessment Phase (current phase). The Scoping Phase provided Interested and Affected Parties (I&APs) an opportunity to provide the EAP with issues and concerns with respect to the proposed project in order to inform the specialist studies that were evaluated in this impact assessment phase of the project.

The Scoping Report provided a guide to the EIA process and specialist studies by:

- Providing an overview of the legal requirements with regard to the proposed project, the proposed project description and anticipated environmental and social issues and impacts that were further investigated in the EIA; and
- Setting out the scope of the EIA process and the Terms of Reference (ToR) for specialist studies (where applicable) and outlining the approach and methodologies to be used in the EIA process, e.g., the proposed impact rating methodology. The Scoping Report was submitted to the KZN EDTEA and DFFE for approval.

The Final Scoping Report was submitted to the KZN EDTEA and DFFE for review and the DFFE approved the Scoping Report and associated Plan of Study on the 06th of September 2022, whereas KZN EDTEA approved the Scoping Report and associated Plan of Study on the 28th of September 2022 (Appendix C), allowing the impact assessment phase to commence. The impact assessment phase entailed the following:

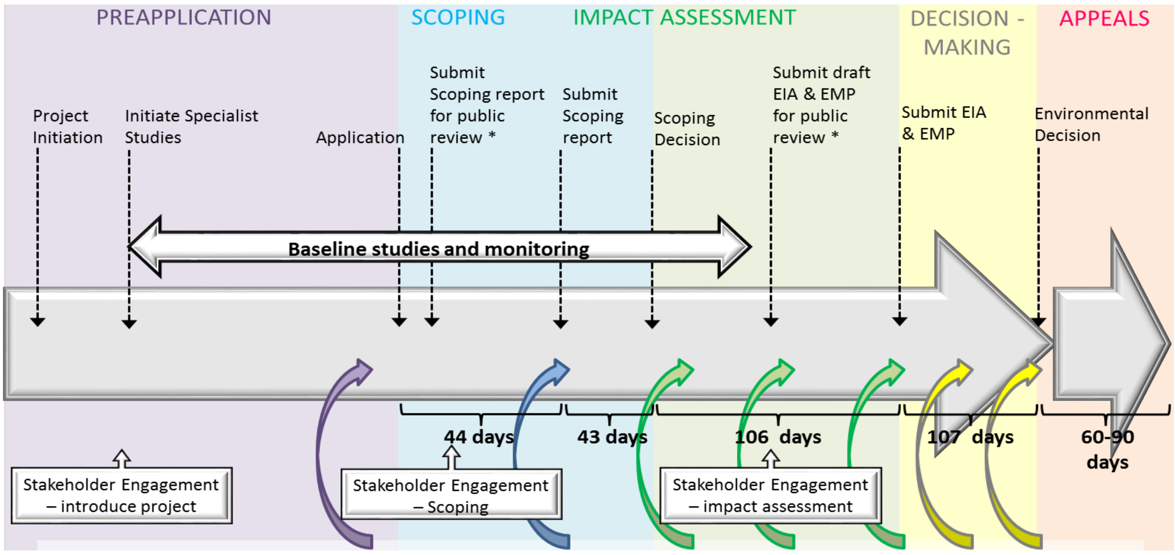
- Incorporating specialist findings into the Draft EIR as per the approved PoS contained in the approved Scoping Report;
- Conducting a quantitative impact assessment as per the approved PoS contained in the Scoping Report;
- Compiling the EMPr; and
- I&APs Consultation.

Stakeholder engagement is a key element of the environmental decision-making process, and stakeholder engagement formed part of both the Scoping and Impact Assessment Phases as described in Section 11.

The EIR and EMPr have been prepared in accordance with requirement of SA Legislation as well as:

- IFC Performance Standards, dated 2012;
- General Environmental, Health and Safety (EHS) Guidelines, dated 2007; and
- Large Volume Inorganic Compounds Manufacturing and Coal Tar Distillation, date 2007

Figure 3-1 provides an illustration of the EIA process that is being followed.



srk consulting	**NYANZA DRAFT EIA REPORT** Overview of the S&EIA Process	Project No. 585503

Figure 3-1: Overview the Environmental Impact Assessment Process

4 Project Location

The proposed project is located on the erf numbers as illustrated in Figure 4-1and Table 4-1 provides a description of the affected properties.

Table 4-1: List of affected properties and property portions

Physical Address	Owner	Property / Erf No.	SG Codes
RBIDZ Phase 1F 125 Alumina Allee Alton Richards Bay 3900	RBIDZ	15825 (wetland area not to be developed)	N0GV04210001582500000
		16817	N0GV04210001681700000
		16789	N0GV04210001678900000
		16788	N0GV04210001678800000
		16787	N0GV04210001678700000
		16786	N0GV04210001678600000

Additional locality maps are provided in Appendix D.

Name	X_Coordinates	Y_Coordinates
A	99643,854	-3180615,189
B	99850,461	-3180208,753
C	99981,896	-3180176,513
D	100215,161	-3180028,866
E	100290,343	-3180064,574
F	100204,922	-3180228,480
G	100248,533	-3180298,104
H	100410,069	-3180524,713
I	100799,025	-3180541,576
J	101077,727	-3180560,033
K	100939,933	-3180971,071

Name	X_Coordinates	Y_Coordinates
L	101124,03843200000	-3181084,38887000000
M	101045,61921500000	-3181241,52382000000
N	100953,27728300000	-3181202,08295000000
O	100850,95139500000	-3181141,80693000000
P	100799,81737000000	-3181109,94713000000
Q	100846,43444000000	-3181000,50276000000
R	100758,78296900000	-3181092,03527000000
S	100564,17315900000	-3180988,87504000000
T	100281,59032300000	-3180791,23440000000
U	100090,59784200000	-3180677,80166000000
V	99872,23002870000	-3180553,57588000000
W	100578,52573600000	-3180954,67010000000

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NYANZA DRAFT EIA REPORT
Relevant Properties

Project No.
585503

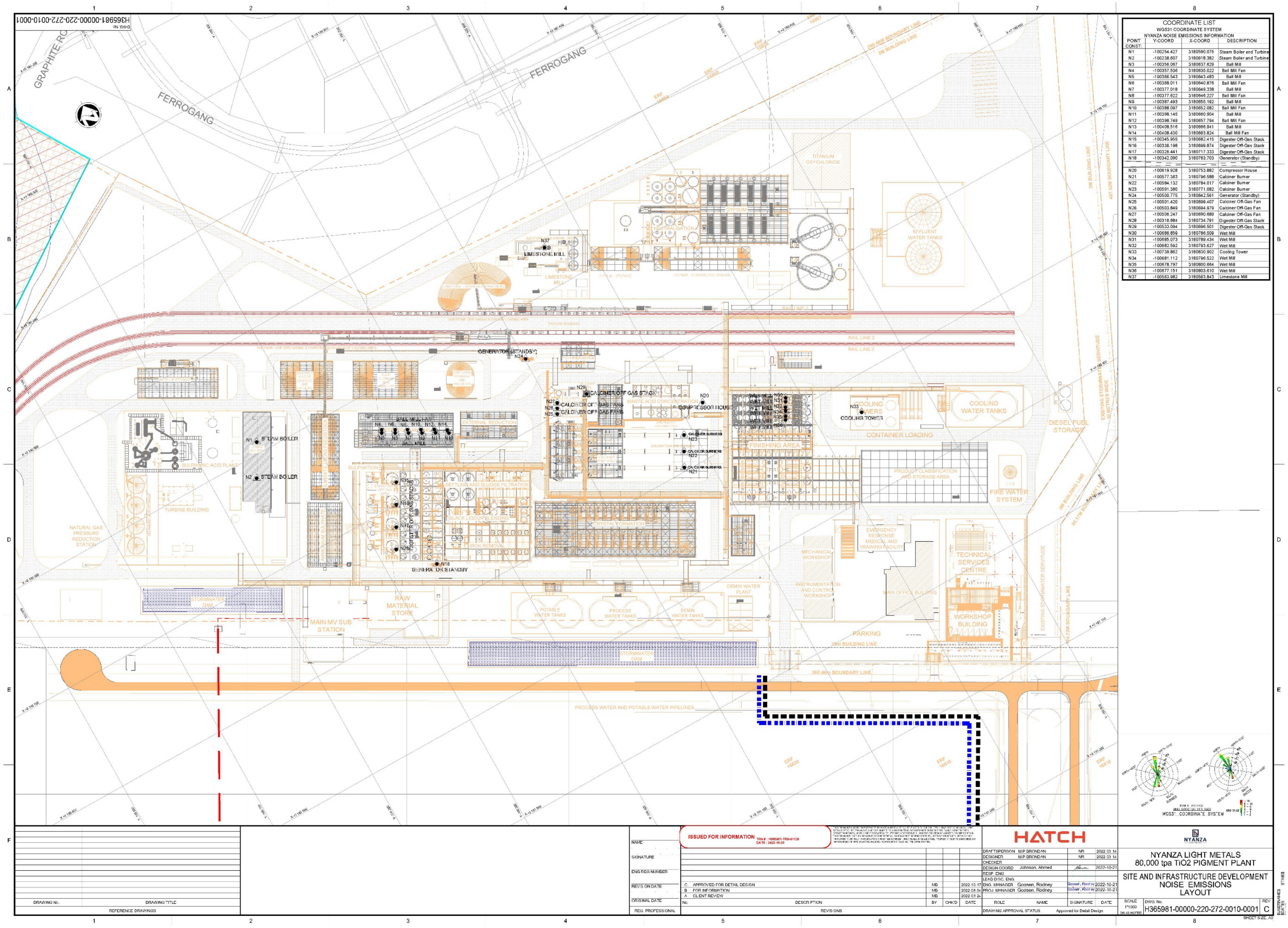
Figure 4-1: Relevant properties

5 Project Description

The proposed project entails:

- A Solar Plant, Water Extraction, and Bottling Plant (Green Park) which will be located on Erf 16789. This site will be used for air-to-water installations along with a bottling plant. The site will also be used for the installation of a ground-mount solar plant.
- Nyanza 80 000 tpa TiO_2 Pigment Plant which will produce 80 000 tpa pigment of the Titanium Dioxide (TiO_2) nature. The plant has an expected life of 60 years.
- Services required will include:
  - A service road;
  - A services area;
  - A pump station to pump potable water to the Nyanza Technical Services Centre (TSC) from the storage tanks;
  - An air-to-water plant located in the services area. Space is set aside for the installation of additional gable structure for the air-to-water generators in the future;
  - A storm water culvert spanned by a bridge along the site's western side to give personnel access from the TSC;
  - A water bottling plant located north of the air-to-water plant; and
  - Parking.

The project layout plan is provided in Figure 5-1 and Appendix E.



COORDINATE LIST WGS31 COORDINATE SYSTEM NYANZA NOISE EMISSIONS INFORMATION			
POINT CONST:	Y-COORD	X-COORD	DESCRIPTION
N1	-100254.427	3180590.075	Steam Boiler and Turbine
N2	-100238.607	3180618.382	Steam Boiler and Turbine
N3	-100356.067	3180637.629	Ball Mill
N4	-100357.536	3180635.022	Ball Mill Fan
N5	-100366.543	3180643.483	Ball Mill
N6	-100368.011	3180640.876	Ball Mill Fan
N7	-100377.018	3180649.338	Ball Mill
N8	-100377.622	3180646.227	Ball Mill Fan
N9	-100387.493	3180655.192	Ball Mill
N10	-100388.097	3180652.082	Ball Mill Fan
N11	-100398.145	3180660.904	Ball Mill
N12	-100398.749	3180657.794	Ball Mill Fan
N13	-100408.516	3180666.941	Ball Mill
N14	-100408.430	3180663.824	Ball Mill Fan
N15	-100345.955	3180682.415	Digester Off-Gas Stack
N16	-100336.198	3180699.874	Digester Off-Gas Stack
N17	-100326.441	3180717.333	Digester Off-Gas Stack
N18	-100342.090	3180763.703	Generator (Standby)
N20	-100619.928	3180753.882	Compressor House
N21	-100577.363	3180796.588	Calciner Burner
N22	-100584.132	3180784.017	Calciner Burner
N23	-100591.360	3180771.082	Calciner Burner
N24	-100500.775	3180642.561	Generator (Standby)
N25	-100501.420	3180699.407	Calciner Off-Gas Fan
N26	-100503.849	3180694.979	Calciner Off-Gas Fan
N27	-100506.247	3180690.689	Calciner Off-Gas Fan
N28	-100316.684	3180734.791	Digester Off-Gas Stack
N29	-100533.094	3180696.501	Digester Off-Gas Stack
N30	-100686.859	3180786.509	Wet Mill
N31	-100685.073	3180789.434	Wet Mill
N32	-100682.592	3180793.627	Wet Mill
N33	-100739.862	3180830.902	Cooling Tower
N34	-100681.112	3180796.522	Wet Mill
N35	-100678.797	3180800.664	Wet Mill
N36	-100677.151	3180803.610	Wet Mill
N37	-100563.982	3180563.843	Limestone Mill

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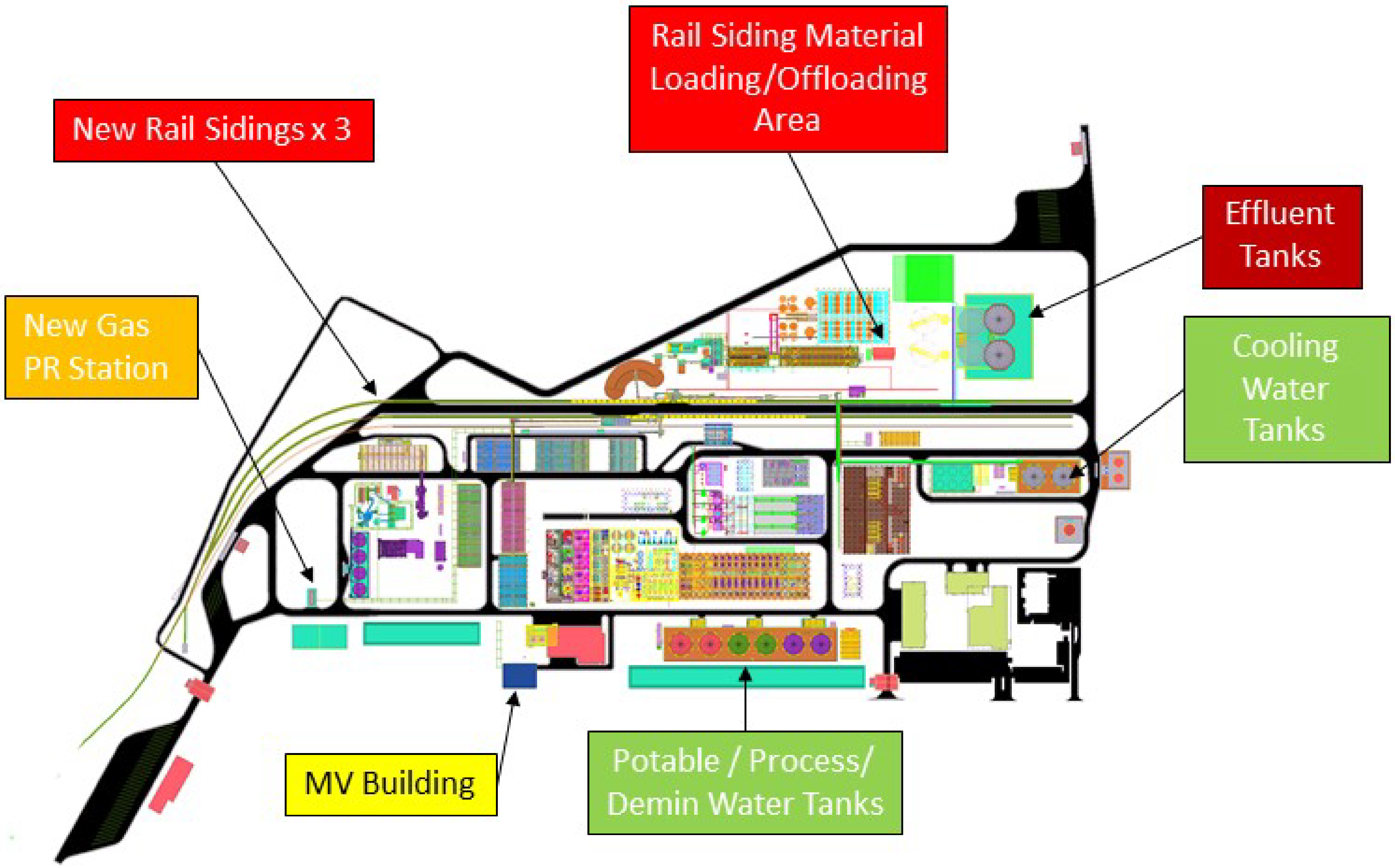
NYANZA DRAFT EIA REPORT
Project Layout Plan

Project No.
585503

Figure 5-1: Project Layout Plan



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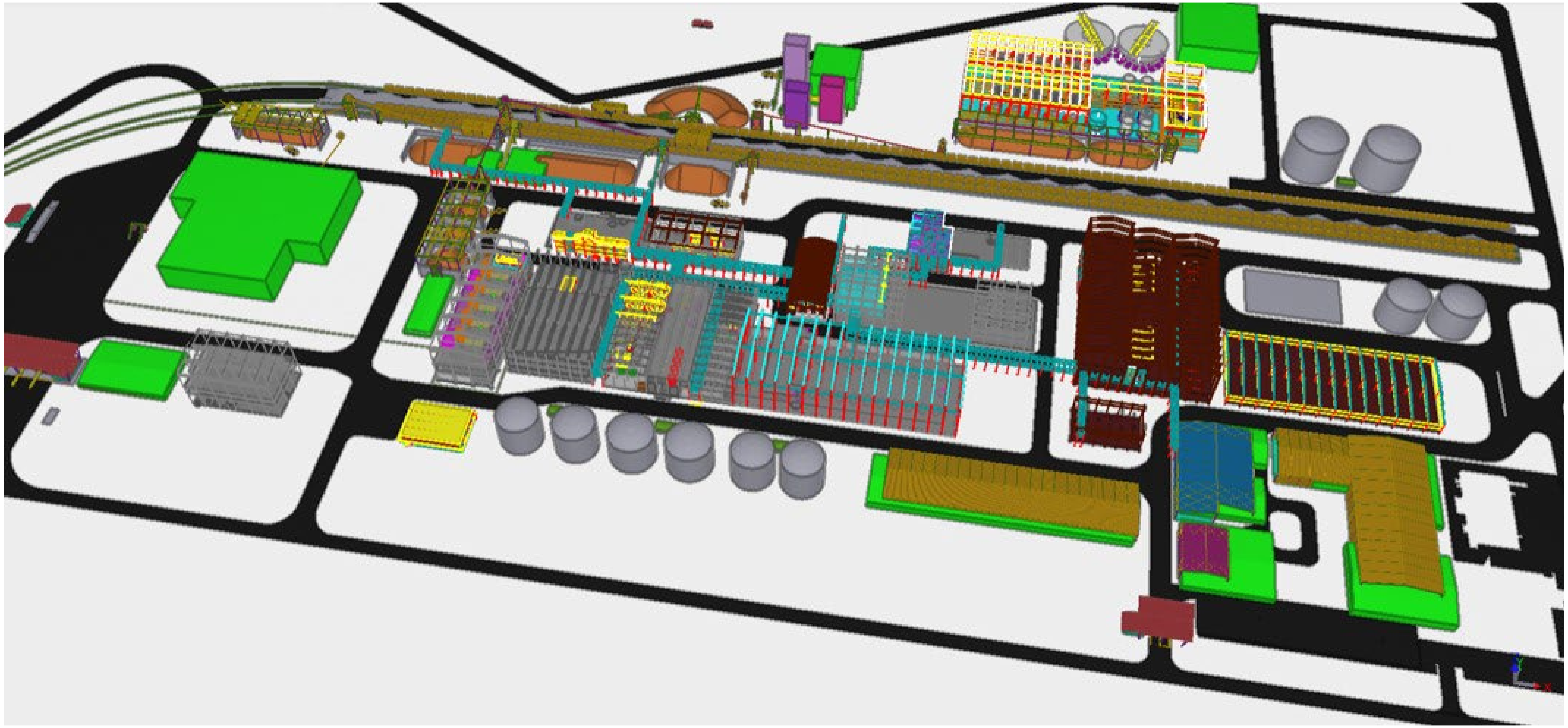
NYANZA DRAFT EIA REPORT
Site Development Plan

Project No.
585503

Figure 5-2: Site Development Plan



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NYANZA DRAFT EIA REPORT
Plant 3-D Illustration

Project No.
585503

Figure 5-3: 3-D Illustration of the Proposed Plant

5.1 Solar Plant, Water Extraction, and Bottling Plant (Green Park)

Approximately 5.7 ha of erf 16789 will be set aside for the “Green Park” which includes air-to-water installations, a bottling plant as well as a ground-mount solar plant.

The air-to water installation’s purpose is to supply the Nyanza Technical Services Centre (TSC) with water and to create a business opportunity to involve a local entrepreneur to extract atmospheric moisture and bottle this water for sale into the local Richards Bay market. Installation of the air-to-water process will be conducted in two phases as follows:

- Phase 1 will supply the TSC with water, where eight (8) water extraction units will be installed to produce 10 m^3 (or 10 kl) of water per day.
- Phase 2 will supply the bottling plant with water, including the bottling plant. Phase 2 will produce an additional 10 m^3 of water per day to be bottled.

Ground-mount solar panels will be installed on the remainder of the Green Park. Assuming a 25 m servitude along the culvert of the 5.7 ha Green Park, and a 3 m building line along the other boundaries, 4.9 ha remains. Approximately 0.3 ha is used for the water and bottling plant, leaving approximately 4.6 ha for the ground-mount solar panels. The general rule for the solar installations is 1 ha per 1 MW resulting in space for approximately 4.5 MW ground-mounted solar panels. Additional solar panels will be mounted on buildings and parking roofs. Approximately a total of 10 MW of power is expected to be produced from all the solar power panels that will be mounted at the Nyanza site.

Areas where the solar panels will be installed include the roofs of the air-to-water plant’s gable structures and the roof of the bottling plant. The concept layout is as follows:

- A service road is located along the site’s western edge;
- The services area located in the site’s south-western corner connects to services and a pump station to pump potable water to the TSC from the storage tanks;
- The air-to-water plant is located on the services area’s northern side. Space is set aside for the installation of additional gable structures for the air-to-water generators in the future;
- The storm water culvert is spanned by a bridge along the site’s western side to give personnel access from the TSC;
- The water bottling plant is located North of the air-to-water plant. A paved section on the bottling plant’s western side provides turning area for delivery vehicles;
- Parking is provided North of the bottling plant; and
- The service road continues around the site’s northern edge as a gravel road.

5.2 Nyanza 80 000 tpa TiO_2 Pigment Plant

The project will produce 80 000 tpa pigment of the Titanium Dioxide (TiO_2) nature. The plant has an expected life of 60 years. Ilmenite will be the feedstock (the design is based on Tellnes ilmenite) and/or conventional sulfatable slag (the design is based on RBM slag) and waste slag from the Erstwhile Highveld Steel Plant (HSS). Provision is made in the design for a blend of any portions of these feedstocks (TCSG, 2022).

Operation of the plant will be 24 hours per day, 365 days per year. The design assumption when considering planned maintenance shuts and unplanned production outages is that on-line time of the plant will be 85%. Emergency power provision and redundancy provision is made on all critical reduction equipment to ensure that on-line time is 100% (TCSG, 2022).

5.2.1 Overview of the Process

The manufacture of TiO_2 via the sulfate process consists of the manufacture of the pure untreated TiO_2 (referred to as Calciner Discharge or 'CD') and the disaggregation and surface treatment of the CD (referred to as 'Finishing') (TCSG, 2022).

Conventional slag, ilmenite, and waste slag from the Highveld Steel site (Highveld Steel Slag (HSS)) will be used as feedstocks. Dried ilmenite or slag from HSS is pulverised and mixed with concentrated sulfuric acid. Water or steam is injected to initiate the reaction. The cake is allowed to mature and dissolved in water or recycled dilute sulfuric acid.

Ferric ions in solution are reduced to the ferrous state but a small proportion of titanic ions must also be reduced to the titanous state (Ti^{3+}), to ensure the reduction of ferric species.

The solution is filtered to remove solids. The filtrate is cooled under vacuum, precipitating $FeSO_4$ as copperas (ferrous sulfate – $FeSO_4.7H_2O$). The copperas can be used in sewage water treatment and as raw material for iron oxide pigment. Alternatively, the filtrate can be roasted to Fe_2O_3 and SO_2, thereby recovering sulfuric acid.

The Final solution is thermally hydrolysed to TiO_2, according to the reaction below. For higher yields, TiO_2 nuclei are added. Hydrous titania is collected and washed with weak acid. The product is bleached with acid and mixed with aluminium powder. The titania is finally dried, calcined and processed.

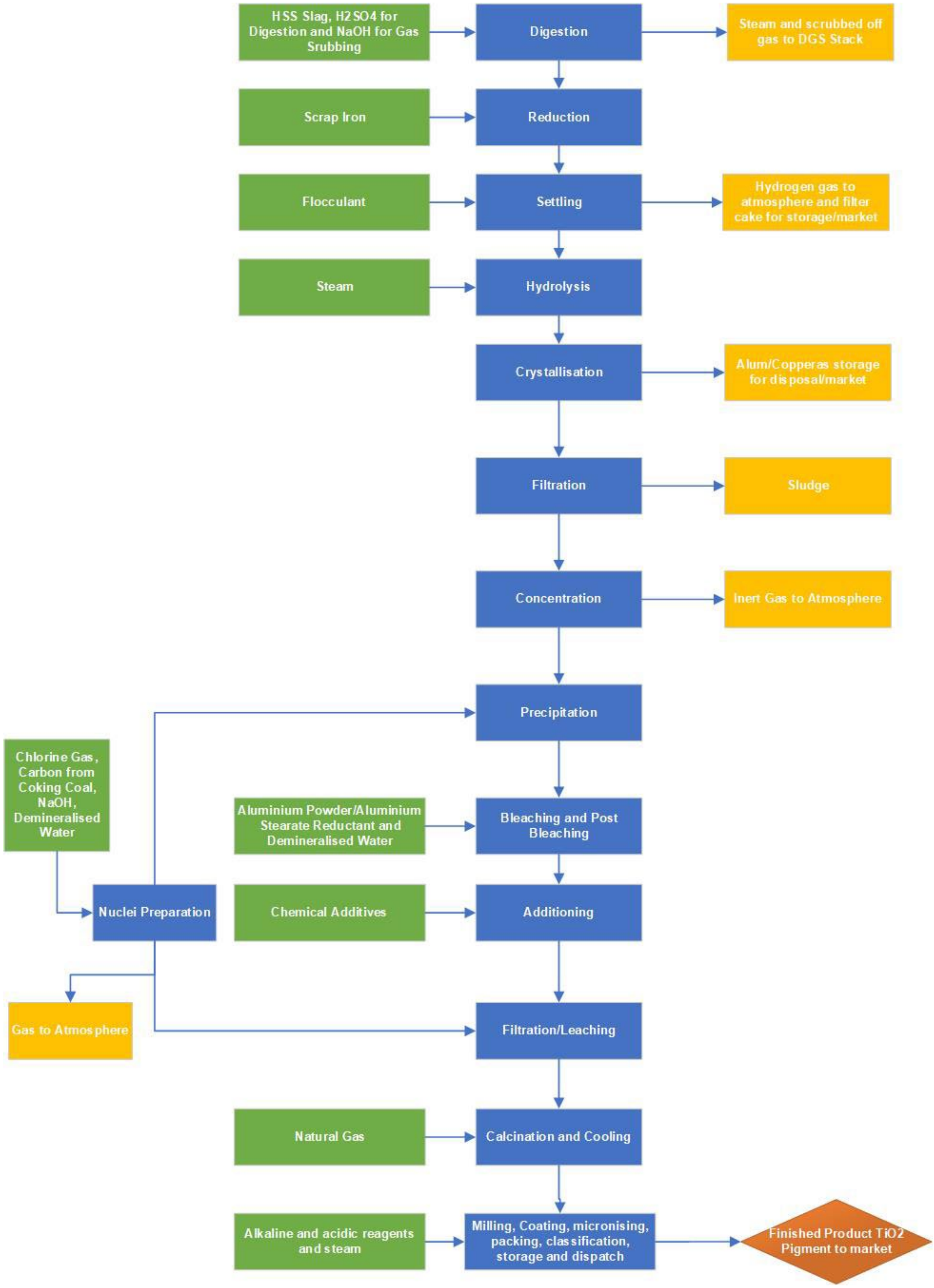
Spent acid (20–28% H_2SO_4) is concentrated to 70–80% and reused. In another approach, the spent acid is neutralised with lime. Alternatively, the spent acid can be used in the fertiliser industry.

The key stages in the manufacture of CD through sulfate technology are (TCSG, 2022):

- Milling of the feedstock to the optimal size fraction;
- Digestion of the TiO_2 feedstock with sulfuric acid (H_2SO_4);
- Reduction of the ferric iron, Fe^{3+} in the titanyl sulfate solution ('black liquor') to Fe^{2+} with iron (Fe) if needed;
- Formation of adequate titanium ions (Ti^{3+}) in the black liquor by further reduction with Fe if needed;
- Oxidation of excess Ti^{3+} in the black liquor if needed;
- Separation of solid impurities from the black liquor;
- Removal of excess Fe from the black liquor and/or removal of excess aluminium from the black liquor and re-concentration of the black liquor (if necessary);
- Preparation of seed crystals ('nuclei') for precipitation in hydrolysis and reutilisation in the calciner;
- Hydrolysis of the titanyl sulfate to form an insoluble hydrous TiO_2 precipitate;
- Washing and bleaching of remaining impurities;
- Conditioning of the hydrous TiO_2 precipitate prior to calcination; and
- Calcination to drive off water and acid and to grow the TiO_2 crystals, yielding pure dry TiO_2.

The TiO_2 that emerges from the calciner will be disaggregated, coated with oxides or hydroxides of aluminium, silicon, phosphorous and/or zirconium and then washed, dried and deagglomerated before packing as a final product (TCSG, 2022).

The process flow chart is provided in Figure 5-2



srk consulting	**NYANZA DRAFT EIA REPORT** TiO_2 Plant Process Chart	Project No. 585503

Figure 5-4: TiO_2 Plant Process Chart

5.2.2 Ancillary Processes

The required ancillary process units include (TCSG, 2022):

- Scrubbing of digestion off-gas;
- Recovery of titanyl sulfate solution from digester solid residues and neutralisation of the digester solid residues;
- Re-concentration of strong waste acid for recycling to the main process;
- Neutralisation of remaining waste acid to pH 7.2;
- Dewatering of gypsum;
- Scrubbing of the calciner off-gas;
- Preparation of the surface treatment and calciner additioning chemicals; and
- Buffer storage facilities in the main TiO_2 plant for copperas and ammonium aluminium sulfate and handling facilities for loading and dispatch of these.

5.2.3 Other Processes

Other process units required for the project are (TCSG, 2022):

- A 2 000 tons/day sulfur-burning sulfuric acid plant ;
- A water demineralisation plant;
- A compressed air plant for plant air and instrument air;
- Vacuum generation plant;
- A lime slaking plant;
- Water cooling plant(s); and
- Steam boilers.

5.3 Raw Materials, Services, Products, and Wastes Stored on Site

Ideally all high-volume raw materials, products, and waste will be delivered to and dispatched from site by rail via an on-site rail siding with limited shunting capacity. The bulk of the shunting will be done in the Transnet rail yard situated west of the Nyanza site and this rail yard will be connected with the rail siding on the Nyanza site. The rail siding has been authorised under EA Ref 14/12/16/3/3/1/1382/AM1 that was issued to the RBIDZ in 2016 and amendment issued in 2021. It is unlikely that this it will be feasible to handle all high-volume bulk by rail within the foreseeable future, but possible in future and the design provision will be made for this (TCSG, 2022).

Note
The design and installation of the rail connection from the Transnet shunting yard to the 1F site is being progressed by a separate task team and does not form part of this project (TCSG, 2022).

Nyanza has engaged in discussions with other service providers on doing the logistics of bulk, raw materials, chemicals, and products on behalf of Nyanza (TCSG, 2022).

Considering the above, key design assumptions are (TCSG, 2022):

- HSS will be railed to site in gondolas;

- Conventional sulfatable slag will be transported by road from RBM. This will be managed by Grindrod Logistics and the slag will be transported to a Grindrod facility from where it will be transported to site by road* or by rail (gondola) (still to be determined);
- Ilmenite will be imported into the Richards Bay harbour from where it will be handled by Grindrod logistics and transported to a Grindrod facility from where it will be transported to site by road* or by rail* (still to be determined);
- Sulfur will be imported into the Richards Bay harbour from where it will be handled by Grindrod logistics and transported to a Grindrod facility from where it will be transported to site by road* or by rail* (still to be determined);
- Limestone will be imported by rail in gondolas;
- Gypsum will be exported by rail in gondolas;
- Alum, copperas, and digester sludge will be exported from site by road in bulk. Provision will be made for doing this by rail in future;
- Ammonium sulfate power will be imported by road in bulk tankers. Provision will be made for doing this by rail in future. Steinweg will manage the logistics thereof; and
- All other raw materials, chemicals, products, and co-products will be transported by road and Steinweg will manage the logistics thereof.

5.3.1 Rail Siding and Loading/Offloading Facility

The high-volume raw materials, products, and wastes delivered to and from site via the authorised rail siding will conceptually need two ballasted railway tracks with a slabbed track in-between. This will converge into a single rail track connecting to the Transnet yard on the western side of the Nyanza site onto the site.

Estimated volumes of the high-volume materials are reflected in Table 5-1 (TCSG, 2022).

Table 5-1: Estimated rail activity

Product	Usage		Estimated delivery schedule (every x number of days)	Volume per shipment (m^3)	In/out bound
	tons per day	m^3 per day			
RBM Slag/ilmenite	319	145	7	1 016	In
HSS	480	234	14	3 278	In
Sulfur	953.3	1 325	1	1 325	In
Limestone (as dry)	648	463	1	463	In
Ammonium sulfate powder	128	144	14	2 013	In
Gypsum to NPC @18% moisture	645	445	1	445	Out
Sludge @50% solids	731	518	1	518	Out
Copperas @95% solids	460	418	1	418	Out

Product	Usage		Estimated delivery schedule (every x number of days)	Volume per shipment (m^3)	In/out bound
	tons per day	m^3 per day			
Alum @70% solids	761	445	1	445	Out

5.3.2 Raw Materials Handling and Storage

The proposed plant will require onsite storage of chemicals and hydrocarbons including:

- Titanium tetrachloride ($TiCl_4$);
- Titanium oxychloride ($TiOCl_2$);
- Calcium hydroxide [$Ca(OH)_2$];
- Sulphuric acid [H_2SO_4] (as 98.0 to 104%); and
- Diesel.

The raw materials required will include:

- Dry Bulk which will include:
  - Feedstock which will be stored at a nearby Grindrod site, from where it will be transported by road (future rail) to the Nyanza site where it will be discharged into and stored in an enclosed warehouse (TCSG, 2022). The enclosed warehouse will have the capacity to store a total of 14 days' worth of stock in six storage bays separated by concrete walls. This is to allow for 2 bays for each of ilmenite, conventional slag and HSS, one bay in operation and one bay for feedstock to have sufficient residence time to drain free moisture (TCSG, 2022). Feedstock will be collected from the selected storage bay by front-end loader and discharged into one of three discharge hoppers from where it will be conveyed to the feedstock milling plant (TCSG, 2022).
  - Sulfur: Bulk sulfur storage in enclosed warehouses will be stored by Grindrod on a nearby Grindrod site and will be transported from the Grindrod site by road* (future rail) to the Nyanza site where it will be discharged into and stored in silos (TCSG, 2022).
  - Ammonium Sulfate: This will be imported to site in bulk and discharged into a storage silo from where it is conveyed (by pneumatic conveyance) to the aluminium removal process section (TCSG, 2022).
  - Limestone: Limestone will be imported by rail in gondolas. It is to be off-loaded and transported to an open storage area nearby the gypsum plant (TCSG, 2022).
- Liquid Bulk including:
  - Chlorine: Chlorine will be imported to site by road in specialised bulk 900kg containers (TCSG, 2022).
  - Sodium Hydroxide: Sodium hydroxide will be imported to site by road tanker and discharged into on-site storage tanks (provision will be made for 14 days' worth of storage capacity). The sodium hydroxide will then be used in the following process sections (TCSG, 2022):
    - $TiCl_4$ nuclei;

        - Sodium titanate nuclei preparation;
        - Digester off-gas scrubbing; and
        - Coating.
    - Titanium Tetrachloride will be imported to site by road in and stored onsite into storage tanks (TCSG, 2022). From the storage tanks it is pumped to the $TiCl_4$ nuclei preparation plant (TCSG, 2022).

- Other Aqueous Raw Materials Receiving and Storage
- Other aqueous raw materials will be imported to site by road and will be offloaded in a purpose-designed enclosed store (ca 100 m^2 floor space) (TCSG, 2022). The drums will be transported from the store to the relevant process section by forklift (TCSG, 2022). Provision has been made for storage capacity for 28 days' worth of usage (TCSG, 2022).
- Other Solids Raw Materials Receiving and Storage: Other solids raw materials will be imported to site by road in 25 kg bags, 0.5 tonne bulk bags or 1 tonne bulk bags and will be offloaded in a purpose-designed enclosed store (ca 100m^2 floor space) (TCSG, 2022). The bags will be transported from the store to the relevant process section by forklift (TCSG, 2022). Provision will be made to cater for 28 days' worth of usage (TCSG, 2022).
- Packing Materials Receiving and Storage: 25 kg bags, 0.5 tonne bulk bags and 1.0 tonne bulk bags will be imported to site by road and offloaded into a separate enclosed store (ca 100 m^2 floor space) for the purpose . The bags will be transported to the packaging area by forklift (TCSG, 2022).
- Recycled Containers Storage and Handling: A facility will be provided for the collection of used containers where it can be cleaned and temporarily stored for dispatch by road off-site (TCSG, 2022).
- Pallet Receipt, Storage Issue & Recycling: A facility will be provided for the receipt and storage of clean product pallets. The pallets will be transported to the packaging area by forklift (TCSG, 2022). In addition, a facility will be provided for the collection of used pallets where it can be cleaned and temporarily stored for dispatch by road off-site (TCSG, 2022).
- Process Consumables Receiving & Storage: Two separate enclosed storage areas will be provided for storage of process consumables, which will include hazardous chemicals in small quantities, filter cloths, cleaning materials and tools, etc (TCSG, 2022).
- Fuel Storage: Provision will be made for diesel tanks for storing diesel on site (TCSG, 2022).
- Diesel will be imported to site by road and will be discharged into vehicles and forklifts with standard metered fuel discharge pumps and nozzles (TCSG, 2022).

Table 5-2 provides a summary of the raw materials, chemicals, by products, core products and waste to be stored on site.

Table 5-2: Raw Materials, Chemicals, By Products, Core Products and Waste to be Stored on Site

	m^3 per annum	m^3 per day	Transport mode	No of days storage on site	On site storage [m^3]
Feedstock	117 561	379			
RBM Slag/ilmenite	44 979	145	Rail - box cars or pneumatic	9	1 306
HSS	72 582	234	Rail - box cars	9	22 107

	m^3 per annum	m^3 per day	Transport mode	No of days storage on site	On site storage [m^3]
Chemicals					
Sulphur [S]	41 075	1 325	Rail - box cars or pneumatic	3	3 975
Fe scrap [Fe]	2 798	9	Road - bales/bags	11	99
Limestone [$CaCO_3$] (as dry)	143 586	463	Rail - box cars	5	2 316
Ammonium sulphate powder [$(NH_4)_2SO_4$]	44 584	144	Rail - box cars or pneumatic	18	2 589
Caustic soda [NaOH] (as 50%)	12 715	41	Road tanker	5	205
Chlorine (Cl_2) liquid	2 444	8	Road tanker - specialised	11	87
Coking coal	807	2.6	Rail/road bulk	32	83
Titanium tetrachloride (TiCl4)	2 370	7.6	Road - specialised containers	32	245
Aluminium sulphate [$Al_2(SO_4)_3$]	994	3.2	Road - bags/drums	11	35
Potassium carbonate [K_2CO_3]	292	0.9	Road - bags/drums	18	17
Monoammonium phosphate [MAP - $NH_4H_2PO_4$]	240	0.8	Road - bags/drums	18	14
Sodium nitrate [$NaNO_3$]	0	0.0	Road - bags	18	0
Sodium silicate [$Na_2O{:}SiO_2$]	986	3.2	Road - drums	11	35
Sodium aluminate [$NaAlO_2$]	1 237	4.0	Road - drums	18	72
Dicalite [volcanic ash]	3 379	10.9	Road - bags	11	120
Trimethyl phosphate [TMP - $C_3H_9O_4P$]	267	0.9	Road - drums	18	15
Monoethanolamine [MEA - C_2H_7NO]	251	0.8	Road - drums	18	15
Zircon beads [ZrO_2]	27	0.1	Road - bags/drums	94	8
Aluminium powder [Al]	65	0.2	Road - bags/drums	32	7
Flocculent	62	0.2	Road - bags/drums	64	13
Intermediate materials produced on site					
Titanium tetrachloride ($TiCl_4$)	2 370	8		32	245
Titanium oxychloride ($TiOCl_2$)	9 379	30		4	121
Calcium hydroxide [$Ca(OH)_2$]	58 331	188		2	376
Sulphuric acid [H_2SO_4] (as 98.0 - 104%)	374 900	1 209		21	25 396
Demineralised water				2	16 407
Steam					
WAC acid recycled (as 68%)	43 557	141		1	222
WAC salts	49 144	159		2	587
Products, co-products & wastes					
TiO_2	72 727	235	Road - bags	5	1 173
Sulphuric acid [H_2SO_4] (as 98.0 - 104%)	188 692	609	Road tanker	5	3 043
Gypsum (as dry)					
Gypsum to NPC @18% moisture	137 931	445	Rail - box cars	5	2 225
Sludge @50% solids	160 725	518	Road bulk	5	2 592
Copperas @95% solids	129 726	418	Rail - box cars	5	2 092

	m^3 per annum	m^3 per day	Transport mode	No of days storage on site	On site storage [m^3]
Alum [$NH_4Al(SO_4)_2.12H_2O$] @70% solids	137 923	445	Rail - box cars or pneumatic	5	2 225
Sulfur Ash	2 015	6.5	Tipper trucks	10	65
Liquid Effluent	5 245 032	16 919	Piped - sea outfall pipeline	2	33 839

5.3.3 Co-products and Wastes

Open-air storage areas will include:

- Gypsum with a low moisture content to be dispatched by rail to cement manufacturers;
- Copperas to be dispatched by road/rail to customers;
- Alum to be dispatched by road/rail to customers;
- Digester sludge to be dispatched by road/rail to customers or to a landfill site; and
- Sulphur ash to be stored for disposal.

Facilities for the collection, temporary storage, and dispatch by road of small volumes of wastes requiring regulated dry disposal wet disposal will be provided (TCSG, 2022).

5.3.4 Effluent Sea Outfall Discharge

Effluent from the collection reservoirs will be pumped to the sea through the existing sea outfall pipeline (TCSG, 2022). The design assumptions are that the instantaneous volume to be pumped through the sea outfall pipeline will be 40% higher than the average volume of liquid effluent emanating from the site (TCSG, 2022).

5.4 Existing Infrastructure and Resources Required for Construction and Operation

The RBIDZ owns and operates the following services and utilities which will be made available to Nyanza (TCSG, 2022):

- Water supplied ‘over-the-fence’ to on-site water storage facilities;
- Electricity supplied ‘over-the-fence’ with on-site pressure reduction and distribution;
- Gas supplied ‘over-the-fence’ with on-site pressure reduction and distribution;
- Neutralised waste liquid settling and buffer storage on-site – for discharge through a sea outfall pipeline which is out of scope; and
- A railway siding with loading and off-loading facilities on-site – shunting facilities will be provided off-site.

Space provision will be made for (TCSG, 2022):

- A colour pigments plant using iron sulfate as feedstock;
- A gypsum board manufacturing plant; and
- A copperas mono-hydrate plant.

5.4.1 Water

A summary of the water requirements is provided in Table 5-3.

Table 5-3: Water Requirements

Nyanza water requirement for 80ktpa TiO_2 plant	m^3 per annum	m^3 per day at on-line time of 310 days per annum
Total potable water	3 150 261	10 162
Total process water	2 730 997	8 810
Total cooling water	3 335 289	10 759

Potable Water

Potable water will be required for use in some process areas, notably for the water demineralisation plant and for general site use (TCSG, 2022). Water from the external supply point will be piped into storage reservoirs on site, with sufficient capacity for 2 days' supply to the site. A pump station installed at the reservoirs will distribute water to off-take points on the site (TCSG, 2022).

Process and Cooling Water

Water from the external supply point will be piped into storage reservoirs on site, with sufficient capacity for 2 days' supply to the site. A pump station installed at the reservoirs will distribute water to off-take points on the site (TCSG, 2022). Process water, which has a less stringent quality requirement, will mostly be used in the process (TCSG, 2022).

Cooling water will either be from process water or filtered sea water (TCSG, 2022). Sources of water supply to the site are currently under investigation. For design purposes it is assumed that process water will be used for cooling as well, but the design will be adjusted if it proves feasible to use sea water as cooling water instead (TCSG, 2022).

Water cooling will be undertaken in the individual process sections (TCSG, 2022).

Demineralised Water

Demineralised water will be produced on-site to suitable quality as follows (TCSG, 2022):

- Hardness: 0.5 mg-eq/dm^3
- Salt content: max 100 mg/dm^3
- Iron content: 0.2 mg/dm^3
- pH value: 6.5 to 7.5
- Temperature: 18 to 40°C

Demineralised water will be piped to off-take points at the boundaries of the various processing areas (TCSG, 2022).

5.4.2 Compressed Air

Compressed air will be generated on-site (TCSG, 2022) as follows:

- Compressed air for general use will conform to ISO 8573.1: 2001: Class 2.4.2 (TCSG, 2022).
- Compressed air for instrumentation will conform to ISO 8573.1: 2001: Class 2.1.1 (TCSG, 2022).

5.4.3 Steam

High pressure and low-pressure steam as heat source will be piped from the sulfuric acid plant and an on-site boiler plant (TCSG, 2022):

5.4.4 Gas

Gas as heat source will be supplied 'over-the-fence' – calorific value: 8 100 kcal/Nm^3 (TCSG, 2022).

A single natural gas off-take point will be established on site. An on-site pressure reducing station in the vicinity of the off-take point will reduce the pressure to 0.35 Mpta. Gas will be piped from the reducing station to off-take points at the boundaries of the various processing areas (TCSG, 2022).

An EIA for the gas pipeline will be undertaken as a separate process.

5.4.5 Electricity

Electricity will be supplied 'over-the-fence'. Electricity supply pressure will be 11 kV, and this will be reduced and distributed on-site (TCSG, 2022). 11 kV feed from an RBIDZ off-take point will be routed to a main on-site substation where it will be reduced to 3.3 kV and 380 V and then distributed to various off-take points (electric power supply will be 3.3 kV 50 Hz 3 Ø to power electric motors ≥ 300 kW and 380 V 50 Hz 3 Ø for electric motors < 300 kW. Instrument electric power supply will be 110 V 50 Hz single phase) (TCSG, 2022).

Design provision will be made for installing solar panels on the roofs of all non-process buildings (TCSG, 2022). Solar rooftop installation will contribute another ca. 0.4MW of electric power, so the total solar power generated on the Nyanza main site will be approximately 5.3MW. Other than site levelling and the provision of gravel service roads, only the ground-mount solar panels and weatherproof enclosures for the solar panel control systems will be constructed in the area where the ground-mount solar panels are to be installed. These will be connected to the site power supply in the TSC and main site substations (Nyanza, 2021).

In addition, ground-mount solar panels will be installed in the Green Park as described in Section 5.1 (Nyanza, 2021).

Steam turbines will be installed to generate electricity with the steam from the sulfuric acid plant. Steam is generated by the exothermic reaction taking place when producing sulfuric acid with the sulfur-burning process.

Table 5-4: Power generated from steam turbines at 2 000 tonnes of H_2SO_4 per day

Sulfuric acid production	2 000 tonnes per day
Steam generated	2 200.0 tonnes per day
Power from steam	24 MW

5.4.6 Vacuum

Vacuum will be generated locally in the relevant process sections (TCSG, 2022).

5.4.7 Waste

Effluent will be piped from connection points at the various process buildings to the waste acid neutralisation plant where it will be neutralised (TCSG, 2022). Effluent collection reservoirs with 2 days' worth of storage capacity will be constructed on site – that will serve to homogenise the effluent before discharge. A pump station at the reservoirs will pump the effluent into the discharge line (TCSG, 2022).

The assumptions regarding waste treatment are (TCSG, 2022):

- All gaseous emissions are treated in accordance with general standards employed in the European Union, except as prescribed by the specific South African air emission limits provided in the NEM:AQA;
- A 3-stage Chematur Eco planning Oy acid re-concentration plant will be installed to concentrate the waste acid to an acid concentration of 68%, and the maximum economic volume of concentrated acidic liquid effluent for re-use in the TiO_2 plant will be re-concentrated and recycled to the process;
- The remainder of this liquid acid effluent is neutralised to pH7.2 and gypsum is produced. Gypsum[3] as a product for use by NPC is dewatered/dried to a moisture content of about 18%. The balance of the gypsum is slurried with liquid effluent and discharged through the sea outfall pipeline;
- Digestion sludge is washed and filtered, and then neutralised by mixing with slaked lime $Ca(OH)_2$ and sold as a brick/tile colourant; and
- [4]Copperas is sold as a co-product.

Digestion Off-gas

Off-gas is generated by the violent reaction of sulfuric acid with feedstock. Where batch digestion is employed the volume of gas discharged is variable (TCSG, 2022).

When digesting ilmenite or HSS, the exhaust gases are composed of air, steam, acid droplets, acid mist, SO_3 and sulfuric acid and dust carried over from the feedstock. Treatment will be by water scrubbing, which can remove the steam, most of the acid droplets, a substantial part of the acid mist and most of the feedstock dust. Water scrubbing would be through a venturi scrubber (TCSG, 2022).

When digesting slag, exhaust gases are composed of all the above, plus SO_2 and H_2S which results from the reduction of sulfuric acid by Ti^{3+}. These gases are relatively insoluble in warm low pH water, so they would not be removed by the water scrubber and the gas must be scrubbed with a weak caustic solution. SO_2 is removed as sodium sulphite and H_2S is removed as sodium sulphide. Both the sulphite and the sulphide will decompose at low pH, releasing SO_2 and H_2S, so great care must be taken in the disposal of spent caustic; it will be necessary to oxidise the sulphite and sulphide to sulfate prior to discharge (TCSG, 2022).

Calcination Off-gas

Calcination off-gas comprises principally N_2, CO_2 and O_2 saturated with water vapour, with traces of TiO_2 dust, SO_2 and SO_3 (TCSG, 2022).

Treatment will be scrubbing with pre-bleach filtrates to cool the gas and, at the same time, increase the sulfuric acid concentration of the pre-bleach filtrates to about 30%. A second stage of water scrubbing further removes TiO_2 dust and SO_3, followed by electrostatic precipitation to remove acid mist. Scrubbing water and precipitation washings are recycled to the pre-bleach washing stage. SO_2 is removed by passing the gas through a bed of activated carbon granules irrigated with water, where SO_2 is catalytically oxidised and then dissolved in water (the Sulfacid™ catalytic converter system) (TCSG, 2022).

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[3] Gypsum is a soft sulfate mineral composed of calcium sulfate dihydrate, with the chemical formula $CaSO_4 \cdot 2H_2O$. It is widely mined and is used as a fertilizer and as the main constituent in many forms of plaster, blackboard/sidewalk chalk, and drywall.
[4] Copperas green crystals of hydrated ferrous sulphate, especially as an industrial product

Condensation Tail Gas

The tail gas emanating from condensation of the $TiCl_4$ in the $TiOCl_2$ plant will be scrubbed on plant. The dilute HCl from tail gas scrubbing will be directed to a buffer tank with a discharge pump for pumping to the waste acid neutralisation plant (TCSG, 2022).

Neutralisation Off-gas

CO_2 results from neutralisation of strong waste acid with limestone. CO_2 emissions will not be treated (TCSG, 2022).

An option to be investigated is to recover and filter the CO_2 to be used in carbonated water ('sparkling water') and/or carbonated drinks ('soft drinks') but this is not in scope (TCSG, 2022).

Other Gases

Combustion gases from heaters and driers, and water vapour from cooling towers are not treated (TCSG, 2022).

Digestion Sludge

The non-dissolved fraction of the feedstock after digestion is referred to as digestion sludge. It will be filtered from the liquor and neutralised by dry mixing with slaked lime and sold as brick/tile colourant. This will be dispatched by road (TCSG, 2022).

Copperas

Copperas ($FeSO_4.7H_2O$) is generated with the removal of iron from the black liquor when digesting ilmenite[5] and will be dispatched by rail (TCSG, 2022).

Space provision will be made to dry the copperas on site to a monohydrate in future if this is found to be necessary as a value-add (TCSG, 2022).

Potential market uses for copperas to be investigated include (TCSG, 2022):

- Soil amelioration (for soils poor in iron);
- Animal feed supplement (iron);
- A reductant to reduce hexavalent chromium (Cr^{6+}) to trivalent chromium (Cr^{3+}) in cement (to make this less harmful and avoid contact dermatitis);
- Colourant to stain concrete, limestone, sandstone, wood, bricks, or tiles;
- Nutritional supplement to fortify foods and to treat iron-deficiency anaemia;
- Treating of iron chlorosis in plants;
- Water purification as flocculant and for phosphate removal in municipal and industrial sewage treatment plants to prevent eutrophication of surface water bodies;
- Treatment for wood panelling either alone, dissolved in water, or as a component of water-based paint; and
- Reagent in the identification of mushrooms.

[5] **ilmenite**, iron-black, heavy, metallic oxide mineral, composed of iron and titanium oxide ($FeTiO_3$), that is used as the major source of titanium.

Liquid Effluent Treatment

The strong acid waste streams (ca. 20% Sulfuric acid) originate from the first washing stage after hydrolysis (TCSG, 2022). The most economic volume of strong waste acid will be re-concentrated for recycling in the TiO_2 process. A 3-stage Chematur Eco planning Oy acid re-concentration plant, concentrating the waste acid to 68%, is included in the project scope (TCSG, 2022).

Salts from the reconcentration process (principally $FeSO_4.H_2O$) will be precipitated and filtered from the concentrated acid. These salts will then either be dispatched by road to a client or mixed with concentrated waste acid to be neutralised (TCSG, 2022).

The remainder of the strong waste acid effluent will be neutralised to a pH of about 5.2 with crushed limestone. The resulting slurry will be filtered and the filtrates, along with the weak acid filtrates will be neutralised with slaked lime along with all other effluent to a pH of about 7.4. The resulting slurry will be filtered and settled. The settled sludge will be pumped through filters to dewater it (TCSG, 2022). Up to 200 000 tonnes per annum of the gypsum will filtered to a moisture content of about 18%. This gypsum will be conveyed into a silo from where it will be loaded onto the rail trucks for dispatch to NPC (TCSG, 2022). The remainder of the gypsum will be filtered to about 50% moisture content (TCSG, 2022).

The clear filtrates from settling will be pumped to a buffer tank from where it is pumped through the sea outfall pipeline (TCSG, 2022).

Slaked lime will be produced from limestone in an on-site slaking plant. The current assumption is that the quicklime (CaO) produced from the limestone in the kiln will be hydrated with water at 5 times stochiometric requirement to produce slaked lime ($Ca\ (OH)_2$) (TCSG, 2022).

The 50% moisture content gypsum will be transported to other end destinations by rail (TCSG, 2022).

Waste Acid Concentration

Iron sulfate ($FeSO_4.H_2O$) is formed as a crystalline solid waste in the acid reconcentration process (TCSG, 2022).

5.4.8 General Buildings and Infrastructure

The general services, utilities, and infrastructure include (TCSG, 2022):

- Offices for administration, management, and supervision;
- Stores (raw materials, consumables, and maintenance spares);
- Maintenance workshops; maintenance workshops;
- Canteen/meal room facilities;
- Changeroom facilities;
- Emergency response facilities; and
- Infrastructure and non-plant services e.g., roads, drainage, fencing, and access control.

Main Office Block

Functions to be accommodated in the main office block are generally (TCSG, 2022):

- Site and operations administration and management;
- Engineering and projects;
- In-process analytical laboratory; and

- Staff canteen (which would double as a meeting room for large meeting groups).

In-process Laboratory

The project will include an in-process analytical laboratory.

Workshops

Engineering workshops made of individual workshops will be included (TCSG, 2022):

Changerooms

Changeroom facilities with ablutions, showers, lockers and receipt and issue facilities for laundry as per industrial standards (laundry will be done off-site by others) (TCSG, 2022).

Stores

Separate storage facilities will be provided for (TCSG, 2022):

- Solid bagged raw materials and chemicals;
- Liquid raw materials and chemicals in small transportable containers (e.g., drums;

  Packing materials to be issued to the product packing area;
- Maintenance spares and general consumables (150m^2 floor space);
- A lay-down area will be provided for large maintenance spares (agitators, rollers etc.
- Storage of used FBC's with sufficient access for the FBC supplier to access and remove the used FBC's; and
- Receipt, storage, issue and return of pallets.

Emergency Response Facilities

The project will include emergency response facilities e.g., firefighting, first aid, and clinic services (TCSG, 2022).

Technical Services Centre (TSC) Reconfiguration

The laboratory will be equipped for final product classification and customer technical services functions (TCSG, 2022). The TSC entrance for heavy vehicles will be used as access point to the eastern side of the operational area. An additional heavy vehicle access point is to be provided on the western end of the sulfuric acid plant (TCSG, 2022).

The TSC entrance for passenger vehicles will be used as access point for all passenger vehicles. The TSC parking area will be expanded for the commercial operation. The parking area should be fenced such that passengers can only access the operational area through dedicated turnstile type personnel gates with access control or through the main office reception (TCSG, 2022).

Site Access, Access Control, Security, and Fencing

On the basis that the Nyanza site is located inside a fenced-off customs area, perimeter fencing around the Nyanza site need only be suitable to prevent inadvertent access to the Nyanza site (TCSG, 2022).

A traffic impact assessment will be conducted to ensure vehicle flow and access to the various loading and unloading areas on the site, also considering space for heavy vehicle lay-bye areas. An additional heavy vehicle entrance to the Nyanza site will likely be required towards the western end of the site (TCSG, 2022).

Drainage

Rainwater from all operations buildings will run off into drains (gutters and gutter run-off piping will be the design responsibility of the entity responsible for the design of the building). All surface rainwater from uncovered areas (including roads) will run off into drains. All drains will run off to the first flush stormwater collection system (TCSG, 2022).

Spillages from all operations areas will be contained within the particular area and drained to a dedicated sump(s) in the area where it will either be treated or piped to a treatment plant. Drains, sumps, and treatment areas for individual process areas will be the design responsibility of the entity responsible for the design of that process area. After treatment it will be piped to the effluent collection tanks for discharge through the sea outfall pipeline. No process spillages whatsoever will be allowed to run off into rainwater drainage systems. Design provision must be made for pumping of the sump contents to the waste acid neutralisation plant (TCSG, 2022). Run-off from sub-soil drains will be collected and re-used on site (TCSG, 2022).

Contractors' Yard

A contractor's yard (not indicated on the general lay-out plan) needs to be established with a lay-down area for temporary offices, equipment, and materials. Provision must be made for a meal room and changeroom for 50 persons in total (male and female). The currently proposed laydown area is shown in Figure 5-3.

srk consulting	NYANZA DRAFT EIA REPORT Proposed Contractor Laydown Area	Project No. 585503

Figure 5-5: Proposed Laydown Area

5.4.9 Roads

Existing access roads will be used for access to and from the Nyanza site.

5.4.10 Sanitation

Sewage is collected from all ablutions and piped to discharge points for off-site discharge to the municipal sewage system (TCSG, 2022).

6 Alternatives Considered

A number of alternatives have been considered for the proposed project and are described in the following sections.

6.1 Site Alternatives

Over the last few years, various studies have been conducted by Nyanza to determine the best site location for the process to work effectively and efficiently. During these studies, it was identified that sulfuric acid would be needed to extract the Titanium from the slag acquired from Highveld Steel and Vanadium. Due to this, the locations which were assessed included the option of constructing a sulfuric acid plant. The following factors were considered as part of the site selection:

- Acid supply locations
- Distance from slag dump
- Electricity supply
- Acid supply
- Liquid effluent
- Solid waste landfill and distance to landfill
- Transport cost

These factors were applied to six different locations namely Middleburg, Coega, Maputo, Vryheid, Richards Bay, and Rustenburg. Due to the site selection criteria, the two locations which were considered as part of the main site selection were Richards Bay and Middleburg. Once the alternatives had been narrowed down to two locations, the following key parameters were considered:

- Proximity to main feedstock which is near Witbank in Mpumalanga Province
- Transportation infrastructure / proximity to a port for bulk export of titanium products
- Availability and suitability of industrial land, infrastructure, services, and utilities
- Proximity to key raw materials

6.1.1 Alternative 1 : Middleburg

Middleburg as a location was the closest to Highveld Steel and Vanadium resulting in the slag not having to be transported as far; however, the final Titanium product would still have to be transported via railway to Richards Bay Port as this is the closest port.

Although there were acceptable transportation options, namely the railway line from Witbank to Richards Bay, Nyanza would still have to install all supporting infrastructure, services, and utilities.

Furthermore, the sulfuric acid which is needed to produce the final Titanium product would need to be transported just under 400 km to the plant, resulting in much higher transportation costs. For these reasons, the Middleburg alternative was discarded.

6.1.2 Alternative 2 (preferred alternative): Richards Bay

Richards Bay was the second furthest from Highveld Steel and Vanadium, however it was one of the closest to a port for bulk export of the final titanium product. In addition, a portion of land within Phase 1F of the RBIDZ, which had already installed key supporting infrastructure, services and utilities was available. Furthermore, the sulfuric acid required for the production of titanium pigment would be sourced from nearby facilities like Foskor which is also located in Richards Bay. For the above reasons, the Richards Bay site was the most suitable site alternative, and thus this is where Phase 1, the Product Testing and Development Centre was developed. Due to the fact that Phase 1 is now already developed, there are no further site alternatives being pursued.

6.2 Technology Alternatives

Four beneficiation options of the discard furnace slag from EVRAZ Highveld were evaluated, smelting, physical upgrading, chlorination and sulfuric acid leaching process. The evaluation of the various typical titanium beneficiation processes revealed that smelting, physical upgrading, and chlorination processes are unsuitable due to the high levels of metal impurities (Ca, Mg etc.) in the slag. As a result, the hydrometallurgical sulfuric acid leaching process route, commonly referred to as the “sulfate” process, was selected as the technically viable processing route for the study. The study was largely based on patents developed for Highveld slag specifically, with enhancements and additions as derived from test work.

In the technology selection phase various processing options were evaluated based on the possible processing routes, the proprietary information and confidentiality regarding certain processing routes, and accessibility to required reagents, technical know-how and operating skills requirements. Uncoated anatase was initially identified as a relatively simple titanium pigment product to produce; possibly at the lower ranges of typical production costs. Conceptual process engineering and costing continued on this basis, up to and including financial analyses of two different processing routes. Following the outcomes of the titanium pigment market study conducted by TZMI, however, the decision was made to target coated rutile as product. This required the incorporation of a rutile nuclei production step as well as a pigment finishing unit operation. The decision to change from uncoated anatase to coated rutile as final product was prompted by the limited and diminishing market for uncoated anatase. These additional process areas were incorporated into the design, and added to the cost estimates and resultant financial analyses”

6.3 Operational Options

With respect to the use of sulfuric acid in the plant, there were 2 options considered, viz buying the sulfuric acid from other suppliers and making own acid on site. A decision was made to rather manufacture the sulfuric acid on site to reduce risks related to transportation as well as to reduce costs.

6.4 No-Go Option

The no-go alternative would entail not implementing the proposed 80 000 tpa TiO_2 Pigment Plant. The proposed plant will be located with the RBIDZ, and the no-go option would mean that development of the section of the RBIDZ 1F affected by the proposed project will not continue. The negative environmental impacts associated with the proposed project including loss of wetland systems, loss of biodiversity etc may not occur and the area will remain in its existing condition for a limited timeframe, barring the impacts that have occurred due to the existing Nyanza TiO_2 PTDC. However, it must be noted that since the RBIDZ was developed for the sole purpose of attracting development, it is expected that the site will eventually be used by another industry, which will still impact on some, if not all of the environmental aspects affected by the Nyanza project.

Not implementing the project will impact the job creation, economic growth, income distribution to low-income households, and SMME simulation development. A further socio-economic assessment of the development was undertaken in 2014 and found that development would have a net positive value of R6.4 billion. The macroeconomic impact analyses for the RBIDZ indicated that developing Phase 1F will add about R23.8 billion to South Africa's GDP and will create 110 000 new jobs, of which 23 000 will be jobs for workers that are unskilled. Households will also benefit to an additional R15.6 billion in household income, R2.6 billion which will expand to low-income households. The no-go option will result in a loss of the socio-economic benefits (NEMAI Consulting, 2016)

Currently, Africa imports 130000 tonnes of TiO_2 pigment per year, while South Africa consumes about 35 000 tonnes (Global Africa Network, 2017). Nyanza will contribute 80 000 tonnes of TiO_2 pigment per annum. The largest quantity will be sold locally, while the remainder will be exported to other countries in Africa and the Middle East.

By not implementing this project approximately 1 750 potential jobs associated with the project will not be created, the local economic opportunities and revenue which could potentially have benefitted the local, regional, and national economy would be lost. Not implementing the project will also result in loss opportunities in foreign exchange for South Africa will be incurred as the potential to sell the TiO_2 pigment internationally will be lost.

In addition, not implementing the project means that the waste product which will be used as the primary resource will not be used and will remain at Highveld Steel and Vanadium.

From the site assessment through undertaking specialist studies, the additional potential negative impacts on the environment associated with project would not exist should the project not be implemented. Nonetheless. the environmental, social, and economic impacts have been assessed in detail during the impact assessment phase to identify and address all negative impacts, where possible, and mitigation measures, management, and monitoring plans for these impacts have been developed.

7 Legal and Policy Assessment Framework

7.1 South African Environmental Legislation, Policies and Guidelines

Table 7-1 provides a summary of the applicable legislation, policies, and guidelines identified as relevant to the proposed project. In addition, a description of how the proposed activity complies with and responds to the legislation and policy context, is provided. This list is not exhaustive but rather represents an indication of the most applicable pieces of environmental legislation relevant to the project.

Table 7-1: Policy and legislative context of proposed project

Legislation	Description and Relevance	Responsible Authority
Constitution of the Republic of South Africa, (Act No. 108 of 1996)	In terms of Section 24, of the Constitution of the Republic of South Africa (108 of 1996), everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development. The needs of the environment, as well as affected parties, should thus be integrated into overall project management in order to fulfil the requirements of Section 24 of the Constitution. Chapter 2 encapsulates the Bill of Rights and Section 24 relates to Environmental Rights. *The proposed activities shall be implemented in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together be avoided, be minimised and mitigated (as per the Environmental Management Programme that will be compiled to guide the process) in order to protect the environmental rights of South Africans.*	N/A
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA)	The Promotion of Access to Information Act (Act No. 2 of 2000) (PAIA) recognises that everyone has a right of access to any information held by the state and by another person when that information is required to exercise or protect any right. The purpose of the Act is to promote transparency and accountability in public and private bodies and to promote a society in which people have access to information that enables them to exercise and protect their right. *The EIRprocess was undertaken in terms of the NEMA, where the associated stakeholder consultation process is aligned with the PAIA in the sense that all I&APs will be given an opportunity to register as an I&AP prior to the initiation of the project and all registered stakeholders were in turn provided a fair opportunity to review and comment on any reports submitted to the competent authorities for decision making.*	N/A
National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA)	The NEMA provides the overarching legislation for environmental governance in South Africa, giving effect to Section 24 of the Constitution of the Republic of South Africa. NEMA sets out the fundamental principles of Integrated Environmental Management that must be adhered to in order to ensure sustainable development. These principles should apply to environmental decision making. Of particular importance is NEMA's ruling that the interpretation of any law concerning the protection and management of the environment must be guided by the principles of NEMA. The core nature of the NEMA principles is the principle on sustainable development. This principle strives towards promoting development that is simultaneously meeting the needs of the present generations without compromising the needs of future generations to come. Section 24 relates to Environmental Authorisations (control of activities which may have a detrimental effect on the environment), and Section 28 relates to the duty of care and remediation of environmental damage.	KZN EDTEA and the DFFE

Legislation	Description and Relevance	Responsible Authority
	Environmental management principles will be incorporated into the EIR, which the applicant will be required to comply with to ensure that negative impacts on the environment are avoided or kept to a minimum and that positive impacts are enhanced. This project triggers Activity 2 and Activity 25 of GNR 983, Activity 4 and Activity 6 of GNR 984, and Activity 2 and Activity 14 of GNR 985. The table below provides a summary of the NEMA listed activities triggered by the proposed project.	

Activity Number:	**Relevant Activity (ies) as set out in Listing Notice 1, 2 & 3 (GN R327, GNR325 & GNR324)**	**Description of Activity as per the project description**
Activity 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	Development of water reservoir of approximately 70 000m^3.
Activity 25	Listing Notice 1: 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 metres but less than 15 000 cubic metres.	The development of a waste acid neutralisation plant which will be used for treatment of liquid effluent from plant processes.
Activity 2	Listing Notice 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.	Installation of steam turbines for generation of electricity to be utilized for steam supply to the TiO_2 plant during Sulphuric acid plant shutdown periods which will produce a maximum of 24MW.
Activity 4	Listing Notice 2: 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 metres.	Storage of the following on site: • Titanium tetrachloride ($TiCl_4$) • Titanium oxychloride ($TiOCl_2$) • Calcium hydroxide [$Ca(OH)_2$] • Sulfuric acid [H_2SO_4] (as 98 to 104%) • Diesel

Legislation	Description and Relevance			Responsible Authority
			Combine storage of ~ 45 000m^3	
	Activity 6	Listing Notice 2: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution, or effluent, excluding- I. activities which are identified and included in Listing Notice 1 of 2014 II. activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply; or III. the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater, or sewage where such facilities have a daily throughput capacity of 200m3 or less; or IV. where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	The need to apply for an Atmospheric Emissions Licence for activities listed in the NEMAQA. The need to apply for a water use licence for activities outlined in NWA.	
	Activity 2	Listing Notice 3: The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. **KwaZulu-Natal** i. Trans-frontier protected areas managed under international conventions; ii. Community Conservation Areas; iii. Biodiversity Stewardship Programme Biodiversity Agreement areas; iv. World Heritage Sites; v. In an estuarine functional zone; vi. In a protected area identified in terms of NEMPAA, excluding conservancies;	Development of water reservoir of approximately 70 000m^3 in a critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	

Legislation	Description and Relevance			Responsible Authority
		vii. Sites or areas identified in terms of an international convention; viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ix. Core areas in biosphere reserves; x. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose; xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; xii. Outside urban areas: (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or xiii. Inside urban areas: (aa) Areas zoned for use as public open space; (bb) Areas seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined; or (cc) Within urban protected areas.		
	Activity 14	Listing Notice 3: The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse;	Development of infrastructure with a physical footprint of more than 10 m^2 in a watercourse located in a critical biodiversity area	

Legislation	Description and Relevance	Responsible Authority
	KwaZulu-Natal vii. Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	
NEMA EIA Regulations 2014 (Government Notice (GN) 324, 325 and 327), as amended	The EIA Regulations (GNR 982) were promulgated in terms of Sections 24 of the NEMA, to manage the process, methodologies, and requirements for the undertaking of an EIA. The GNR 982 stipulates that the applicant for activities listed under GNR 983, 984, or 985, as amended in 2021 must appoint an independent EAP to manage the EIA process. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental impact on the environment, and which may not commence without an EA from the Competent Authority (CA). EA required for Listed Activities is subject to the completion of either a Basic Assessment (BA) process or full Scoping and Environmental Impact Assessment (S&EIA) with applicable timeframes associated with each process. The EA must be obtained prior to the commencement of those listed activities. *The project triggers activities listed in Listing Notices 1(GNR 983), 2 (NGR 984), and 3 (GNR 985), as amended in 2017 and 2021 and requires a full EIA (scoping and impact assessment).*	
Department of Environmental Affairs (DEA) Integrated Environmental Management Guideline Series, Guideline 5: Assessment of the EIA Regulations, 2012 (Government Gazette 805)	*Environmental impacts will be generated primarily in the construction phase of this project. These, together with associated operational and decommissioning phase impacts will be assessed during the impact assessment phase of the process.*	
Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004	*An Environmental Assessment is required for the proposed project as activities are triggered under GNR 325 and GN R327.*	
Review in Environmental Impact Assessment, Integrated Environmental Management, Information Series 13, Department of Environmental Affairs and Tourism (DEAT), Pretoria.		

Legislation	Description and Relevance	Responsible Authority
DEA Integrated Environmental Management Guideline Series, Guideline 7: Public Participation in the Environmental Impact Assessment Process, 2012 (Government Gazette 807)	*Public participation is a requirement of the EIA Process and will be conducted for the proposed project as stipulated in Chapter 6 of the NEMA and will consider various public participation guidelines as stipulated in Section 9.*	
National Water Act, 1998 (Act No. 36 of 1998) (NWA)	The NWA is the primary regulatory legislation controlling and managing the use of water resources as well as the pollution thereof. This act provides for fundamental reformation of legislation relating to water resource use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The purpose of the Act is stated in Section 2 and enforced by the Department of Water and Sanitation (DWS). *The proposed project triggers Section 21 (a), (b), (c), (i), and (j) water uses and therefore requires a Water Use Licence (WUL) from the DWS. An application for a WUL will be submitted to the DWS.*	Department of Water and Sanitation (DWS)
National Environmental Management Waste Act (Act No. 59 of 2008) (NEM: WA)	The objectives of the National Environmental Management: Waste Act (NEM:WA) involve the protection of health, wellbeing, and the environment by providing reasonable measures for the minimization of natural resource consumption, avoiding, and minimizing the generation of waste, reducing, recycling, and recovering waste, and treating and safely disposing of waste as a last resort. The Act involves the management of waste according to the waste management hierarchy. In terms of the NEM:WA, all waste management activities must be licenced. A distinction is made between Category A waste management activities, which require a basic assessment, Category B activities, which require a full EIA, and Category C waste management activities which do not require a waste management licence but compliance with relevant requirements or standards. *The HSS to be used as one of the feedstocks into Nyanza's metallurgical process was classified as hazardous waste. The pre-milled HSS will be transported from the Highveld Steel Site to Nyanza for use in the Rutile Pigment production process. Provision will be made for the on-site storage of HSS for 18 days' worth of stock (2 200m^3).* *The project triggers Activity 3, 4 and 10 under Category B and Activity 2 under Category C as listed in GNR921 of the NEM:WA, as amended in 2022 and will therefore require a Waste Management Licence (WML). Activity 2 triggered under Category does not require a WML and is therefore noted and will be complied with. The table below provides a summary of the NEM: WA listed activities that are applicable to the project.*	KwaZulu-Natal EDTEA and DFFE

<table>
<tr><th>Legislation</th><th>Description and Relevance</th><th>Responsible Authority</th></tr>
<tr><td></td><td>
<table>
<tr><th>Listed Activity</th><th>Description</th><th>Applicability to Project</th></tr>
<tr><td colspan="3">GNR 921 Category B</td></tr>
<tr><td>Activity 3</td><td>The recovery of waste including the refining, utilisation, or co-processing of the waste at a facility that processes in excess of 100 tons of general waste per day or excess of 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises.</td><td>The metallurgical processing of recovering HSS which is classified as a hazardous waste.</td></tr>
<tr><td>Activity 4</td><td>The treatment of hazardous waste in excess of 1 ton per day calculated as a monthly average; using any form of treatment excluding the treatment of effluent, wastewater, or sewage.</td><td>The metallurgical processing of treating HSS which is classified as a hazardous waste.</td></tr>
<tr><td>Activity 10</td><td>The construction of a facility for a waste management activity listed in Category B</td><td>Construction of the facility to store HSS which is classified as a hazardous waste.</td></tr>
<tr><td colspan="3">GNR 921 Category C</td></tr>
<tr><td>Activity 2: (does not require a Waste Management License but will comply to GNR 921)</td><td>The storage of hazardous waste at a facility that has the capacity to store in excess of 80m^3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste.</td><td>The storage of HSS which is classified as a hazardous waste.</td></tr>
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</td><td></td></tr>
<tr><td>National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA) as well as Listed Activities and Associated Minimum Emission Standards identified in terms of Section 21 of NEM:AQA</td><td>
The NEM:AQA was implemented on 24 February 2005 and reforms the law regulating air quality in order to protect the environment. On 22 November 2013 the list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions, or cultural heritage was published under GNR 893 in Governmental Gazette 37054, in terms of section 21(1)(b) of the NEM:AQA thereby repealing the previous list of activities which were promulgated on 31 March 2010.
Section 32 relates to dust control, Section 34 relates to noise control, and Section 35 relates to the control of offensive odours.
Listed activities in terms of NEM:AQA will be triggered as a result of the proposed project and includes Subcategory 1.2, 1.4, 4.1, 4.20, 5.6, 7.2, and 8.1. The project will therefore require an Air Emissions Licence (AEL) from the King Cetshwayo District Municipality. An Air Quality Impact Assessment will be undertaken by a specialist as part of the EIA and AEL application processes. The principles of the act, focusing on minimisation of pollutant emissions will be taken cognisance
</td><td>DFFE and King Cetshwayo District Municipality</td></tr>
</table>

Legislation	Description and Relevance	Responsible Authority
	of in the development of the EMPr during the EIA. The table below provides a summary of the NEM: AQA activities applicable to the proposed project. .	

Listed Activity	Description	Applicability to Project
Subcategory 1.2: Liquid Fuel Combustion Installations	Liquid fuels combustion installations used primarily for steam raising or electricity generation. All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used.	Heat input will be greater than 50MW when the turbines are driven by steam arising from the production of sulfuric acid.
Subcategory 1.4: Gas Combustion Installation	Gas combustion (including gas turbines burning natural gas) used primarily for steam raising or electricity generation. All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used.	Gas-fired boilers to supplement steam from the sulfuric acid plant.
Subcategory 4.1: Drying and Calcining	Drying and calcining of mineral solids including ore. Facilities with capacity of more than 100 tons/month product.	Drying of a slurry via a gas- fired spin flash drier and Calcination to drive off water and acid to grow the TiO_2 crystals.
Subcategory 4.20: Slag Processes	The processing or recovery of metallurgical slag by the application of heat. All installations.	Richards Bay and HSS will be used in the process.
Subcategory 5.6: Lime Production	Processing of lime, magnesite, dolomite, and calcium sulfate. All installations.	Lime Slaker
Subcategory 7.2: Production of Acids	The production, bulk handling and or use in manufacturing of hydrofluoric, hydrochloric, nitric, and sulfuric acid (including oleum) in concentration exceeding 10%. Processes in which oxides of sulfur are emitted through the production of acid sulfites of alkalis or alkaline earths or through the production of liquid sulfur or sulfurous acid.	The sulfuric acid plant will be sized to produce the total steam requirement for the TiO_2 plant, and the excess sulfuric acid produced will be sold in the local market.
	Secondary production of hydrochloric acid through regeneration. All installations producing, handling and or using more than 100 tons per annum of any of the listed compounds (Excluding metallurgical processes related activities regulated under category 4).	

Legislation	Description and Relevance	Responsible Authority
	Subcategory 8.1: Thermal Treatment of General and Hazardous Waste — Facilities where general and hazardous waste are treated by the application of heat. All installations treating 10kg per day of waste. — HSS, which is classified as a hazardous waste, will be used on site.	
National Forestry Act, 1998 (Act No. 84 of 1998) (NFA)	The NFA protects against the cutting, disturbance, damage, destruction, or removal of protected trees. *The proposed project will include the clearance of vegetation and trees from the project footprint. A biodiversity assessment was conducted as part of the EIA process and included an assessment of the potential impacts the proposed project will have on biodiversity, including flora as well as mitigation measures that will be required to minimise impacts on biodiversity.*	Ezemvelo KZN Wildlife (EKZNW) and the DFFE
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	For the generation of noise during construction and operations. *Any occupational health and safety aspects and issues have been addressed in the EIA and have been taken cognisance of in the EMPr development.*	DFFE
National Noise Control Regulations in terms of Section 25 of the ECA (1992), revised 14 January 1994	For the generation of noise during construction and operations. *A number of noise generating activities are associated with the proposed project. A Noise Impact Assessment was undertaken by a specialist where all noise control aspects and issues have been identified and addressed. The study identified all potential sources of noise associated with the project and modelled the potential extent of impact. Mitigation measures to be implemented to minimise the noise impacts have been identified and included in the EMPr.*	King Cetshwayo District Municipality
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) provides for the management and conservation of South Africa's biodiversity within the framework of NEMA, as well as the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources. The Act provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable, or protected. In line with the Convention on Biological Diversity, the NEM:BA aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. The NEM:BA established the South African National Biodiversity Institute (SANBI). The NEM:BA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and the identification of biodiversity hotspots and bioregions, which will then be given legal recognition. It imposes obligations on landowners (state or private) governing alien invasive species as well as regulates the introduction of genetically modified organisms. Furthermore, the NEM:BA serves to regulate bioprospecting, making provision for communities to share the profits of any exploitation of natural materials involving indigenous knowledge. *The management and control of alien invasive species on the impacted areas during all the phases of the project will be governed by the NEM:BA. The NEM:BA ensures that provision is made by the site developer to remove any alien species,*	DFFE, KwaZulu-Natal EDTEA, and Ezemvelo KZN Wildlife (EKZNW)

Legislation	Description and Relevance	Responsible Authority
	which have been introduced to the site or are present on the site. A biodiversity impact assessment was undertaken by a specialist and included the identification of alien invasive plant species that are located on the proposed project site. The specialist also identified mitigation measures that Nyanza will be required to implement to manage and control alien invasive plant species located on the project site. *In addition, the specialist also identified any protected species that may be affected by the proposed project. Where required, Nyanza will apply for permits for the relocation of protected species.*	
KwaZulu-Natal Nature Conservation Management Act, 1997 (Act 9 of 1997) (KZNNCMA)	This Act makes provision for the protection of the natural environment of the KwaZulu-Natal province. It establishes the KwaZulu-Natal Nature Conservation Board and the KwaZulu-Natal Nature Conservation Service and grants powers to the Minister to establish a local board in respect of one or more protected areas. The Minister, being a member of the KwaZulu Natal Executive Council, shall be responsible for nature conservation policy and the implementation of provisions of this Act. He or she may, in consultation with the Board, proclaim an area to be a protected area. The Board shall, among other things, direct management nature conservation and protected areas in the province, develop and promote ecotourism in protected areas and ensure the efficient management of the Conservation Service. The Conservation Service shall, among other things, provide support to the Board and local boards in management of nature conservation and protected areas. *The Biodiversity Assessment study take cognisance of the requirements of the Act and has included mitigation measures that will be aimed at protecting the natural environment affected by the project.*	KZN EDTEA, DFFE, Ezemvelo
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)	The CARA aims to provide for control over the utilisation of natural agricultural resources in order to promote the conservation of soil, water resources and vegetation and to combat weeds and invader plants. The Act makes provision for control measures to be applied in order to achieve the objectives of the Act, these measures relate to inter alia: • Cultivation of virgin soil; • Utilisation/protection of wetlands, marshes, water sponges, water courses/sources; • The regulating of the flow pattern of run-off water; • The utilisation and protection of vegetation; • The grazing capacity of veld and the number and type of animals; • The control of weeds and invader plants; and	DFFE and the Department of Agriculture, Land Reform and Rural Development (DALRRD)

Legislation	Description and Relevance	Responsible Authority
	The restoration or reclamation of eroded land or land, which is disturbed or denuded. *Alien invasive plant species located on the proposed project site were identified during the biodiversity assessment. The specialist also identified measures required for the control and management of the alien invasive species that have been included in the project EMPr.*	
National Heritage Resources Act, 1999(Act No 25 of 1999) (NHRA)	Heritage Permit for structures 60 years or older. Any person who intends to undertake any of these developments, 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 Project. If the Heritage Impact Assessment (HIA) indicates that the development will have an impact on a heritage resource listed within sections 38 of the Act must be followed. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In terms of Section 34, 35, 36, 37, and 38 of the NHRA, initiating a development must at the very earliest stages of development notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the project. In addition, Section 23(2)(b) of the NEMA requires that cultural heritage resources be assessed as part of the impact assessment process and thus in turn is subject to the EIA Regulations. *A Heritage Impact Assessment (HIA) was undertaken as part of the RBIDZ Phase 1F EIA. The assessment found that there are no heritage resources located on the Phase 1F properties. An additional site-specific phase 1 HIA was also undertaken a part of the EIA for the project. The specialist has identified mitigation measures that must be implemented should by chance graves and heritage resources be affected by the project.*	South African Heritage Resource Agency (SAHRA)
Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), as amended in 2014.	This Act deals specifically with land claims. *The proposed plant location is owned by the RBIDZ.*	Department of Agriculture, Land Reform and Rural Development (DALRRD)
National Environmental Management: Waste Act: National norms and Standards for the storage of waste (GN. 926 of 2013)	"Hazardous waste storage facility" means a storage facility that has a capacity to store in excess of 80m3 of hazardous waste continuously; This will be triggered by all the waste storage areas on site with a capacity of 80m^3 and more.	EDTEA & DFFE

Legislation	Description and Relevance	Responsible Authority
National Environmental Management: Waste Act: Waste Classification and Management Regulations, (GN. 634 of 2013)	4 (3) Waste must be kept separate for the purposes of classification in terms of sub-regulation (2) and must not be mixed prior to classification. All the waste streams generated on site must be classified before being given to the third party.	DFFE
National Environmental Management: Waste Act: National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN. 635 of 2013)	7 (1) The specific type of waste for disposal to landfill must be determined by comparing the TC and LC of the elements and chemical substances in the waste with the TCT and LCT limits specified in section 6 of these Norms and Standards. All the waste streams generated on site must be assessed before landfill disposal.	EDTEA & DFFE
National Environmental Management: Waste Act: Regulations regarding the exclusion of waste stream from the definition of waste (GN. 715 of 2018)	5. An application for the exclusion of a waste stream or a portion of a waste stream must be lodged with the Minister, using an application form obtainable from the Department. Consideration of applications for exclusion of a waste stream or portion of a waste stream from the definition of waste. All the waste streams generated on site which will be diverted away from the landfill for third part beneficiation.	N/A
National Environmental Management: Waste Act: National Waste Information Regulations (GN. 625 of 2012)	5 (1) Any person conducting an existing activity listed in Annexure 1 must apply to the Department to be registered on the SAWIS within ninety (90) days of the coming into operation of these Regulations To register as a Hazardous waste generator and Waste treatment facility	DFFE (SAWIC)

7.2 IFC Performance Standards

The IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy.

The Performance Standards are directed towards Nyanza's, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

The IFC's Environmental and Social Performance Standards define Nyanza's responsibilities for managing their environmental and social risks.

International Finance Corporation

International Finance Corporation (IFC) is the private sector arm of the World Bank Group. Summarily, it aims at fighting poverty with passion and professionalism for lasting results and to help people help themselves and their environment by providing resources, sharing knowledge, building capacity, and forging partnerships in the public and private sectors.

IFC's Policy on Environmental and Social Sustainability, Effective January 1, 2012 supersedes the IFC Disclosure of Information Policy (April 2006) in its entirety. This Policy is not an express or implied waiver of IFC's privileges and immunities under its Articles of Agreement, international conventions, or any applicable law, nor does it provide any contractual or other rights to any party.

At IFC while transparency and accountability are fundamental to fulfilling its development mandate, IFC encourages its clients to be more transparent about their businesses and believes that when clients are committed to transparency and accountability, they help promote the long-term profitability of their investments.

IFC strives for positive development outcomes in the activities it supports in developing countries including: (i) investments financed directly by IFC; (ii) investments implemented through financial intermediaries (FIs) or managed by IFC's Asset Management Company or any other IFC subsidiary, as well as investments funded in part or in whole by donors; and (iii) advisory services.

IFC believes that an important component of achieving positive development outcomes is the environmental and social sustainability of these activities, which IFC pursues and expects to achieve through the application of this Policy on Environmental and Social Sustainability (the Sustainability Policy or the Policy), and a comprehensive set of environmental and social Performance Standards. Through this Policy, IFC puts into practice its commitments to environmental and social sustainability. Activities supported and financed by IFC include a wide range of investment and advisory products including technical, financial and/or regulatory advice, project structuring as well as training to companies, industries, and governments.

Within the scope of an agreed advisory activity, all advice and training will be consistent with the Performance Standards. The Performance Standards on Environmental and Social Sustainability consist of the followings:

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; and

Performance Standard 8: Cultural Heritage.

These Performance Standards help IFC investment and advisory clients manage and improve their environmental and social performance through a risk and outcomes-based approach. While managing environmental and social risks and impacts in a manner consistent with the Performance Standards is the responsibility of the client, IFC seeks to ensure, through its due diligence, monitoring, and supervision efforts, that the business activities it finances are implemented in accordance with the requirements of the Performance Standards. As a result, the outcome of IFC's environmental and social due diligence of a proposed business activity is an important factor in its approval process and will determine the scope of the environmental and social conditions of IFC financing.

IFC's development mission are its efforts to carry out investment and advisory activities with the intent to "do no harm" to people and the environment, to enhance the sustainability of private sector operations and the markets they work in, and to achieve positive development outcomes. IFC is committed to ensuring that the costs of economic development do not fall disproportionately on those who are poor or vulnerable, that the environment is not degraded in the process, and that renewable natural resources are managed sustainably.

IFC recognizes that climate change is a serious global challenge and that climate-related impacts may impede economic and social well-being and development efforts. Working with the private sector and other parties to address climate change is therefore a strategic priority for IFC. IFC will engage in innovative investments and advisory services to support climate-friendly solutions and opportunities for business.

Table 7-2 provides a summary of Nyanza's policy approaches in complying with the IFC Performance Standards and how the IFC PS will be addressed during the EIA for the proposed project. The IFC's ESIA requirements have also been addressed in this EIR and specialist studies undertaken for the project.

Table 7-2: Nyanza's policy approaches in complying with the IFC Performance Standards

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
1	Assessment & Management of Environmental and Social Risks & Impacts	a) Environmental Policy b) Procedure outlining how E&S risks and impacts will be identified c) Management Programs (EMP) d) Organizational Capacity & Competence e) Emergency Preparedness & Response (Plan, consultation, resources, Plan review staff training) f) Monitoring & Review (E&S performance information reports, g) Stakeholder Engagement (Community Engagement process, disclosure of assessment information, Prior & Informed Consultation of affected Communities) h) External Communication and Grievance Mechanism (Mechanism to receive communication & grievances from the public, Queries register)	Y	Nyanza is in the beginning stages of developing its Environmental Social Management System (ESMS). As Nyanza expands its organizational structure it will resource the development of its management systems. Nyanza has a draft **Environmental Policy** Statement that communicates company policy to staff, board, suppliers, contractors and future customers. Internally, this policy statement represents a guide for what is expected when it comes to environment & social issues. The policy is the first step in the development of Nyanza's ESMS. This policy has been included in the Environmental Management Programme (EMPr). This policy statement, together with the proposed Environmental Code of Conduct (also in the EMPr), should be aligned to IFC's Performance standards taking into account the specific risks of both the chemicals industry and the risks presented by this project. Now that this Environmental Impact Assessment is underway, this will help Nyanza in developing procedures which outline how Environmental and Social **(**E&S) risks will be managed. The EIA process and HAZID 1 & 2 studies has already provided a baseline of the E& S risks posed by the project. Basic identification of E&S risks and impacts has been done, although it might be limited to the activities detailed in this EIA. A Risk Management Plan (RMP), HAZID 1 & 2 studies, and a fire risk study are attached to the EMPr. As the project progresses to detailed designs, further activities must be added, and the risk identification must be updated. A Hazard and Operability (**HAZOP**) study will be undertaken as detailed designs become available. Furthermore, **Procedures for identification of E&S risks** across all activities must be documented. The E&S risks must cover Environmental, Occupational Health & Safety, Labour, Community Health & Safety and Security. The risk assessment must be conducted at regular intervals and at any time where there are significant changes. It must include input from all workers and managers, as well as affected communities.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
				As part of this EIA, an EMPr to mitigate project impacts has been proposed. This EMPr is currently limited to the E&S risks identified during the EIA and this is commensurate with the information available at this stage of the project. As the project progresses, a robust Management Programme with preventative and corrective actions as well as clear and effective procedures must be developed for each impact, and it must cover all E&S risks including those pertaining to Human resource policies. The management hierarchy of 'Avoid, Minimize, Compensate/offset' must be used to prioritise management actions. Action Plans with clear targets and responsibilities for various teams must then be developed Currently, Nyanza has a limited number of personnel to resource an ESMS. Currently the Nyanza ESMS team comprises of: General Manager Sustainability and Corporate Affairs (E&S issues); Safety Officer (Safety, Health & Security issues); Human Resources (HR) Officer, Plant and Laboratory Managers and Procurement & Logistics Officer. The roles of the various personnel are clear in respect of E&S and these are expressed in the personnel contracts. The GM Sustainability & Corporate Affairs leads this team. As the project progresses this team must be enhanced and its capacity commensurate with the complexity of project activities and scale. The team must be provided with the requisite training to develop and implement an effective ESMS. Currently, Nyanza has an **Emergency Preparedness Response Plan** (EPRP) for the Product Testing and Development Centre (PTDC). A more robust EPRP for the main plant must be developed once the plant designs are finalized and HAZOP studies have been completed in the next phases of the project. Occupational Health and Safety hazards must include physical, biological, chemical, ergonomical and psychosocial hazards The EPRP must include identification of all emergency situations including those caused by external events (floods, fires, civil unrest etc) as well as procedures to respond to them, procedures to shutdown equipment, rescue and evacuation

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
				procedures, evacuation routes and meeting points, schedule of trainings and drills, procedures for emergency drills, emergency contacts and communication protocols with communities, government authorities, location of alarms and emergency response equipment, schedules of periodic inspection and testing of equipment, x The EIA process has assisted Nyanza to identify key stakeholder who have an interest in the project's Environmental and Social performance. Nyanza is in the process of developing an engagement model for all the stakeholders that have been mapped and identified to be key in order to lower the risk of anti-company sentiment. The stakeholders that have been prioritized for consultation during the EIA process have been listed under the public participation section of the EIR. Over and above external stakeholders that have been involved in the EIA process, there are workers who are a key stakeholder as they are involved in a range of project activities. The stakeholder mapping exercise must be enhanced and completed as the project progresses. The process of identification of risks and impacts have included: • Stakeholder engagement with I&APs. The purpose of the stakeholder engagement is to provide stakeholders with the description of the proposed project and provide them with an opportunity to provide information on how the proposed project is likely to impact on them. This has been considered during the impact assessment phase of the project. • Identification of potential risks and impacts: High level potential risk and impacts have been identified, based on the environment and project processes. Specialist have been employed to refine the identified impacts and assess the significance of the risks and impacts on the environment. • Specialist Studies: Specialists have been appointed to define the baseline receiving environment and identify and assess the potential risks and impact associated with the proposed project in their areas of expertise. A preliminary environmental baseline characterisation and high-level impact assessment has been undertaken as part of the scoping phase of the process. The specialist studies identified are included in Section 10 and Appendix F of this report.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
				• Mitigation: Specialists and the EIA team have identified mitigation measures that Nyanza will be required to implement to minimise the significance of the identified potential impacts on the environment. The mitigation measures have been included in the different management plans that will be included in the project EMPr. In addition, it is expected that Nyanza (through the IDZ) will have continual discussions on environmental issues associated with the project with the communities through the Environmental Review Committee (ERC). The Stakeholder Engagement and External communications procedure adopted so far has been based on a two-way communication anchored on providing meaningful information to stakeholders. Nyanza must expand this approach beyond the EIA and develop its Stakeholder Engagement and external communications procedure. Apart from detailed engagements with authorities, there were detailed engagements with the Richards Bay Clean Air Association (RBCAA) on issues of Air quality. The RBCAA owns some air quality monitoring stations from which monitoring data was used in the impact assessment. The engagement procedure deployed with the RBCAA therefore can be classified as Informed Consultation and Participation (ICP). This approach taken however does not reflect the severity of adverse impacts that will be felt by the communities, rather it reflects the activism of the RBCAA in the area and the willingness to ensure a proper assessment of impacts. Nyanza must regularly communicate with identified stakeholders throughout the project cycle, and document procedures in relation to Stakeholder Engagement and External Communication. Records of Stakeholder engagements must always be kept. Nyanza has developed a Complaints Register (attached in the EMPr) as a key component of its **External Communications & Grievance Mechanism** for external stakeholders. The implementation of the ESMS must ensure that the management

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
				program is adjusted accordingly based on input and feedback from external communications and grievance mechanism. The Grievance Redress Mechanism in Section 26 of this EIR is a starting point to address external stakeholder complaints. Nyanza must enhance this mechanism to comply with ESMS requirements.
2.	Labour & Working Conditions	a) Human Resource Policies & procedures, Working conditions,	Y	Nyanza already has HR policies and procedures in place with detailed description of working conditions for its workers. These policies indicate workers' rights in terms of labour law and the policies are accessible to employees. All Nyanza employees have contracts that communicate conditions of employment, which conditions are compliant to South African Labor and employment legislation. As the project progresses and gets more complex, these policies must be adapted to fit scale and complexity of the project. Furthermore, Nyanza must ensure that its contractors and third parties involved in the project subscribe to Nyanza's policies or that their policies are aligned to Nyanza's policies.
		b) Worker Organisations		Nyanza has a written policy to respect the right to form and belong to worker organisations
		c) Non-discrimination & Equal Opportunity		Nyanza has a written policy of non-discrimination and equal opportunities
		d) Retrenchment		There is no plan to retrench people at present. Nyanza must ensure that the contractors who will be involved in the construction period, have retrenchment plans that a) are consulted with affected workers and b) mitigate adverse impacts.
		e) Grievance mechanism		Nyanza currently has a written grievance mechanism for its workers. Nyanza must ensure that all contractors who will be involved in the project, have a grievance mechanism for their workers.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
		f) Protecting the workforce (Child Labour, Forced Labour)		Nyanza has a policy to ensure that no child or forced labour will be used in its operations. This must also apply to contractors. Nyanza must, in relation to its contractors, develop mechanisms by which it will detect and act against child and forced labour. These mechanisms must be included in management programs of the ESMS.
		g) Occupational Health & Safety		Nyanza currently provides a safe and healthy working environment in the current operations of the PTDC, and the current workers have been trained on occupational health and safety. There is an incidents and accidents register under implementation and there is an Emergency Preparedness and Response procedure. These are aligned to the EHS guidelines. For the main plant, once all hazards and risks have been identified in the HAZOP studies, measures must be put in place to deal with those hazards and manage impacts. All workers must be trained on occupational health and safety. In addition to complying with local Occupational Health and Safety legislation, the EHS guidelines must be complied with and incorporated into Nyanza's OHS protocols.
		h) Workers engaged by Third Parties		Nyanza must ensure that only reputable and legitimate third parties who comply with labour standards will be engaged in the project. Nyanza must develop robust policies and procedures for managing third party E&S performance
		i) Supply Chain		Nyanza has a policy to ensure that no child or forced labour will be used in its operations. This must also apply to contractors. Nyanza must, in relation to its contractors, develop mechanisms by which it will detect and act against child and forced labour. These mechanisms must be included in management programs of the ESMS. Nyanza must also develop a system to ensure that primary suppliers will prevent or correct life-threatening situations.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
3.	Resource Efficiency & Pollution Prevention	a) General Env, Health & safety Guidelines (Pollution prevention & control and waste management techniques, compare water & Air emissions against EHS Guideline, Impacts to ambient conditions) b) Resource Efficiency (resource conservation and energy efficiency measures incorporated into the design and operations c) Green House Gases (GHG quantification d) Options for GHG emission reductions e) Water consumption (Significant consumer of water? Measures to reduce water usage f) Pollution Prevention (Demonstrate Avoidance or minimization of pollutants/emissions; Degraded airshed?) g) Waste (Demonstrate measure to Avoid, reduce, recover and re-use waste. Environmentally sound disposal of hazardous and non-hazardous waste, Use of legitimate and reputable contractors, chain of custody documentation to final destination, h) Haz Materials management (Hazardous Materials Management including wastes/inputs during production, handling, storage, and	Y	The EIA included an assessment of the risk of pollution and identified mitigation measures that will be aimed at minimisation pollution. The requirements of PS 3 on pollution management have been addressed in the emergency preparedness and response plan and the management plans that have been compiled by specialists. The specialist studies undertaken include an Air Quality Impact Assessment, where GHGs and other air emissions that may result from the proposed project were identified and quantified and their potential impacts assessed. An air quality management and monitoring plan was also compiled and incorporated into the project EMPr that will be implemented by Nyanza. • Water requirements have been quantified. The engineers incorporated a stormwater management plan into the project layout plan to prevent pollution of water resources from storm water. A water management and monitoring plan has been incorporated into the project EMPr for implementation. • The waste streams produced from the project were identified and potential impacts due to storage and disposal of the wastes have been assessed in Section 12 of the EIR. Mitigation measures to be implemented to reduce the significance of impacts have been identified and included in Section 12. A waste management plan is included in the project EMPr for implementation. • Complying with the mitigation measures in the EMPr and relevant management plans will ensure that negative environmental impact are avoided and/or reduced and the positive impacts are enhanced. EHS Guidelines and EHS Guidelines for Large Volume Inorganic Compounds Manufacturing and Coal Tar Distillation must be complied with to manage impacts. • The proposed project will not make use of pesticides.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
		use, any banned or phased out substances or chemicals? i) Pesticide Use and Management (Will pesticides be used?)		
4.	Community Health, Safety & Security		Y	Impacts and risks to the health and safety of affected communities during the project life cycle have been assessed. The mitigation measures proposed in the EMPr are aligned to EHS guidelines. Over and above what is proposed in the EMPr, Nyanza must ensure that: • All Infrastructure designs are approved by competent professionals and authorities • EHS guidelines are complied with in respect of Hazardous materials handling and transportation; avoidance of communicable and water borne diseases • When final designs are finalized and HAZOP and EPRP's are prepared, that where there are shortcomings in emergency response measures, that these shortcomings are addressed • Security forces involved in the project comply with industry standards.
5.	Land Acquisition and Involuntary Resettlement		N	Nyanza is a tenant with a lease in the RBIDZ and therefore it is not acquiring any land. This project will not result in any resettlement.
	Biodiversity Conservation and Sustainable Management of Living Natural Resources		Y	Due to inter alia the project location in a critical habitat, a Biodiversity assessment study was undertaken by a specialist ecologist. The assessment included an assessment of the potential impacts of the project on biodiversity and ecosystem services. The outcomes of the study have been incorporated into this EIR and accompanying EMPr. Baselines of key flora and fauna, habitats, ecosystems, ecosystem services and movement corridors were established. With respect to habitats, the extent and condition of the different habitats was thoroughly described. The biodiversity specialist study report is included in Appendix F.

IFC PS	Performance Standard	PS Requirements	Applicable (Y/N)	How the PS has been addressed
7.	Indigenous Peoples		N	Indigenous Peoples refer to people who either a) self-identify as members of a distinct indigenous cultural group; or b) have collective attachment to habitats or ancestral territories in the project area and the natural resources in these habitats and territories; c) have or a part of customary institutions, that are separate from those of the mainstream society or culture, and d) have a distinct language or dialect. There are no Indigenous Peoples that were identified on this project, and none will be affected.
8.	Cultural Heritage		Y	A Heritage Impact assessment was undertaken by a qualified specialist. The study found that there are no heritage resources that will be affected by the Nyanza project. Outcomes of this study have been considered in this EIR and accompanying EMPr. There was a tree species indicative of old graves that was identified on the site. Nyanza will be required to be on the lookout for graves at the site. Should any graves be found, the chance find protocol will be implemented.

7.3 World Bank Group / IFC Environmental, Health and Safety Guidelines

The following guidelines have been consulted in respect of both the assessment of impacts as well as formulation of mitigation measures and management plans for the project:

- General EHS Guidelines, dated 2007; and
- Large Volume Inorganic Compounds Manufacturing and Coal Tar Distillation, dated 2007

7.4 Provincial and Municipal Bylaws

The King Cetshwayo District Municipality, City of uMhlathuze Local Municipality, and the KwaZulu-Natal Province have developed local bylaws and various policies relating to waste disposal, water, economic development, air quality, etc. The proposed project must ensure that such policies and bylaws are adhered to as far as possible during the construction and operation of the 80 000 tpa Titanium Dioxide (TiO_2) pigment plant.

7.5 Guidelines

The following documents have been taken into account during the impact assessment process and compilation of the EMPr of the proposed project:

- KwaZulu-Natal Provincial Biodiversity Management Plan;
- City of uMhlathuze Local Municipality Final Integrated Development Plan (IDP) Review (2021/2022);
- Richard's Bay Environmental Management Framework (EMF);
- DEA. 2012. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs;
- DEA. 2012. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs;
- DEA. 2004. Companion to the EIA Regulations 2010, Integrated Environmental Assessment Guideline Series 11, Department of Environmental Affairs; and
- DEAT. 2012. Companion to the EIA Regulations 2010, Review in Environmental Impact Assessment, Integrated Environmental management Information Series 13, Department of Environmental Affairs and Tourism.

8 Need and Desirability of the Proposed Project

The environmental right is contained in the Constitution of the Republic of South Africa, Act 108 of 1996 (hereafter referred to as “The Constitution”) Section 24 of the Constitution enshrines environmental rights in South Africa, which are interpreted to have a two-fold purpose. The first part guarantees a healthy environment to every person. The second part mandates the State to ensure compliance with the first part. The State is prohibited from infringing on the right to environmental protection and is further required to provide protection against any harmful conduct towards the environment.

8.1 Socio-economic Impact of the proposed project

More than 90% of the rutile and ilmenite TiO_2 feedstock are used for the manufacturing of TiO_2 pigments that are used in industrial paints, coatings, paper, cosmetics, plastics, etc. Currently, Africa imports 130 000 tonnes of TiO_2 pigment per year, while South Africa consumes about 35 000 tonnes (Global Africa Network, 2017). Nyanza will contribute 80 000 tonnes of TiO_2 pigment per annum. The largest quantity will be sold locally, while the remainder will be exported to other countries in Africa and the Middle East.

A technology partnership between Avertana of New Zealand and Nyanza will result in the construction of the 80 000 tpa TiO_2 Pigment Plant in Richards Bay. TiO_2 will produced from stockpiled waste steel slag to create the pigment. This is the white pigment use most widely across the world (Global Africa Network, 2017).

The 80 000 tpa TiO_2 Pigment Plant will be situated within the Richards Bay Industrial Development Zone (RBIDZ) Phase 1F. Zoning for the RBIDZ Phase 1F is classified as noxious industry. The proposed land use is permissible as a free entry (primary right). The project is in line with the mandate of the RBIDZ to be a purpose-built and secure industrial estate developed specifically to manufacture goods and to produce services to enhance beneficiation, investments, economic growth, job creation, and developing skills (ZO, 2021). This project will bring new technology to South Africa as well, aid the industrialisation programme of the government, and add value to mineral and mining processing value chain of the country (Global Africa Network, 2017).

Construction of the 80 000 tpa TiO_2 Pigment Plant strengthened the purpose to rebuild the economy of KwaZulu-Natal (KZN) after the Covid-19 outbreak caused delays. The destruction of the economy was left in the pandemic’s track, resulting in thousands of job losses and companies closing down. Following its mandate, the economic recovery initiatives from the government and with the leadership of Member of Executive Council (MEC) Pillay, the RBIDZ in now required to speed up energies reserved to create job opportunities for people in the KZN province (ZO, 2021).

Commencing with the construction of investment projects and the persistent partnership between Nyanza and the RBIDZ, will contribute to stimulating and restoring the KZN economy. Local and provincial government parties along with Nyanza and the RBIDZ are pleased by this momentous project which will enhance the position of Richards Bay as the African Continent’s Titanium and Minerals Beneficiation Capital (ZO, 2021).

It is expected that the project will lead to the creation of about 1 200 jobs during its construction phase and 550 job during its operational phase. Approximately 680 of these jobs will be for skilled labourers, while 1 070 of these jobs will be for unskilled labourers. People from the Richards Bay area will be preferably employed as this will be the most economically viable option. Should the project not proceed, a large negative socio-economic loss will be a consequence for the region.

8.2 Environmental responsibility

The environmental right is contained in the Constitution of the Republic of South Africa, Act 108 of 1996 (hereafter referred to as "The Constitution") Section 24 of the Constitution enshrines environmental rights in South Africa, which are interpreted to have a two-fold purpose. The first part guarantees a healthy environment to every person. The second part mandates the State to ensure compliance with the first part. The State is prohibited from infringing on the right to environmental protection and is further required to provide protection against any harmful conduct towards the environment.

It is expected that the proposed project will have negative environmental impacts. The impacts will be investigated in detail during the impact assessment phase of the project. Measures to mitigate the impacts of the project will also be identified and investigated during the impact assessment phase of the project. The mitigation measures will include designs and management practices that will be embarked on, to prevent and/or minimise the identified impacts on the social, cultural, and environmental aspects. These mitigation measures will be described in more detail in the EMPr that Nyanza will be required to comply with throughout the life of the project.

The EMPr will also include environmental monitoring programme that will allow Nyanza to keep track of the impacts of the project on the environment and where required, to take remedial action. A stormwater management plan will be developed for the project to ensure that clean and dirty water are separated and to minimise the uptake of water for project activities by reusing water where possible.

8.3 Needs and Desirability as per Government Regulation Notice 792 of 2012

DEA (2017), Guideline on Need and Desirability, says that when evaluating project specific applications, the strategic context of such applications and the broader societal needs and the public interest should be considered. The contents of Municipal Integrated Development Plans (IDP), Strategic Development Frameworks (SDF), Environmental Management Frameworks (EMF) and other relevant plans frameworks and strategies must be considered. Whether a proposed activity will be in line with or deviate from the plan, framework, or strategy per se is not the issue, but rather the ecological, social, and economic impacts that will result because of the alignment or deviation". Where an application deviates from a plan, framework, or strategy the EIA must show why the deviation might be justifiable.

Considering the merits of a specific application in terms of the need and desirability consideration, it must be decided which alternative represents "the most practicable environmental option", which in terms of the definition in NEMA and the purpose of the EIA Regulations are *"that option that provides the most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long-term as well as the short-term*." This is the ultimate goal of the EIA process and will only be fully addressed after the specialist studies have been undertaken and EIR and EMPr have been compiled.

The DFFE 2017 Guideline on Need and Desirability says that during Scoping the questions presented in the guideline document should be used to identify issues to be addressed in the EIA process and alternatives that should be considered. In the EIR, the questions must again be considered, but for those questions for which the "scoping" found that no further information were required, it can simply be reported that the questions were dealt with during scoping, with the remaining questions having to be considered in terms of the additional information generated during the assessment stage. Table 9-1 presents the questions where responses emanate from additional information has been generated during the assessment stage.

Table 8-1: Questions from DFFE 2017 Need and Desirability Guideline Document

Questions (DFFE, 2017)		Response
PART I: NEED		
1.	Is the land use associated with the activity being applied for considered within the timeframe intended by the existing approved SDF agreed to be the relevant environmental authority?	Yes. The proposed project will be located on a property owned by the RBIDZ. This site is zoned as General Industrial (IDZ Industry) and is in line the IDP of uMhlathuze Local Municipality. According to the IDP, the RBIDZ serves to boost economic activity in the area. The proposed project will contribute to the local, regional, and national economy as described in Section 9.1.
2.	Should the development, or if applicable, expansion of the town/area concerned in terms of this land use occur here at this point in time?	Yes. The proposed project forms part of the RBIDZ. The relevant land development application for the IDZ was submitted to the uMhlathuze Local Municipality and was approved in May 2014. Authorising the project will allow Nyanza to construct and operate a new plant that meets international standards and needs and will aid the recovery of the area's socio-economy following the Covid-19 pandemic.
3.	Does the community/area need the activity and the associated land use concerned? This refers to the strategic as well as local level.	Yes. This project will enhance the Richards Bay area as the African Continent's Titanium and Minerals Beneficiation Capital. Authorising the project will allow Nyanza to construct and operate a new plant that meets international standards and needs and will aid the recovery of the area's socio-economy following the Covid-19 pandemic. It is expected that the project will lead to the creation of about 1 200 jobs during its construction phase and 550 job during its operational phase. Approximately 680 of these jobs will be for skilled labourers, while 1 070 of these jobs will be for unskilled labourers. People from the Richards Bay area will be preferably employed as this will be the most economically viable option. Should the project not proceed, a large negative socio-economic loss will be a consequence for the region.
4.	Are the necessary services with adequate capacity currently available (at the time of application) or must additional capacity be created to cater for the development?	The RBIDZ will make provision of the required services. Where additional services are required, Nyanza has made provision for the additional services in the proposed project.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of the services and opportunity cost)?	This specific development is not included in the IDP of the municipality, however, the property that will be developed is owned by RBIDZ, zoned as General Industrial. The RBIDZ is included in the infrastructure planning of the municipality, catering for the development of this project as well.

Questions (DFFE, 2017)		Response
6.	Is the project part of a national programme to address an issue of national concern or importance?	Yes, the proposed project forms part of the RBIDZ, whose strategic intent is to realize the fundamental objectives as set out by the Cabinet upon creating the IDZ Programme in September 2000, namely: • Develop and establish a purpose built world-class industrial park incorporating a delimited Customs Controlled Area and linked to the Richards Bay International Port; • Provide quality infrastructure including Information and Communications Technology (ICT) and transport infrastructure, business, and utility services; • Attract foreign and local investment projects which create jobs and are export led and sustainable; • Make arrangements for and mobilise financial, human, and other resources for the development of the RBIDZ; • Promote, foster, and mentor BEE and SMME business opportunities in and around the zone. • It is expected that the development of Phase 1F will trigger a large inflow of foreign and domestic investment, leading to the generation of additional economic activity and creation of employment opportunities. This project will enhance the Richards Bay area as the African Continent's Titanium and Minerals Beneficiation Capital and will result in creation of significant employment and business opportunities for local businesses.
PART II: DESIRABILITY		
7.	Is the development the best practicable environmental option for this land/site?	Yes. The proposed project will be located on a property owned by the RBIDZ. This site is zoned as General Industrial (IDZ Industry) and is in line with proposed project's description.
8.	Would the approval of this application compromise the integrity of the existing approved and credible IDP, and SDF as agreed to by the relevant authorities?	No. The project forms part of the RBIDZ which was approved by the local municipality in terms of the KwaZulu Natal Planning and Development Act (Act 6 of 2008) in 2014. Both the IDP and SDF also consider the RBIDZ 1F development.
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g., as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	No. The project will be located on the property owned by the RBIDZ and will not compromise the integrity of existing management priorities. An EMF for the Richard's Bay was developed, which specifically notes the RBIDZ Zone 1F where the Nyanza project will be located. As part of the management guideline, the EMF highlights the following: The wetlands and ecological linkages in Phase 1F must be protected, maintained, and managed as a contribution to the management of water quality by: • Discouraging encroachment of development into and/or near wetlands; • Delineating appropriate ecological buffers in accordance with the land development types; • Preventing the illegal dumping of waste into water features and stormwater gutters; and • Ensuring that activities which pose a risk of water contamination employ appropriate design measures to avoid and minimise this risk. The RBIDZ made a decision where a no net loss policy is being followed. Whilst wetlands will be infilled as part of the Nyanza project (as approved by EA Ref 14/12/16/3/3/2/665), a Wetland Mitigation Plan was compiled as part of the RBIDZ EIA process. In addition, a site-specific Wetland Management Plan, which will

Questions (DFFE, 2017)		Response
		consider the RBIDZ Wetland Mitigation Plan, will be developed as part of the EIA process. The management guidelines included in the EMF will be considered in the EMPr for the proposed project. The approval of this application will not compromise the integrity
10.	Do location factors favour this land use at this place? (This relates to the contextualization of the proposed land use on this site within its broader context).	Yes. The proposed site is located on a property owned by the RBIDZ that is zoned as General Industrial (IDZ Industry) and is in line with proposed project's description. The area is also adjacent to other industrial developments.
11.	How will the activity of the land use be associated with the activity being applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	The biodiversity specialist study undertaken as part of the EIA identified additional protected species. Permits for the relocation of the protected species will be applied and an additional search and rescue team was mobilised. It is expected that the proposed project will result in clearance of vegetation, which will result in localised loss in vegetation. The biodiversity assessment undertaken includes a biodiversity management plan that has been incorporated into the project EMPr. A Phase 1 heritage impact assessment conducted for the project found no heritage and cultural areas located on the project site. The study identified a tree species indictive of old graves. Nyanza will be on the lookout for grave around the site and should any graves be found, the chance find protocol will be implemented. According to the wetlands delineation undertaken for RBIDZ, there are currently three wetlands present on the property. It must be noted that the EA issued for the RBIDZ (Ref 14/12/16/3/3/2/665) makes provision for the following: • Wetland Unit A will be conserved and will have a 30m buffer; • Wetland Unit B may be partially infilled; and • Wetland Unit C may be infilled. The site-specific wetlands delineation undertaken identified additional wetlands on the Nyanza site which will be infilled as part of the construction process. Nyanza however ensured that the conservation wetland and 30m buffer are left unaffected by the plant. In addition, the wetlands assessment included mitigation measures to avoid/minimise edge effects that have been incorporated into the EMPr for implementation.
12.	How will the development impact on people's health and well-being? (E.g., In terms of noise, odours, visual character and sense of place, etc.)?	During construction, there will be particulate emissions (dust) related to debris handling, materials transportation, storage, handling, and transfer; and open areas (windblown emissions). Gas emissions are also expected to occur due to vehicle and construction equipment activity (exhaust fumes). These impacts, however, taking into consideration, the area where the proposed 80 000 tpa TiO_2 pigment plant will be located, are expected to be of low significance and can be mitigated and managed to acceptable levels, with a post mitigation impact that is negligible. Movement of construction vehicles and machinery result in the production of construction related noise which may cause a nuisance to people working and living in the vicinity of the proposed property. However, the implementation of appropriate mitigation measures would reduce the noise levels to remain within applicable and acceptable SANS levels (SANS 10103:2008). Occupational health and safety standards will apply. It is expected that the project will not have any significant impact on the visual character and sense of place, especially since the 80 000 tpa TiO_2 pigment plant will be located in the RBIDZ, adjacent to other industrial developments.

Questions (DFFE, 2017)		Response
13. 13.	Will the proposed activity or the land use associated with the activity being applied for, result in unacceptable opportunity costs?	No. The objective of the project is to construct and operate an 80 000 tpa TiO_2 pigment plant, which will result in numerous socio-economic benefits. The property affected by the proposed facility is owned by the RBIDZ and is currently not earmarked for other use. In addition, the proposed project is in line with the purpose pf the IDZ, which is earmarked for industrial development. The impact assessment to be undertaken will include mitigation measures that will be implemented by Nyanza to minimise any negative impacts as well as enhance the positive impacts associated with the project.
14. 14.	Will the proposed land use result in unacceptable cumulative impacts?	No. It is expected that the project may result in negligible cumulative impacts on the environment. It is anticipated that the majority of the impacts will be short lived, during the construction phase. It is however expected that implementation of the mitigation measures included in the EMPr will reduce the significance of the impact during all phases of the 80 000 tpa TiO_2 pigment plant. A cumulative impact assessment has been undertaken as part of the impact assessment phase of the process.

9 Environmental Impact Assessment Methodology

The Final Scoping Report was submitted to the KZN EDTEA and DFFE for review and the DFFE approved the Scoping Report and associated Plan of Study on the 06th of September 2022, whereas EDTEA approved the Scoping Report and associated Plan of Study on the 28th of September 2022, allowing the EAP team to conduct the EIA phase.

A quantitative impact assessment methodology was used for the EIA. This method makes use of the basic risk assessment approach of deriving an expression for risk from the product of likelihood (probability) and consequences.

The main objective of the impact assessment is to identify the negative impacts that can be avoided and/or mitigated and the benefits of the positive impacts during the construction and operation phases of the cement-ash mixing plant on the environment.

9.1 Baseline Characterisation of the Environment

The Department of Forestry, Fisheries, and the Environment, (DFFE) environmental screening tool, the area is considered to be of very high agriculture, aquatic biodiversity, and terrestrial biodiversity value. The results from the DFFE Screening Tool are summarised in Table 9-1.

Table 9-1: DFFE Screening Tool Results

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme				X
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

The following site-specific specialist studies have been conducted during the impact assessment phase:

- Terrestrial Biodiversity Impact Assessment;
- Aquatic Biodiversity Impact Assessment;
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Hydrology and Stormwater Management;
- Geotechnical;
- Traffic Impact Assessment;
- Hydropedology;
- Geohydrology Impact Assessment; and
- Heritage Impact Assessment.

The generic terms of reference (ToR) for each specialist study were to:

- Describe the existing baseline characteristics of the study area and place this in a regional context;
- Identify and assess potential impacts resulting from the project (including impacts associated with the construction and operation of the project), using SRK's prescribed impact rating methodology;
- Identify and describe potential cumulative impacts resulting from the proposed development in relation to proposed and existing developments in the surrounding area;
- Recommend mitigation measures to avoid or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring programme, if applicable.

Other specialist studies including Air Quality, Noise, Hydrology, and Groundwater will require modelling which were undertaken as part of the studies.

Certain impacts that are anticipated to be of limited or lower significance, either by virtue of the scale of the impacts, their short duration (e.g., construction phase only), disturbed nature of the receiving environment and/or distance to communities, were assessed by EAP Team and have been reported directly into the EIR.

The baseline characterisation of the environment included in Section 10 of this EIR is based on findings from the specialist studies conducted for the project. Each specialist study details the overall methodology used (e.g. sampling methods, rationale). In addition, the EAP also made use of existing monitoring reports to describe the environmental status quo of the area.

The impact assessment and mitigation measures of this report and the accompanying EMPr were also based on findings and recommendations from the specialist studies.

Assumptions and Limitations in relation to data accuracy, data sources and reliability are detailed under Section 13 of this EIR.

The specialist studies reports have been attached as F.

9.2 Identification of Key Issues

Anticipated impacts that have been identified by the project team are summarised in Table 9-2. A comprehensive quantitative impact assessment has been conducted for the project and the findings are included in Section 12 of this report.

Table 9-2: Summary of Potential Environmental Impacts Associated with the Proposed Development

Element of Environment	Potential Impact Descriptions
Socio-Economic	Possible job and business opportunities during all phases of the project.
Hydrogeology	Possible groundwater contamination from hydrocarbons leaking from construction vehicles, chemicals and materials handled on site.
Surface water	Possible surface water contamination from hydrocarbons leaking from construction vehicles, chemicals and materials handled on site.
Air Quality	Possible impact on air quality in the area.
Noise	Possible generation of noise during the construction, operation, and decommissioning of the 80 000 tpa TiO_2 Pigment Plant.
Heritage Resources	Possible impact on heritage resources.
Visual	Possible visual impacts due to the construction and operation of the plant

Element of Environment	Potential Impact Descriptions
Soils/Land Use/Land Capability	Localised loss of soil resource and change in land capability and land use due to the clearance of vegetation is expected.
Traffic	Possible impacts on traffic due to transportation of construction material
Biodiversity	Loss of biodiversity due to vegetation clearance for construction.
Aquatic Biodiversity Impact Assessment	Possible impacts on the wetlands on the project site.
Traffic	Possible impact on traffic during all phases of the project

The findings from the specialist studies have been incorporated into the impact assessment process and quantified the impacts as described in Section 9.3

The assessment also considered any anticipated cumulative impacts.

9.3 Quantitative Impact Assessment

The anticipated impacts associated with the proposed project were assessed according to SRK's standardised impact assessment methodology, which is presented below. This methodology has been utilised for the assessment of environmental impacts where the consequence (extent, intensity, and duration of the impact) and probability of the impact have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact as follows:

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring, including possible irreversibility of impacts and/or loss of irreplaceable resources, and the **probability** that the impact will occur.

The criteria used to determine impact consequence are presented in Table 9-3.

Table 9-3: Criteria used to determine the Consequence of the Impact

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered and/or irreplaceable resources[6] are lost	3
C. ***Duration*** *– the timeframe over which the impact will be reversed*		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2

[6] Defined as important cultural or biological resource which occur nowhere else, and for which there are no substitutes.

Rating	Definition of Rating	Score
Long-term	More than 15 years or irreversible	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as provided in Table 9-4.

Table 9-4: Method used to determine the Consequence Score

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence is derived, the probability of the impact occurring is considered using the probability classifications presented in Table 9-5.

Table 9-5: Probability Classification

***Probability**– the likelihood of the impact occurring*	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall **significance** of impacts is then determined by considering consequence and probability using the rating system prescribed in Table 9-6.

Table 9-6: Impact significance ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Finally the impacts will also be considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in Table 9-7.

Table 9-7: Impact status and confidence classification

Status of impact	
Indication whether the impact is adverse (negative) or beneficial (positive).	+ ve (positive – a 'benefit')
	– ve (negative – a 'cost')
Confidence of assessment	
The degree of confidence in predictions based on available information, SRK's judgment and/or specialist knowledge.	Low
	Medium
	High

SRK recommends that the impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity/development.

- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity/development.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity/development.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity/development.
- **HIGH**: the potential impact **will** affect the decision regarding the proposed activity/development.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

In the report, practicable mitigation and optimisation measures will be recommended and impacts rated in the prescribed way both without and with the assumed effective implementation of essential mitigation and optimisation measures. Mitigation and optimisation measures will be either:

- **Essential**: best practice measures which must be implemented and are non-negotiable; and
- **Best Practice**: recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the applicant if not implemented.

10 Description of the Baseline Environment

The following section presents an overview of the biophysical and socio-economic environment in which the proposed project is located, so as to:

- Understand the general sensitivity of and pressures on the affected environment;
- Inform the identification of potential issues and impacts associated with the proposed project, which was assessed during the Impact Assessment Phase; and
- Conceptualising practical mitigation measures.

The specialist studies reports are attached as Appendix F.

10.1 Climate

The Richards Bay area is located on a coastal plain. According to the Köppen-Geiger climate classification, the climate is Cfa (humid subtropical climate). Figure 10-1 shows that temperatures peak from December to February at approximately 35 °C with a minimum of 18 °C, dropping to daytime heights of approximately 28 °C and a minimum of 12 °C from June to August (TCSG, 2022).

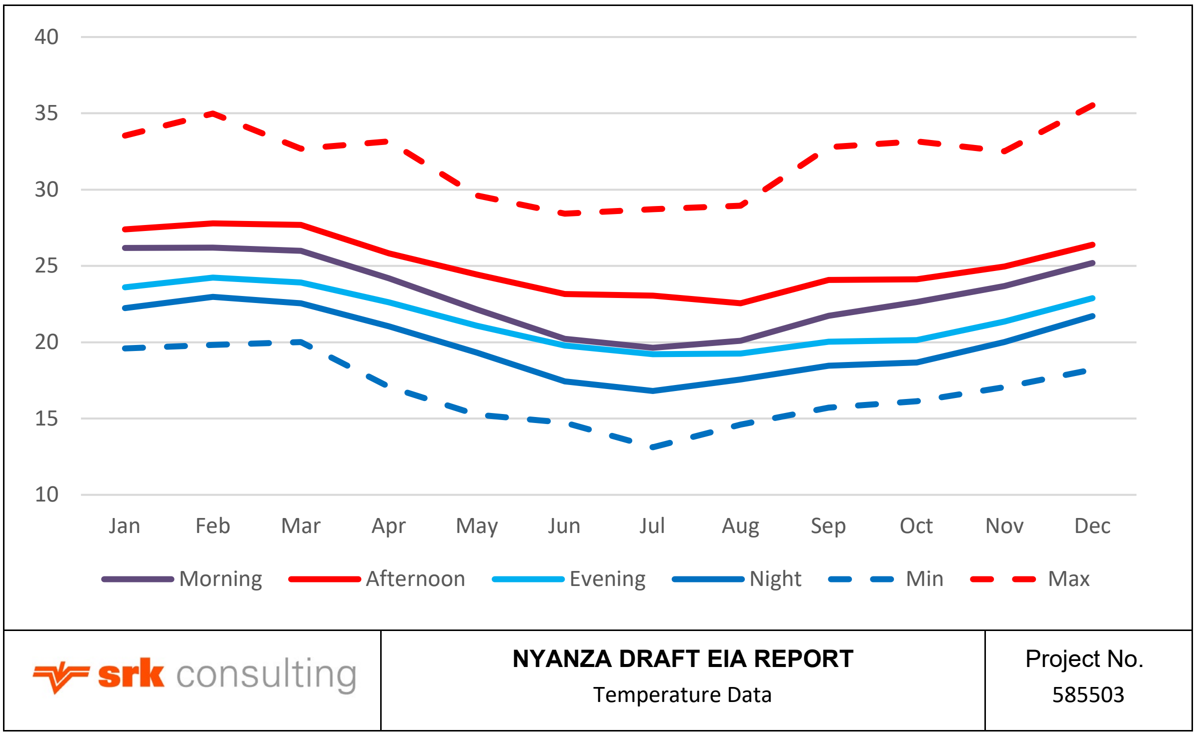
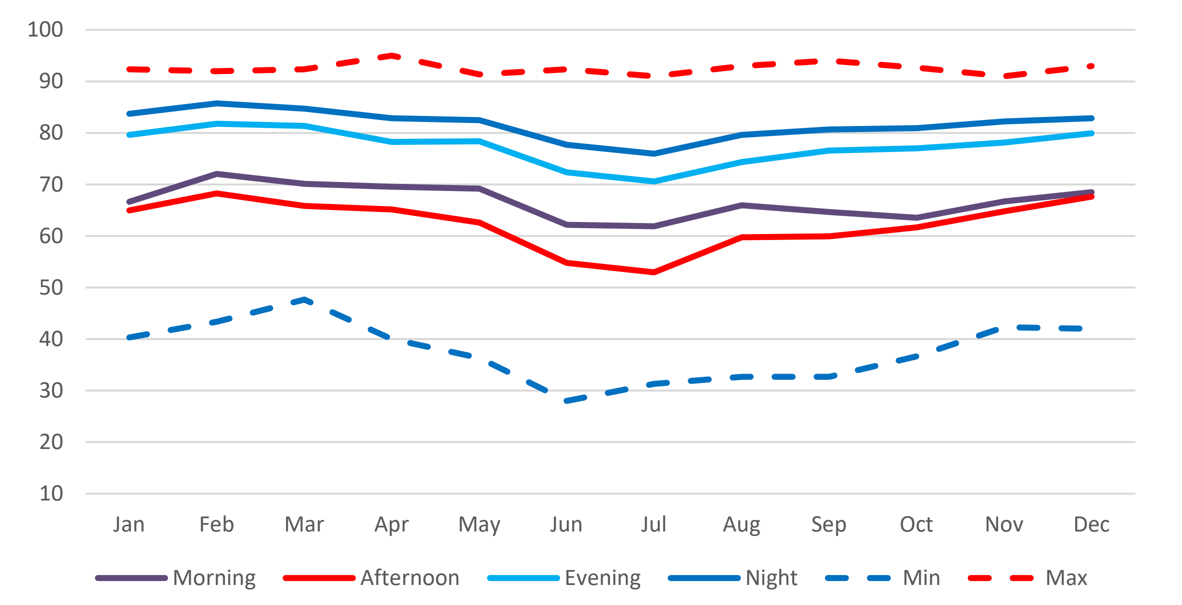


Figure 10-1: Temperatures (°C) (TCSG, 2022)

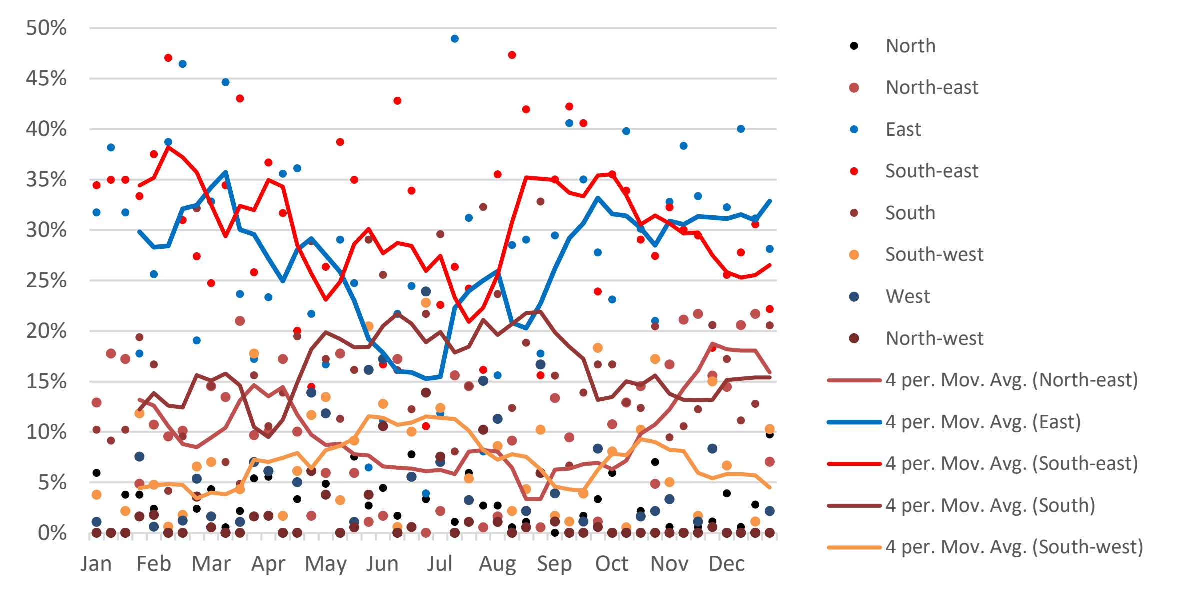
The relative humidity is high, ranging from a high of 95% in the summer to a low of 28% in the winter (Figure 10-2) (TCSG, 2022).



srk consulting	**NYANZA DRAFT EIA REPORT** Humidity	Project No. 585503

Figure 10-2: Relative humidity (%) (TCSG, 2022)

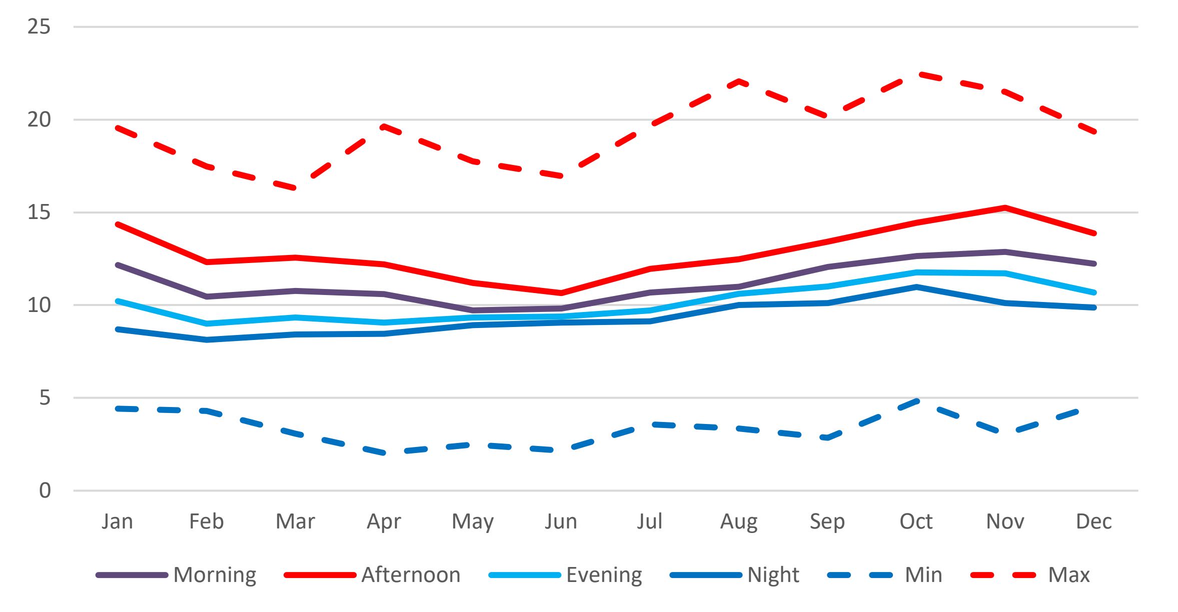
Figure 10-3 shows that the wind most often blows from the South, South-East, and East, but shifts to North-East in the summer (TCSG, 2022).



srk consulting	**NYANZA DRAFT EIA REPORT** Wind Direction	Project No. 585503

Figure 10-3: Wind direction (TCSG, 2022)

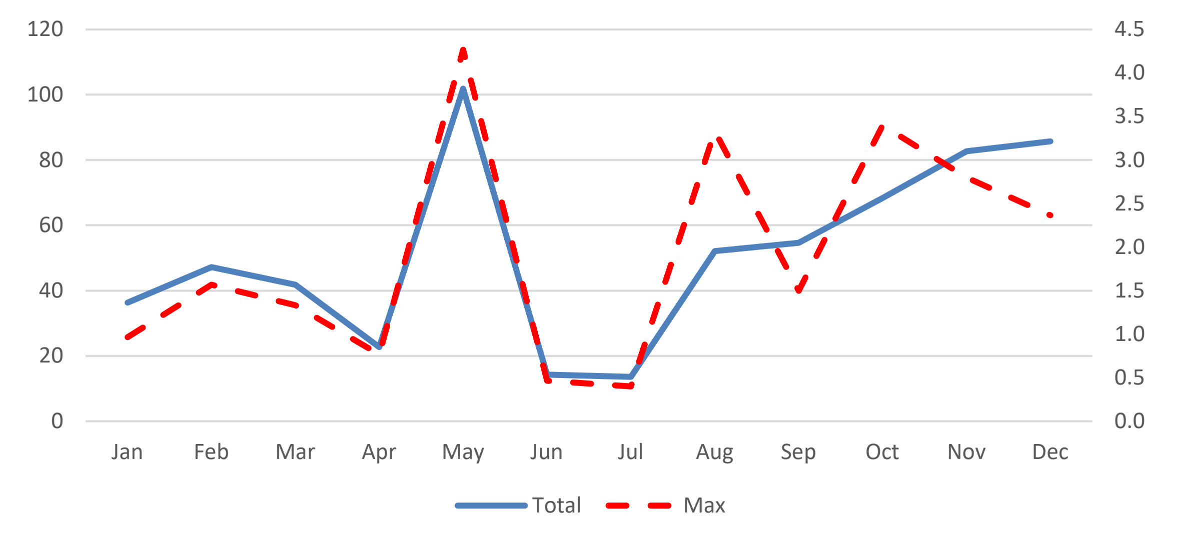
Mean wind speeds range between 16 km/h and 24 km/h, only dropping below 10 km/h rarely (Figure 10-4) (TCSG, 2022).



srk consulting	NYANZA DRAFT EIA REPORT Wind Speed	Project No. 585503

Figure 10-4: Wind speed at 10 m (km/h) (TCSG, 2022)

Mean annual rainfall was around 620 mm in 2017, 2018, and 2019 (Figure 10-5) and the long-term average rainfall was approximately 1 200 mm, which was particularly low. Months with the highest rainfall are May, and November and December, although May, August, and October have the highest precipitation per hour (TCSG, 2022).



srk consulting	NYANZA DRAFT EIA REPORT Rainfall Data	Project No. 585503

Figure 10-5: Total rainfall per month (mm) and maximum rainfall in an hour (mm) (TCSG, 2022)

Figure 10-6 shows that rainfall is more-or-less evenly spread during different times of the day for most months but are slightly more during evening and night-time in October, November, and December (TCSG, 2022).

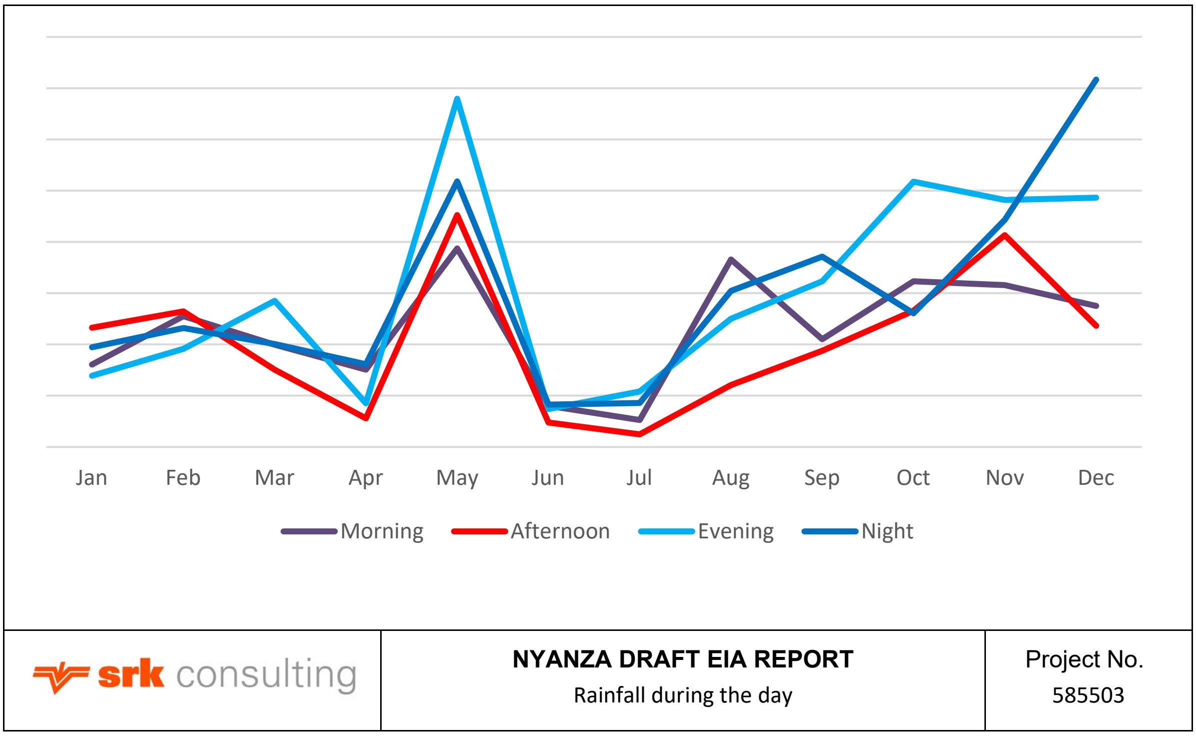


Figure 10-6: Occurrence of rainfall during the day (TCSG, 2022)

10.2 Topography

The terrain is overall very flat with some gradual slopes towards the South at about 0.4% and some large pans. On the northern portion of the site, there is a sand dune and a high lying area. The site is approximately 67 m above sea level in the North and about 42 m to 44 m above sea level in the South (NEMAI Consulting, 2016).

The area's topography has three broad landforms. The coastal area is made up of Neogene marine and coastal aeolian sediments, to the inland, a broad, curving band running parallel to the coastal sediments include areas North of Empangeni, comprising of post-African surfaces (partly planed). The area South of Empangeni comprises of dissected landforms of various ages (NEMAI Consulting, 2016).

A depiction of the area's topography is indicated in Figure 10-7.

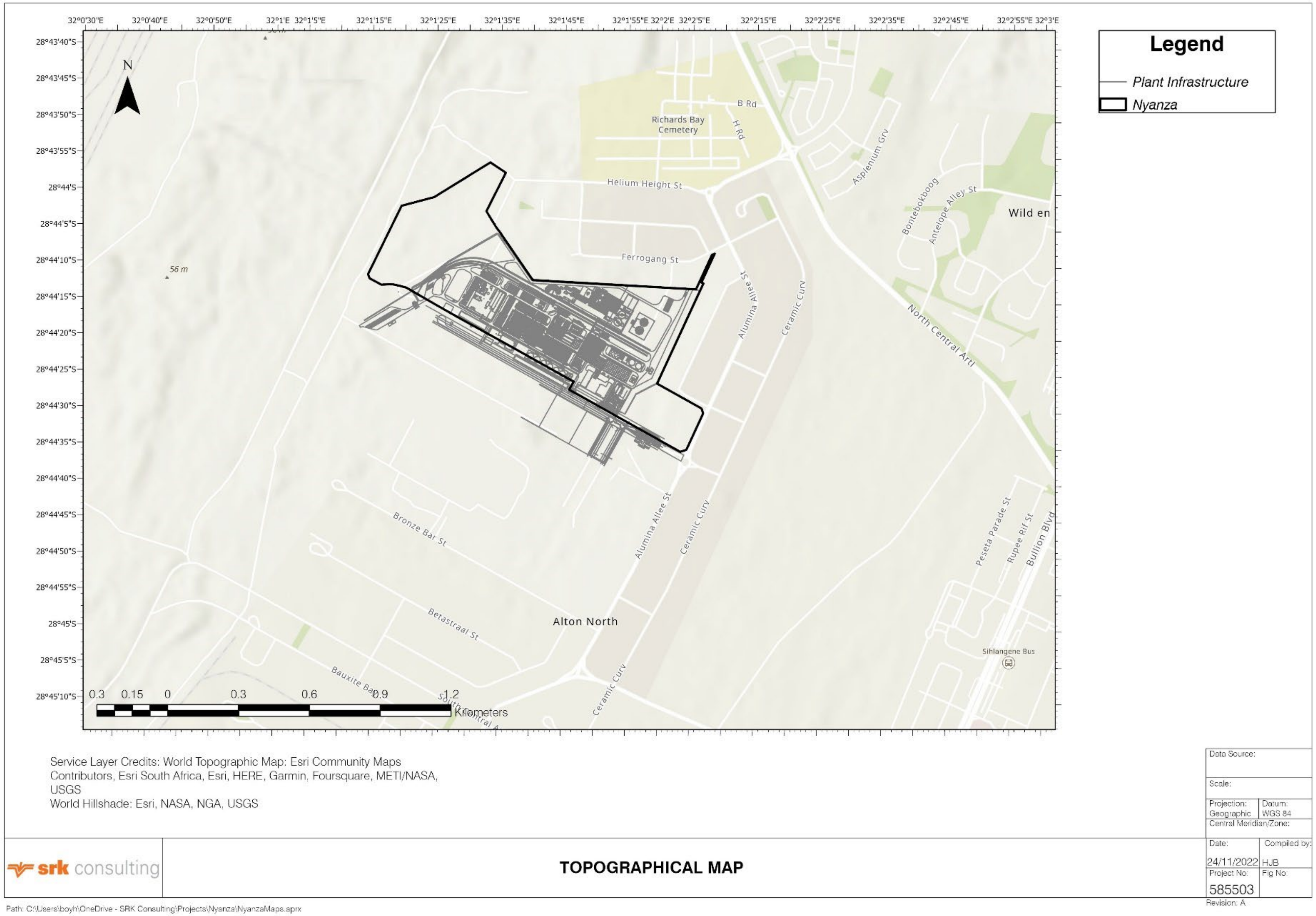


Figure 10-7: Topography

10.3 Geology

The site is situated on the Maputaland Coastal Belt (a generally flat landscape). This landscape comprises of quaternary sediments of marine origin that is about 18 000 years old. These sediments are yellowish in colour. Argillaceous redistributed sand of the Berea and Muzi Formations also forms part of the Maputaland Coastal Belt. The soils have very poor nutrition and is well leached, except in the interdune depressions where soils are rich in organics (Mucina & Rutherford, 2006).

Main land types on the site are “Ha” and “Hb” and may include the Constantia, Shepstone, and Vilafontes soil forms, while the “Db” land type is less distributed, associated with various geological units like the basement granites, Natal Group sandstones, Ecca shales and sandstones, Dwyka tillites, mudstones, as well as shale and/or sandstone of the Escourt, Nyoka, Emakwezini, Clarens, and Ntabene Formations, sandstone/siltstone of the Zululand Group, and some Cenozoic deposits. The broad-spectrum soil pattern of the “Db” land type is situated in low gradient slopes and are thus prone to flooding and inundation. The “Db” land type is characterised by duplex soils and has non-red B horizons (Hatch, 2019).

Figure 10-8 shows the underlying geology of the study site and the geology of the surrounding area.

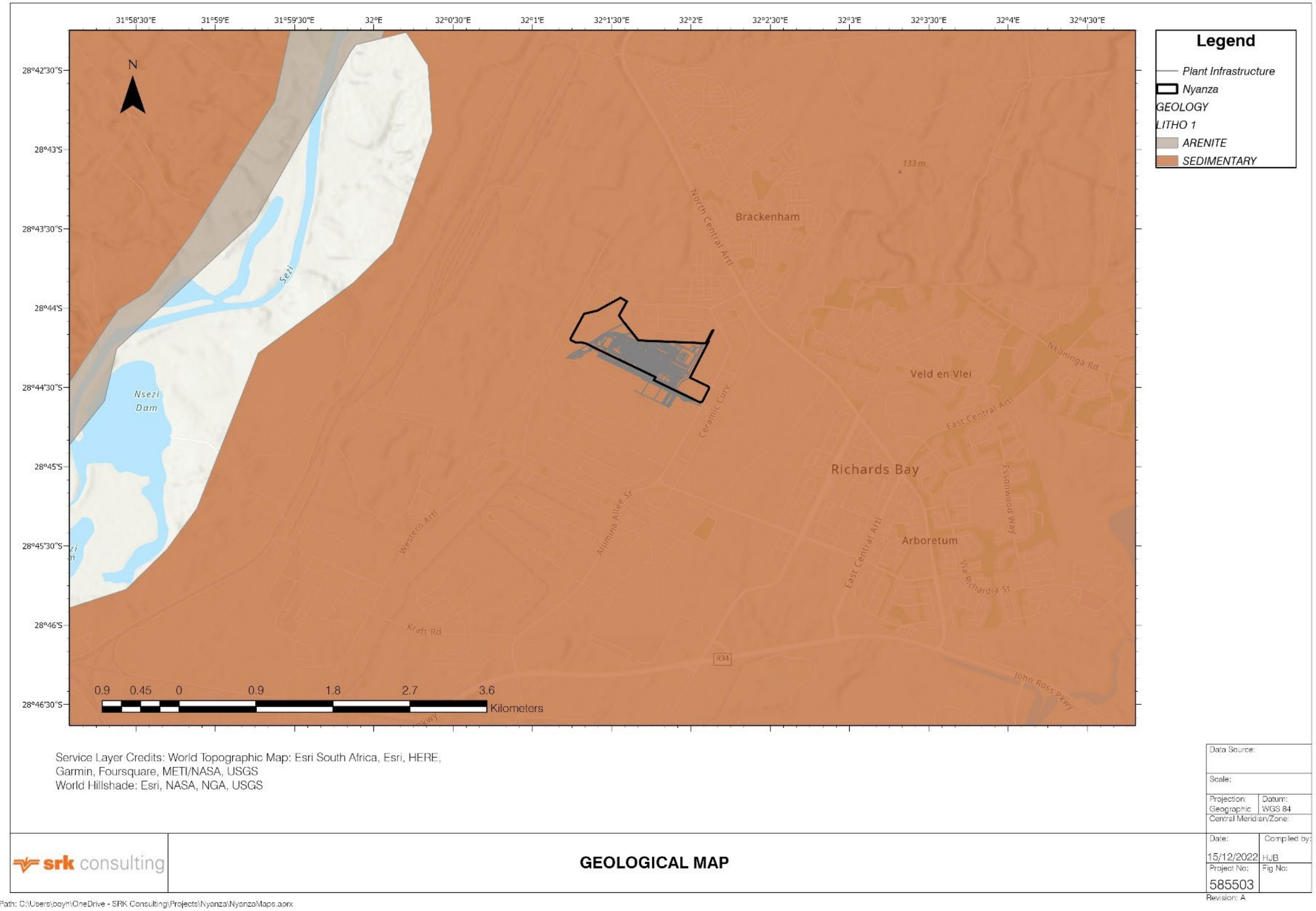


Figure 10-8: Geology

10.4 Geotechnical

The geological investigation that was undertaken for the RBIDZ Phase 1F (Engeolab, 2013), the site is underlain by medium dense soils, grading from approximately 1.0 m into silty to clean sands that is compressible, or sandy clays that is fully expanded with low shear strengths causing poor foundation conditions because of its lowered bearing capacity and increased settlement potential.

The zones identified on Phase 1F are described as follow (Engeolab, 2013):

- Zone 1: Main geotechnical constraints recorded within Zone 1 are compressible and potentially collapsible soils with low bearing capacity, requiring modified construction techniques.
- Zone 2: As in Zone 1 but this zone is subject to seasonal ponding and seepage, requiring adequate drainage.
- Zone 3: Zone 3 comprises of 5 areas with recognized wetlands (no development is recommended).

The project is located within zones 1 and 2.

The findings from the 2013 study were supported by a site-specific geotechnical assessment that was undertaken for the proposed plant. The study found that the proposed site is:

- underlain by poorly graded sand which is non-plastic. This was expected since the site is located in a coastal area mainly comprising estuarine deposits. The sand was primarily described as moist to wet, with shades of colours ranging from light brown, brown, brownish-black, reddish-orange, and brownish maroon. The consistency of the sand is generally loose across the upper 3m and generally improves below this. The consistencies are however highly variable up to the full investigated depth.
- Clay layers were intercepted in at depth of between 22.75-30.00) at boreholes located on the western portion of the site. The clayey material was described as moist, olive in colour with a stiff consistency. A slicken sided soil structure was observed, and the material was described as silty clay. Poorly developed relict jointing was observed. The slicken sided structure usually indicates that the material is potentially expansive. This layer was approximately 0.45m in thickness, located at a depth of 27.0m. Another clay layer was observed on BH2 between 22.7 to 30.0m. The latter was described as moist, dark grey with a stiff consistency. Fissured and slicken sided structures were observed in this layer. The above structures are usually associated with potentially expansive clays. This material was described as clay and was approximately 5.9m in thickness.

10.5 Soils, Land-Use, and Land capability

The City of uMhlathuze Local Municipality zoned the RBIDZ Phase 1F as noxious industry. The proposed land use is permissible as a free entry (primary right). Figure 10-9 provides the land use map for the area. The IDZ provides for industries of lower impact to be developed.

Soil underlying the study area is provided in Figure 10-10 and can be described as Q: Moderate to deep, sandy, and flat. The Department of Agriculture, Land Reform and Rural Development (DALRRD) Soil Classes information shows that the site occurs on imperfectly drained sandy soils, with favourable water-holding properties. These soils are usually highly erodible.

According to the DALRRD land capability GIS information RBIDZ 1F occurs in area of moderate potential arable land.

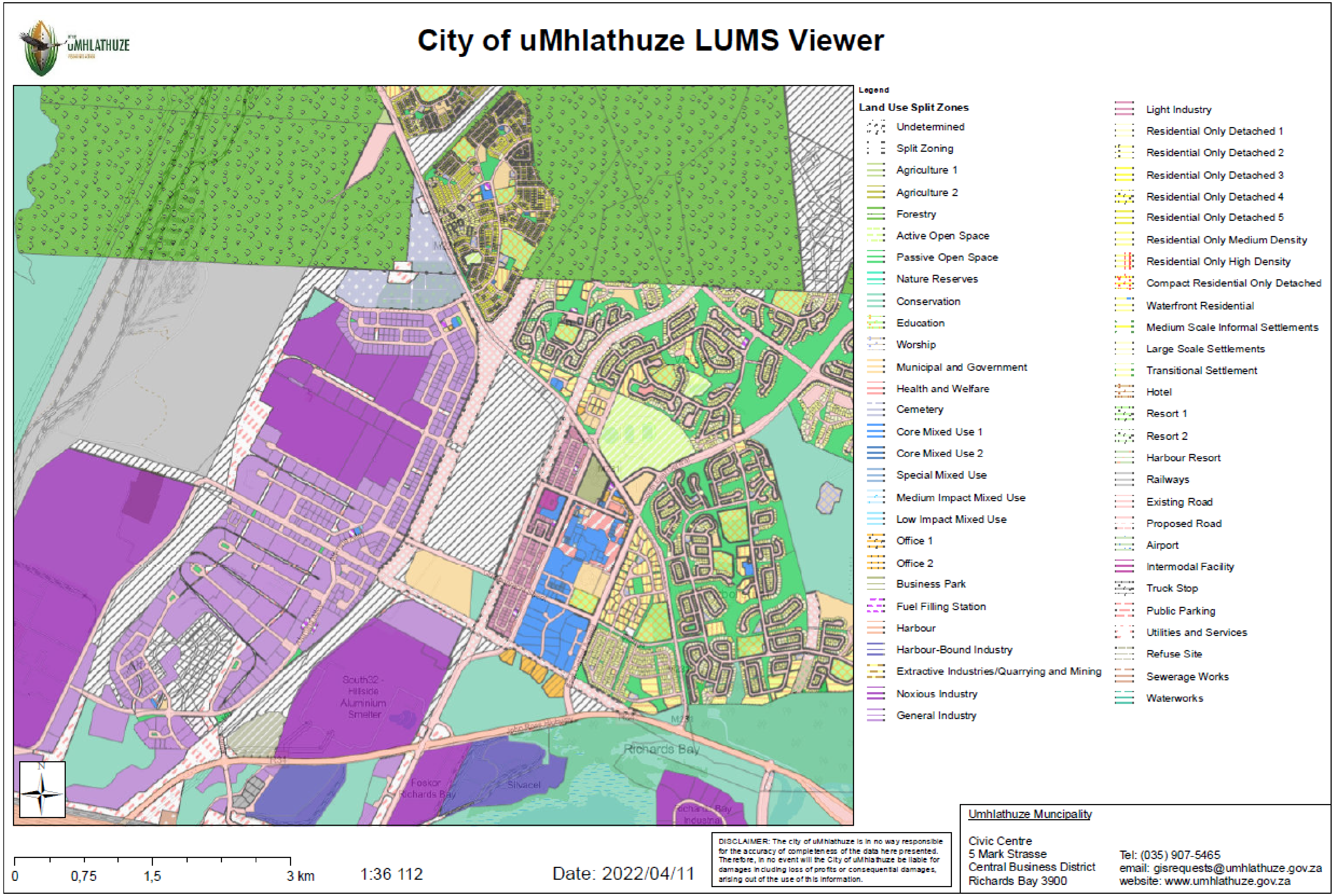


Figure 10-9: Land use zoning

Figure 10-10: Soil map

10.6 Air Quality

Air Quality data was sourced directly from RBCAA for the period January 2019 to December 2021 for stations around the proposed Nyanza facility for PM_{10}, $PM_{2.5}$, SO_2 and Total Reduced Sulfur (TRS), which constitute the priority pollutants. Concentrations of pollutants are often assessed at sensitive receptor locations (locations where people may be present and will likely be exposed to pollutants). This data was used to assess compliance against the NAAQS.

According to SANAS requirements, a minimum of 90% data recovery is required for assessing compliance. While some data recovery sets fulfilled this requirement for all pollutants at Brackenham (2019 and 2020), CBD (2019 and 2021) and Harbour West (2019 to 2021), failures were assessed at Brackenham (2021), eNseleni (2020 and 2021) and Scorpio (2021) monitoring stations. The available retrieved data was used to provide an insight towards the background ambient air pollution profile in the study area. Conversions were made in relation to SO_2 and TRS to convert units from parts per billion (ppb) to micrograms per cubic meter (µg/m^3). The station information and percentage data recovery are presented in Table 10-1. The locations of the monitoring points are presented in Figure 10-11.

Table 10-1: Regional Station Information and Percentage Data Recovery for the Period January 2019 to December 2021

Parameter	Pollutant	Brackenham	CBD	eNseleni	Harbour West	Scorpio	Felixton	Arboretum
Latitude (m)		-28.731301	-28.744719	-28.662960	-28.787286	-28.769692	-28.829229	-28.752385
Longitude (m)		32.039016	32.054805	32.017774°	32.027065	32.034228	31.893536	32.062738
Direction from project site		NNE	ESE	NNW	SSW	SSE	SSW	SE
Distance from project site (m)		1 329.65	2 307.83	8 734.47	5 092.72	3 143.78	16 773.34	3 552.95
Data Recovery (Percentage of Data Recovered (%))[1]	**2019**							
	PM_{10}	92.34	96.24	90.76	NM	NM	72	NM
	$PM_{2.5}$	ND	NM	NM	NM	NM	ND	NM
	SO_2	90.49	97.03	90.44	93.49	98.37	63.26	62.53
	TRS	NM	97.49	4.30	NM	NM	NM	NM
	2020							
	PM_{10}	90.77	93.82	60.23	NM	NM	ND	NM
	$PM_{2.5}$	ND	NM	NM	NM	NM	ND	NM
	SO_2	82.82	74.95	1.35	92.55	94.73	59.93	52.76
	TRS	NM	92.07	0.22	NM	NM	NM	NM
	2021							
	PM_{10}	22.16	92.50	77.76	NM	NM	ND	NM
	$PM_{2.5}$	71.61	NM	NM	NM	NM	73	NM
	SO_2	85.0	93.31	ND	95.01	85.24	95.05	85.15
	TRS	NM	95.62	ND	NM	NM	NM	NM

[1]Data was retrieved from the RBCAA for the period January 2019 to December 2021.

ND - No Data.

NM – Pollutant is not measured at the station.

Red - Lower than the national standards minimum requirement of 90% data recovery

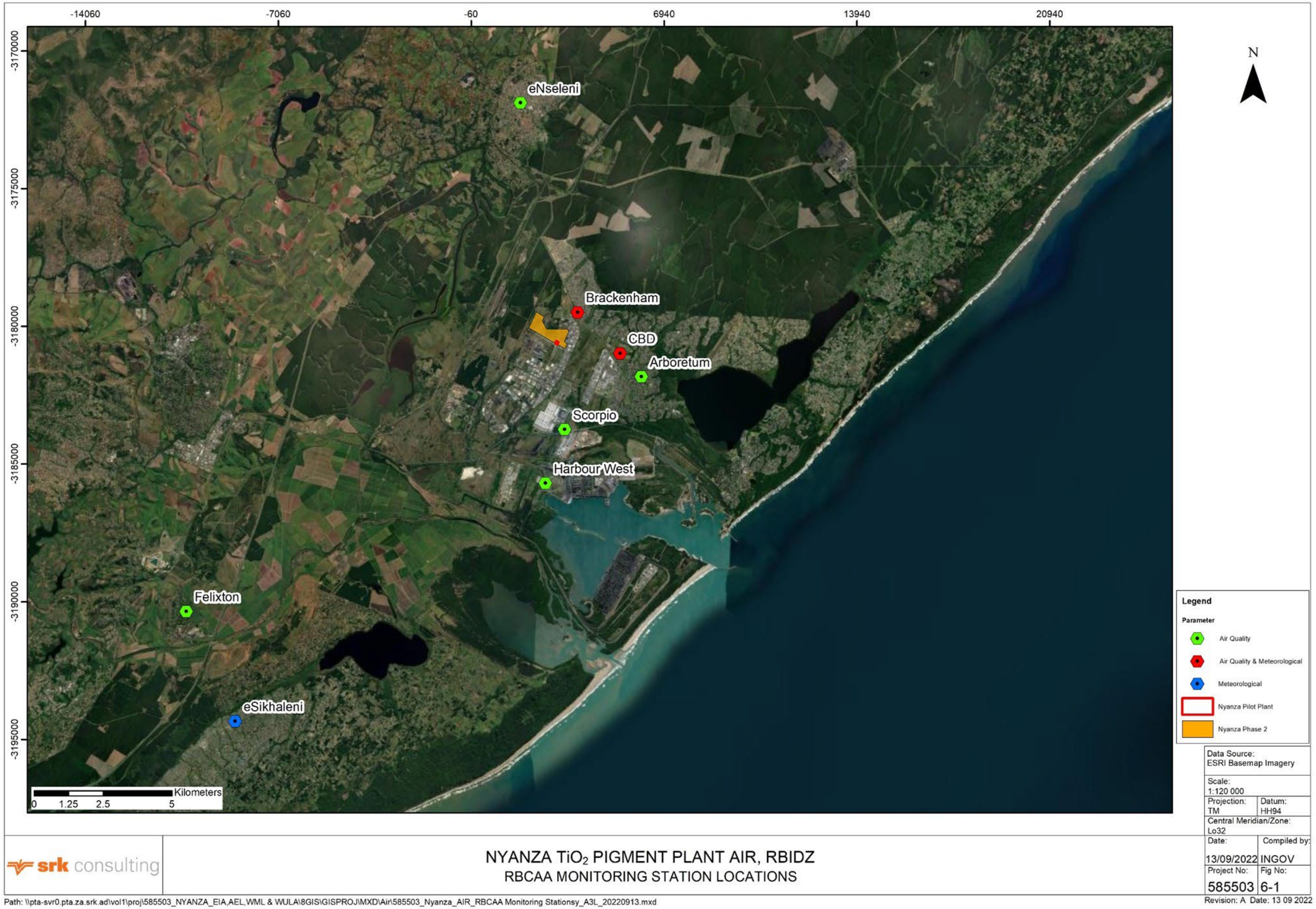


Figure 10-11: RBCAA monitoring station locations

10.6.1 Particulate Matter (PM_{10})

PM_{10} concentrations are measured at the Brackenham, CBD, eNseleni and Felixton monitoring stations. Their maximum measured 24-hour PM_{10} concentrations, number of exceedances of the 24-hour NAAQS and annual average PM_{10} concentrations for the period 2019 to 2021 are presented in Table 10-2. The 24-hour NAAQS is 75 µg/m^3, with four allowable exceedances of this standard per annum. The annual average NAAQS is 40 µg/m^3, no annual exceedances of this standard is permitted. The 24-hour WHO guideline is 45 µg/m^3 and annual WHO guideline is 15 µg/m^3.

Table 10-2: Measured ambient PM_{10} for 2019, 2020 and 2021

Parameter	Period	Brackenham	CBD	eNseleni	Felixton
Maximum 24-hour concentrations (µg/m^3)	2019	72.83	69.46	100.58	70.29
	2020	72.08	42.14	70.33	ND
	2021	50.63	39.63	93.33	ND
Number of 24-hour NAAQS exceedances	2019	0	0	1	0
	2020	0	0	0	ND
	2021	0	0	1	ND
Maximum 24-hour concentrations (µg/m^3)	2019	78.83	69.46	100.58	70.29
	2020	72.08	42.14	70.33	ND
	2021	50.63	39.63	93.33	ND
Number of 24-hour exceedances of the WHO guidelines	2019	41	20	36	33
	2020	27	0	22	0
	2021	3	0	27	0
Annual average (µg/m^3)	2019	30.04	25.99	29.31	26.72
	2020	26.31	12.98	26.32	ND
	2021	23.41	12.46	25.22	ND
ND – No Data Red- Exceeds NAAQS Orange- Exceeds WHO Guideline					

Key observations from Table 10-2 are as follows:

- The maximum 24-hour PM_{10} concentrations were below the NAAQS at Brackenham, CBD and Felixton stations throughout the period of 2019 to 2021. All stations were complaint against the 24-hour NAAQS. The maximum 24-hour PM_{10} concentrations exceeded the WHO guidelines at Brackenham and eNseleni stations throughout the period of 2019 to 2021, and at the CBD and Felixton stations for 2019.
- One exceedance of the 24-hour PM_{10} NAAQS was noted at the eNseleni station in 2019 and 2021. Since four exceedances are permitted per year, the eNseleni station is compliant against the 24-hour NAAQS for 2019 to 2021. Multiple exceedances of the WHO guideline were noted at Brackenham, CBD, eNseleni and Felixton.
- The annual average PM_{10} concentrations were compliant against the annual NAAQS at all monitoring stations. Annual average PM_{10} concentrations exceed the annual WHO guideline at Brackenham and eNseleni stations throughout the period of 2019 to 2021, and at the CBD and Felixton stations for 2019.

Figure 10-12 (a-d) shows a distinct seasonal trend, where elevated concentrations were noticed during the winter months for Brackenham, CBD, eNseleni and Felixton stations.

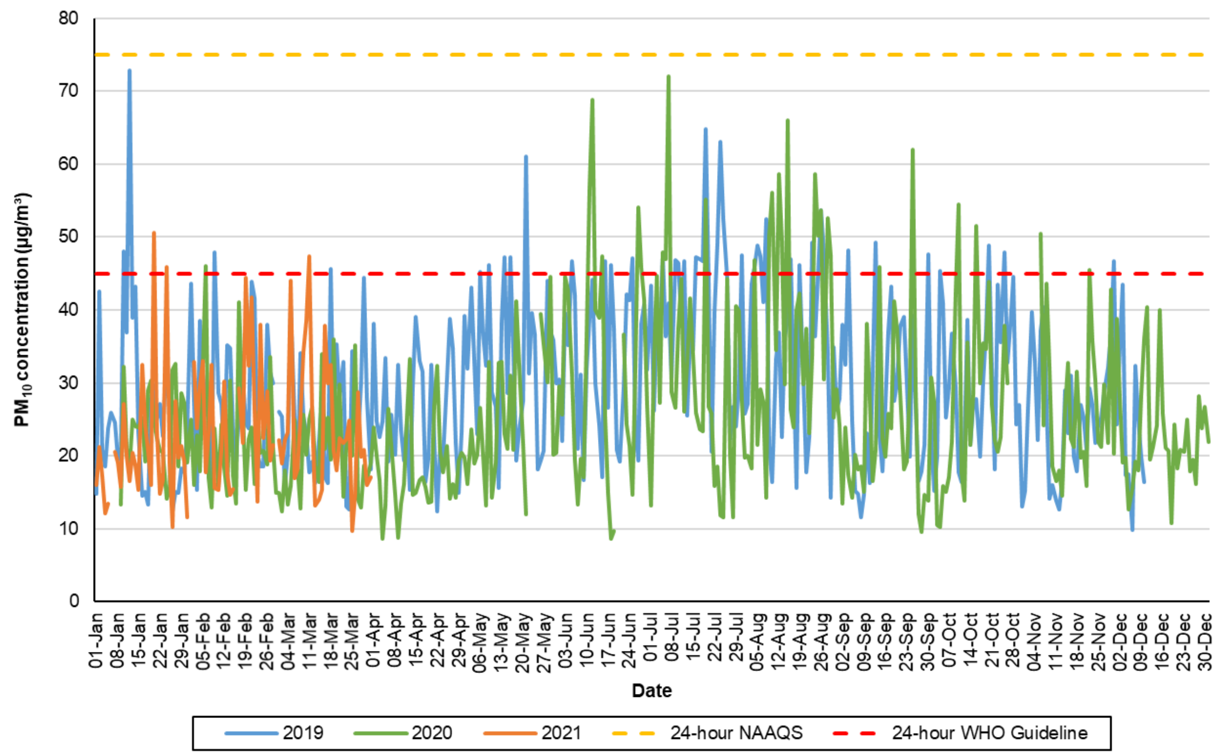


Figure 10-12 (a): PM_{10} concentrations at the Brackenham station

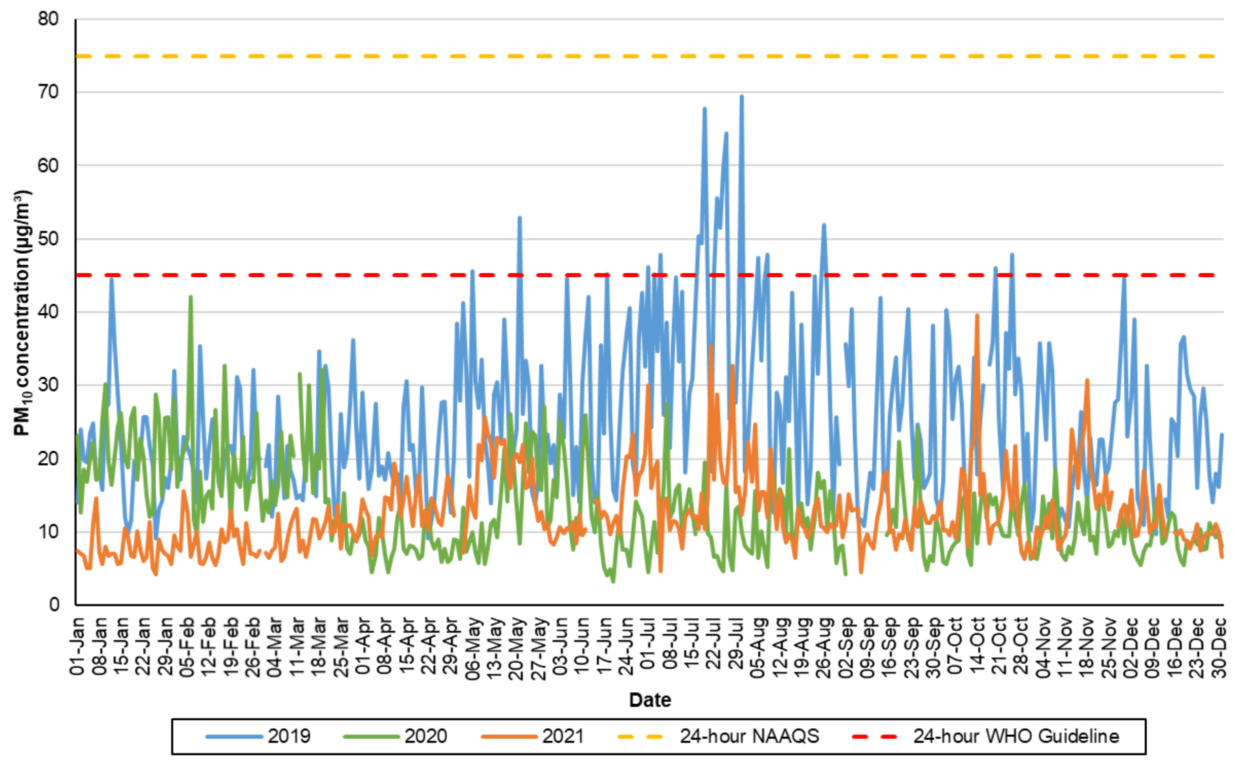


Figure 10-12 (b): PM_{10} concentrations at the CBD station

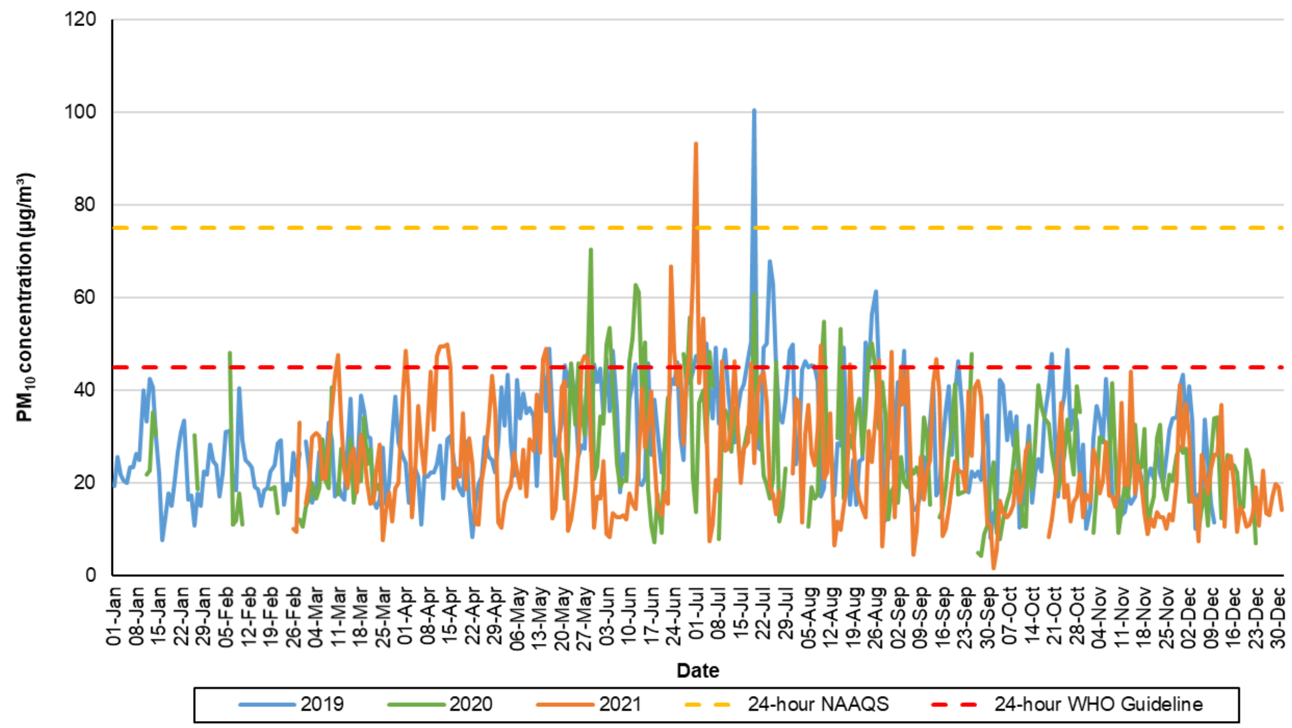


Figure 10-12 (c): PM_{10} concentrations at the eNseleni station

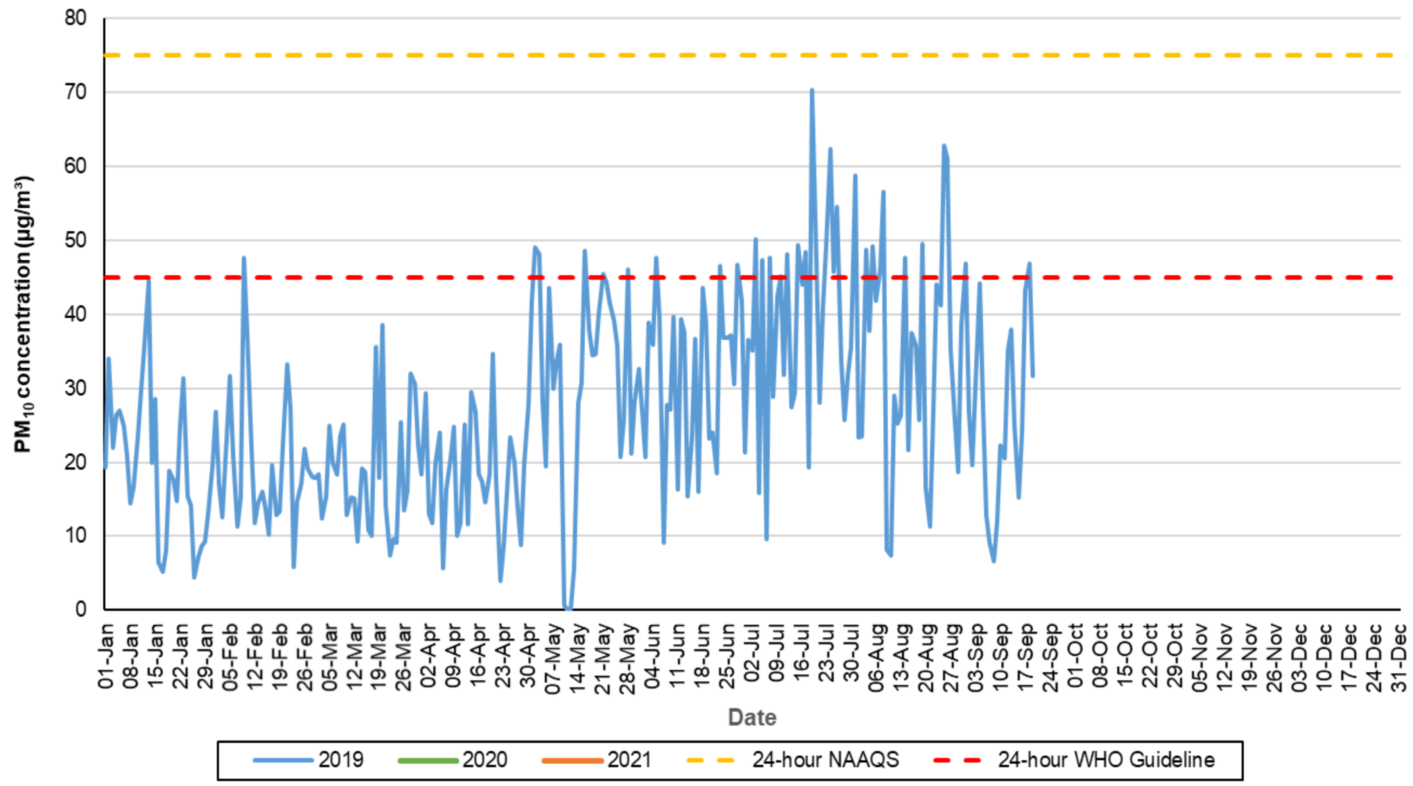


Figure 10-12 (d): PM_{10} concentrations at the Felixton station

srk consulting	**NYANZA TiO_2 PIGMENT PLANT AIR, RBIDZ** PM_{10} CONCENTRATIONS	Project No. 585503

Figure 10-12: Daily PM_{10} concentrations at all monitoring stations the period January 2019 to December 2021

10.6.2 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ concentrations are measured at the Brackenham and Felixton monitoring stations. Their maximum measured 24-hour $PM_{2.5}$ concentrations, number of exceedances of the 24-hour NAAQS and annual average $PM_{2.5}$ concentrations for the period 2019 to 2021 are presented in Table 10-3. The 24-hour NAAQS is 40 µg/m^3, the maximum number of exceedances of this standard per annum is four. The annual average NAAQS is 20 µg/m^3, no annual exceedances of this standard is permitted. The 24-hour WHO guideline is 15 µg/m^3 and annual WHO guideline is 5 µg/m^3.

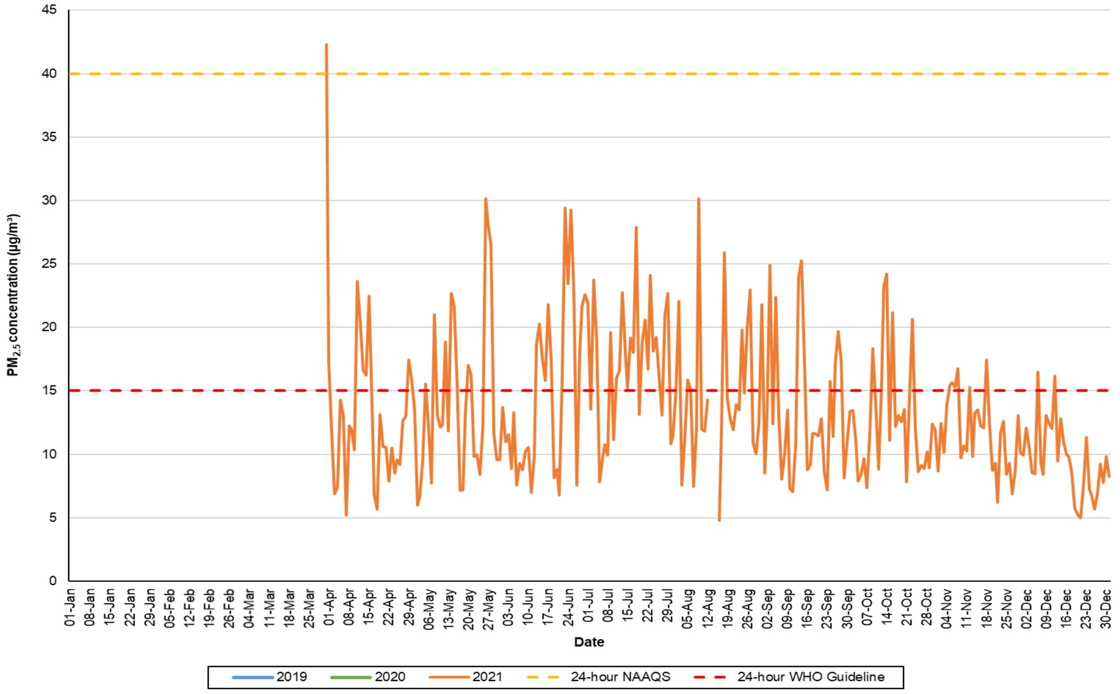
Table 10-3: Measured ambient $PM_{2.5}$ for 2019, 2020 and 2021

Parameter	Period	Brackenham	Felixton
Maximum 24-hour concentrations (µg/m^3)	2019	ND	ND
	2020	ND	ND
	2021	42.31	69.65
Number of 24-hour NAAQS exceedances	2019	N/A	ND
	2020	N/A	ND
	2021	1	19
Maximum 24-hour concentrations (µg/m^3)	2019	ND	ND
	2020	ND	ND
	2021	42.31	69.65
Number of 24-hour exceedances of the WHO guidelines	2019	0	0
	2020	0	0
	2021	88	132
Annual average (µg/m^3)	2019	ND	ND
	2020	ND	ND
	2021	13.45	18.52
ND – No Data Red – Exceeds NAAQS Orange- Exceeds WHO Guideline			

Figure 10-13 and Figure 10-14 and presents daily $PM_{2.5}$ concentrations for 2021 at the Brackenham and Felixton station. Key observations from Table 10-3, Figure 10-13 and Figure 10-14 are as follows:

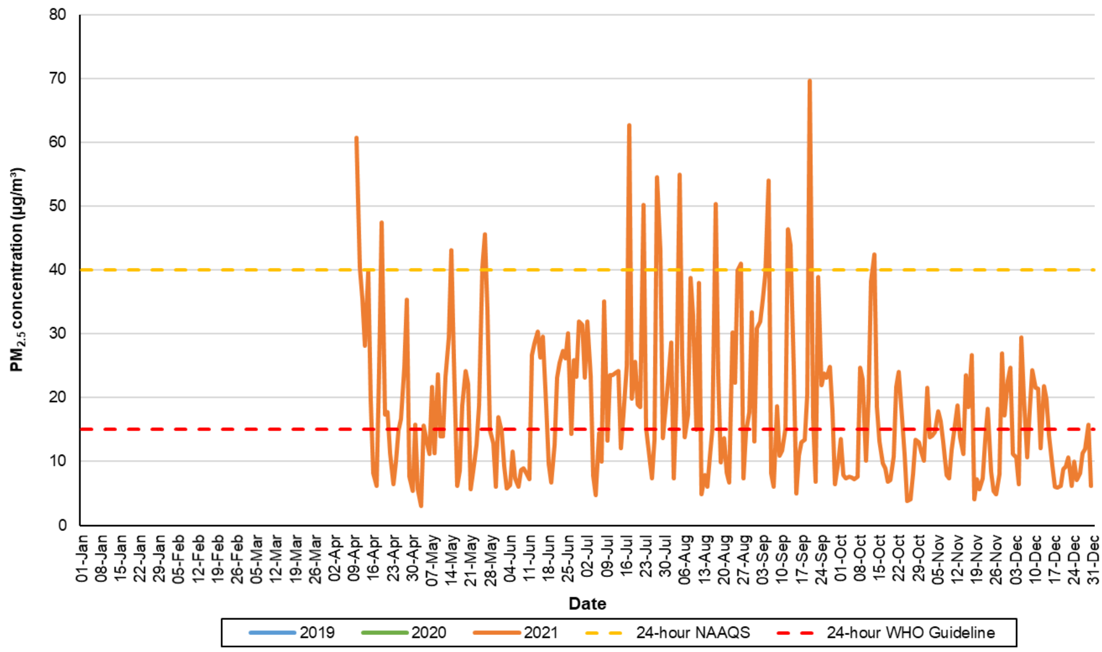
- No $PM_{2.5}$ data was available for 2019 and 2020 at the Brackenham and Felixton stations.
- $PM_{2.5}$ data for 2021 from the Brackenham and Felixton stations were compared against the NAAQS and WHO guidelines.
- The maximum 24-hour $PM_{2.5}$ concentrations exceeded the 24-hour NAAQS once and 19 times at the Brackenham and Felixton station, respectively. Since four exceedances are permitted per year, the Brackenham station is compliant against the 24-hour NAAQS while the Felixton station is non-compliant against the 24-hour NAAQS in 2021.
- The average annual $PM_{2.5}$ concentrations for 2021 are compliant against the annual average NAAQS for Brackenham and Felixton station.
- The maximum 24-hour $PM_{2.5}$ concentrations exceeded the 24-hour WHO guideline at the Brackenham and Felixton stations, respectively, for 2021.

- The average annual $PM_{2.5}$ concentrations for 2021 exceeded the annual WHO guidelines for the Brackenham and Felixton stations.



	NYANZA TiO₂ PIGMENT PLANT AIR, RBIDZ 24-HOUR PM₂.₅ CONCENTRATIONS	Project No. 585503

Figure 10-13: 24-hour $PM_{2.5}$ concentrations at the Brackenham station for 2019 and 2021 (RBCAA, 2022)



	NYANZA TiO₂ PIGMENT PLANT AIR, RBIDZ 24-HOUR PM₂.₅ CONCENTRATIONS	Project No. 585503

Figure 10-14: 24-hour $PM_{2.5}$ concentrations at the Felixton station for 2019 and 2021 (RBCAA, 2022)

10.6.3 SO_2

The maximum measured 10-minute, 1-hour and 24-hour SO_2 concentrations, number of exceedances of the 24-hour NAAQS and annual average SO_2 concentrations for the period 2019 to 2021 are presented in Table 10-4. The 10-minute concentrations of SO_2 at each station are presented in Figure 10-15. The 1-hour concentrations of SO_2 at each station are presented in Figure 10-16. The 24-hour concentrations of SO_2 at each station are presented in Figure 10-17.

The following NAAQS apply to SO_2:

- 10-minute averaging period - 500 µg/m³ with 526 exceedances permitted.
- 1-hour averaging period - 350 µg/m³ with 88 exceedances permitted.
- 24-hour averaging period - 125 µg/m³ with 4 exceedances permitted.
- Annual average - 50 µg/m³ with 0 exceedances permitted.

The following WHO guidelines apply to SO_2:

- 10-minute averaging period - 500 µg/m³.
- 24-hour averaging period - 40 µg/m³.

Table 10-4: Measured ambient SO_2 for 2019, 2020 and 2021

Parameter	Period	Brackenham	CBD	Arboretum	eNseleni	Harbour West	Scorpio	Felixton
Maximum 10-minute concentrations (µg/m³)	2019	182.88	448.81	117.90	324.88	1,196.29	1,636.98	291.082
	2020	4,332.96	2,755.72	327.76	406.10	8,316.67	7,953.53	2215
	2021	59.74	5,604.44	655.52	0.00	8,316.67	7,953.53	1,554.45
Number of 10-minute NAAQS and WHO guideline exceedances	2019	0	0	0	0	1	12	0
	2020	189	2	0	0	65	326	18
	2021	0	1	2	ND	215	141	2
Maximum 1-hour concentrations (µg/m³)	2019	53.40	369.68	87.12	90.43	318.72	518.15	248.64
	2020	1,158.43	639.37	327.76	78.43	6,175.91	2,095.17	921.89
	2021	48.47	2,621.22	319.77	ND	6,275.07	3,139.02	406.19
Number of 1-hour NAAQS exceedances	2019	0	1	0	0	0	4	0
	2020	26	1	0	0	5 3	93	2
	2021	0	8	0	ND	13	41	1
Maximum 24-hour concentrations (µg/m³)	2019	18.25	63.57	20.57	19.97	137.89	107.15	171.09
	2020	843.78	62.72	327.76	9.65	1,125.40	303.86	92.56
	2021	17.20	266.50	84.10	ND	2,111.32	274.21	35.28
Number of 24-hour NAAQS exceedances	2019	0	0	0	0	1	0	1
	2020	5	0	36	0	2	12	0
	2021	0	2	0	ND	4	7	0
Maximum 24-hour concentrations (µg/m³)	2019	18.25	63.57	20.57	19.97	137.89	107.15	171.09
	2020	843.78	62.72	327.76	9.65	1,125.40	303.86	92.56
	2021	17.20	266.50	84.10	ND	2,111.32	274.21	35.28
	2019	12	5	0	0	39	36	1
	2020	0	5	71	0	71	107	1

Parameter	Period	Brackenham	CBD	Arboretum	eNseleni	Harbour West	Scorpio	Felixton
Number of 24-hour WHO exceedances	2021	0	13	2	ND	80	80	0
Annual average ($\mu g/m^3$)	2019	3.67	10.65	5.12	3.55	17.50	17.87	8.27
	2020	11.26	11.37	47.11	ND	26.53	37.58	17.64
	2021	3.90	15.01	5.13	ND	31.21	30.58	4.93
ND – No Data Red – Exceeds NAAQS Orange- Exceeds WHO Guideline								

Key observations from Table 10-4, Figure 10-16 and Figure 10-17 are as follows:

- Brackenham Station:
  - 10-minute SO_2 concentrations exceeded the 10-minute NAAQS and WHO guidelines 189 times in 2020, while no exceedances were noted in 2019 and 2021. Since 526 exceedances are permitted, Brackenham station is in compliance of the 10-minute NAAQS.
  - Exceedances of the 1-hour NAAQS were noted 39 times in 2020, no exceedances were recorded for 2019 and 2021. Since 88 exceedances are permitted, Brackenham station is in compliance with the 1-hour NAAQS.
  - Five exceedances of the 24-hour NAAQS were noted in 2020, no exceedances were recorded for 2019 and 2021. Since four exceedances are permitted, Brackenham station does not comply with 24-hour NAAQS in 2020. Exceedances of the 24-hour WHO guideline was noted in 2019.
  - No exceedances of the annual average NAAQS were recorded.
- CBD Station:
  - SO_2 concentrations exceeded the 10-minute NAAQS and WHO guidelines twice in 2020 and once in 2021. No exceedances were recorded for 2019. Since 526 exceedances are permitted, the CBD station is in compliance of the 24-hour NAAQS for all years.
  - Exceedances of the 1-hour NAAQS were noted once in 2019 and 2020 and 8 times in 2021. Since 88 exceedances are permitted, CBD station complies with this standard.
  - SO_2 concentrations exceeded the 24-hour NAAQS 36 times in 2020. No exceedances were recorded for 2019 and 2021. Since 4 exceedances are permitted, CBD station is in compliance of the 24-hour NAAQS for all years.
  - 3, 5 and 13 exceedances of the 24-hour WHO guideline were noted in 2019, 2020 and 2021 respectively.
  - No exceedances of the annual NAAQS were recorded.
- Arboretum Station:
  - SO_2 concentrations exceeded the 10-minute NAAQS and WHO guidelines twice in 2021. No exceedances were recorded for 2019 and 2020. Since 526 exceedances are permitted, Arboretum station is in compliance of the 10-minute NAAQS for all years.

  - No exceedances of the 1-hour NAAQS were noted in 2019 and 2020 and 2021. Since 88 exceedances are permitted, Arboretum station complies with this standard.
  - 36 exceedances of the 24-hour NAAQS were noted in 2020, no exceedances were recorded for 2019 and 2021. Since four exceedances are permitted, Arboretum station does not comply with the 24-hour NAAQS.
  - 71 and 2 exceedances of the 24-hour WHO guideline were noted in 2020 and 2021 respectively, with no exceedances in 2019.
  - No exceedances of the annual NAAQS were recorded.
- eNseleni Station:
  - Low data recovery was noted at the eNseleni station for the 2020 and 2021 years.
  - eNseleni Station had no exceedances of the 10-minute, 1-hour, 24-hour or annual NAAQS for 2019.
  - No exceedances of the 10-minute and 24-hour WHO guidelines were noted for 2019.
- Harbour West Station:
  - SO_2 concentrations exceeded the 10-minute NAAQS and WHO guidelines once in 2019, 65 times in 2020 and 215 times in 2021. Since 526 exceedances are permitted, Harbour West station complies with the 20-minute NAAQS.
  - Exceedances of the 1-hour NAAQS was noted 53 times in 2020 and 13 times in 2021, no exceedances were recorded for 2019. Since 88 exceedances are permitted, Harbour West station is in compliance against the 1-hour NAAQS.
  - Two exceedances of the 24-hour NAAQS were noted in 2021, no exceedances were recorded in 2019 and 2020. Since four exceedances are permitted, Harbour West station complies against the 24-hour NAAQS.
  - SO_2 concentrations exceeded the 24-hour WHO guideline 39 times in 2019, 71 times in 2020 and 80 times in 2021.
  - No exceedances of the annual average NAAQS were recorded.
- Scorpio Station:
  - Exceedances of the 10-minute NAAQS and WHO guidelines was noted 12 times in 2019, 326 times in 2020 and 141 times in 2021. Since 526 exceedances are permitted, Scorpio Station complies against the 10-minute NAAQS.
  - SO_2 concentrations exceeded the 1-hour NAAQS four times in 2019, 93 times in 2020 and 41 times in 2021. Since 88 exceedances are permitted, Scorpio Station is non-compliant against the 1-hour NAAQS in 2020.
  - Exceedances of the 24-hour NAAQS was noted 12 times in 2020 and 7 times in 2021, no exceedances were recorded for 2019. Since four exceedances are permitted, the Scorpio station was non-compliant against the 24-hour NAAQS in 2020 and 2021.
  - SO_2 concentrations exceeded the 24-hour WHO guideline in 2019, 2020 and 2021.
  - No exceedances of the annual average NAAQS were recorded.
- Felixton Station:

- 10-minute SO_2 concentrations exceeded the 10-minute NAAQS and WHO guidelines 0, 18 and 2 times in 2019, 2020 and 2021. Since 526 exceedances are permitted, Felixton station is in compliance of the 10-minute NAAQS.
- Exceedances of the 1-hour NAAQS were noted twice and once in 2020 and 2021, no exceedances were recorded in 2019. Since 88 exceedances are permitted, Felixton station is in compliance with the 1-hour NAAQS.
- One exceedance of the 24-hour NAAQS was noted in 2020, no exceedances were recorded for 2019 and 2021. Since four exceedances are permitted, Felixton station does not comply with 24-hour NAAQS in 2019.
- One exceedance of the 24-hour WHO guideline was noted in 2019 and 2020, with no exceedances in 2021.
- No exceedances of the annual average NAAQS were recorded.

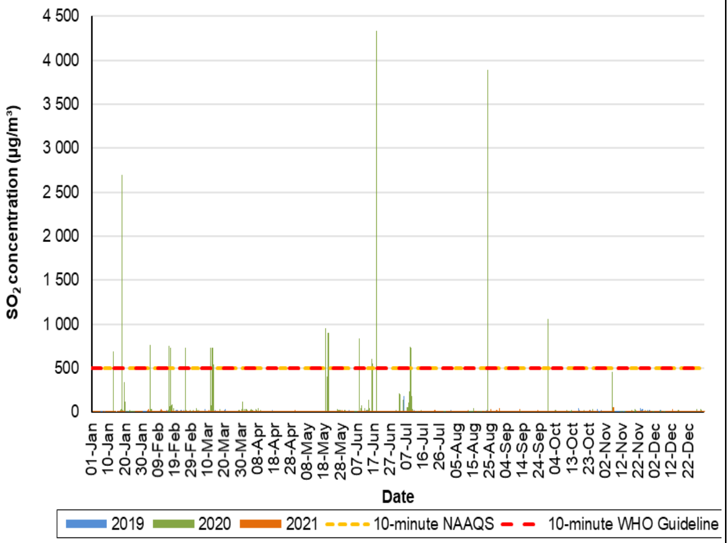


Figure 10-15 (a): 10-minute SO_2 concentrations at the Brackenham station

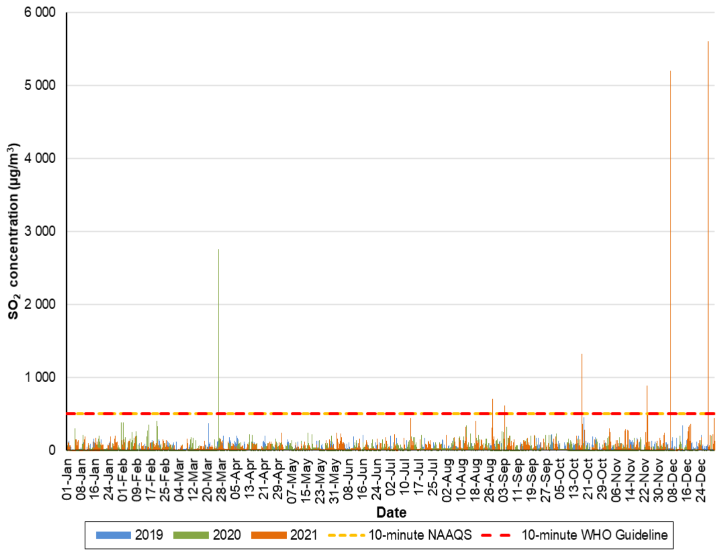


Figure 10-15 (b): 10-minute SO_2 concentrations at the CBD station

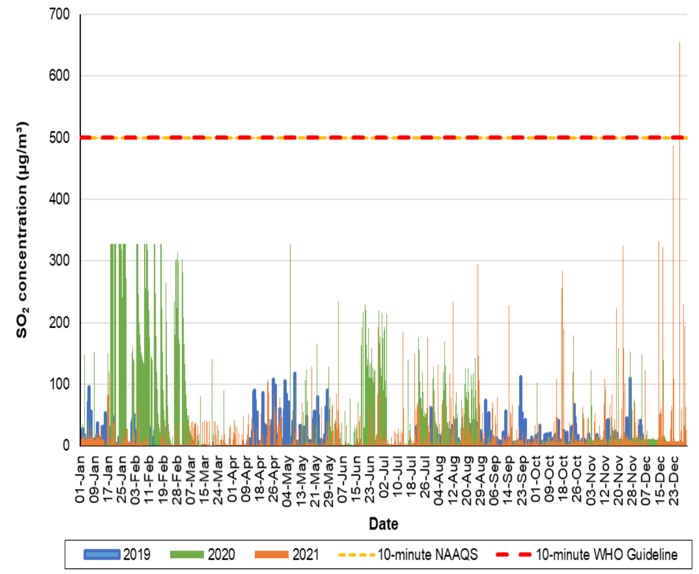


Figure 10-15 (c): 10-minute SO_2 concentrations at the Arboretum station

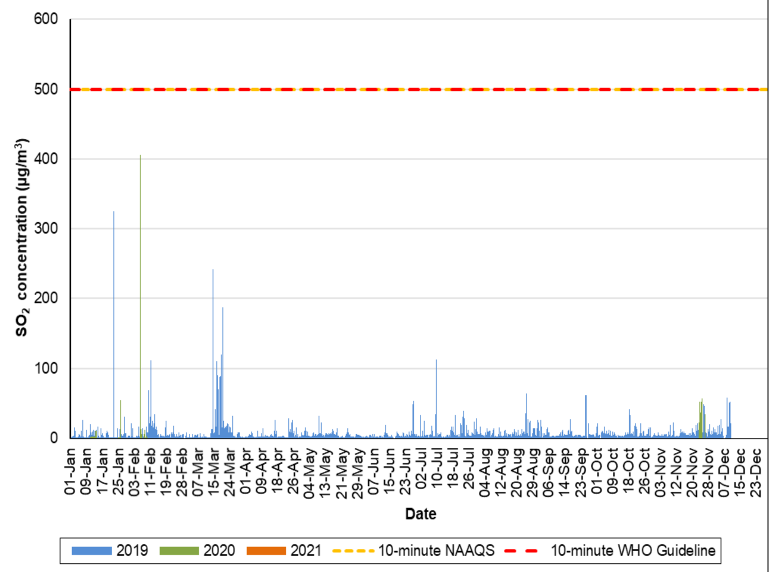


Figure 10-15 (d): 10-minute SO_2 concentrations at the Nseleni station

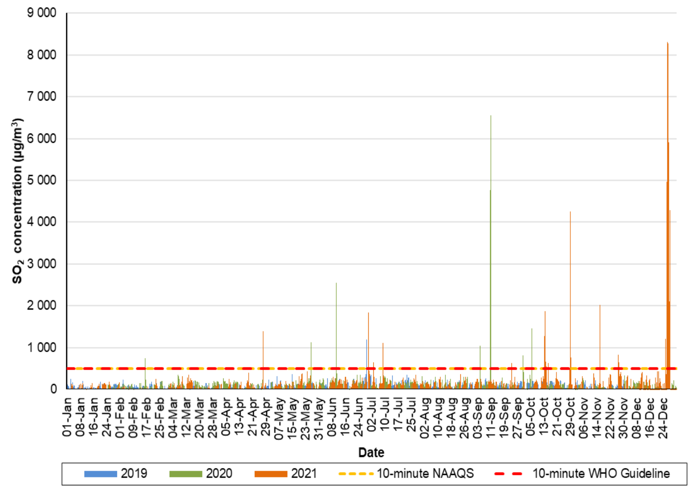


Figure 10-15 (e): 10-minute SO_2 concentrations at the Harbour West station

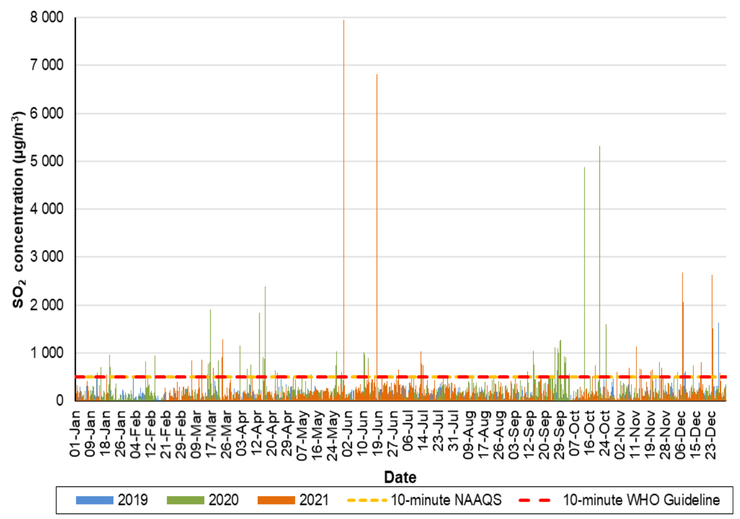


Figure 10-15 (f): 10-minute SO_2 concentrations at the Scorpio station

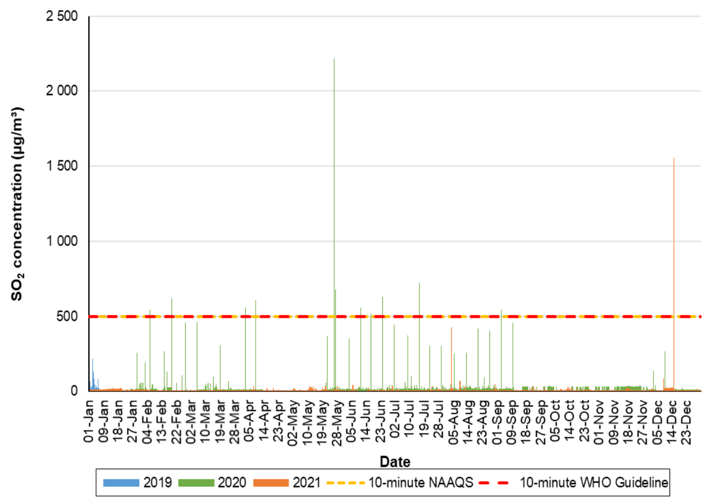


Figure 10-15 (g): 10-minuteSO_2 concentrations at the Felixton station

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Figure 10-15: 10 minutes SO_2 concentrations monitoring stations for the period January 2019 to December 2021

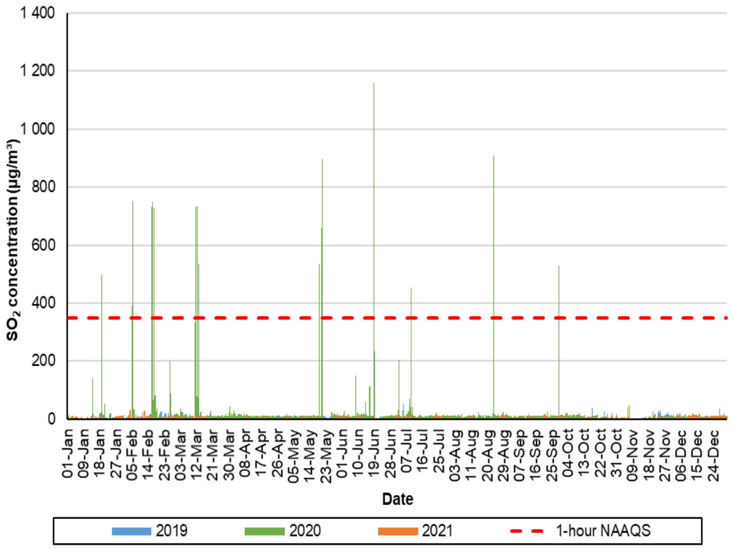

Figure 10-16 (a):1-hour SO_2 concentrations at the Brackenham station

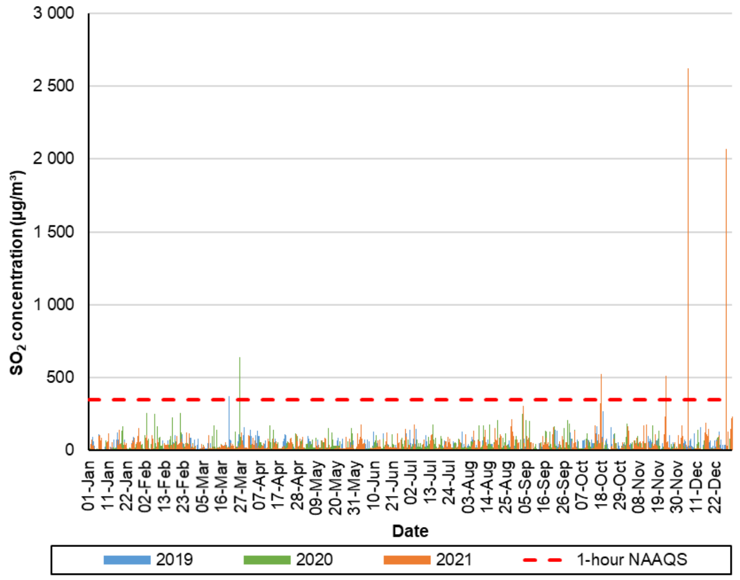

Figure 10-16 (b):1-hour SO_2 concentrations at the CBD station

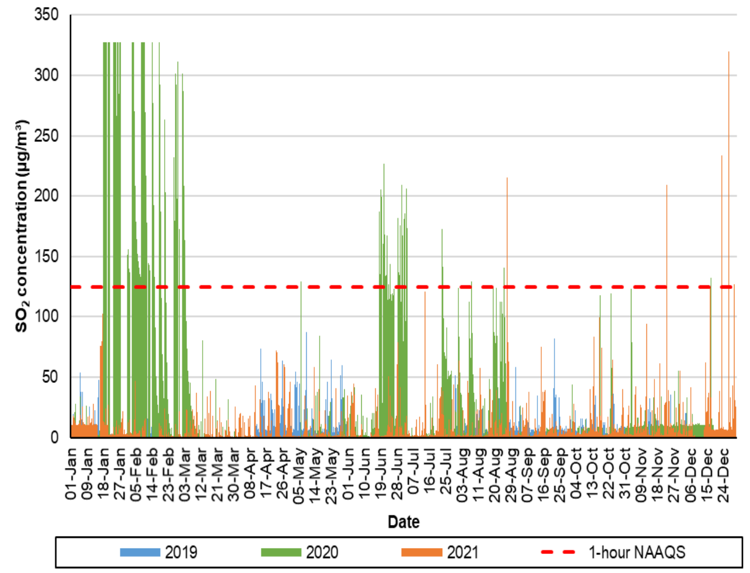

Figure 10-16 (c):1-hour SO_2 concentrations at the Arboretum station

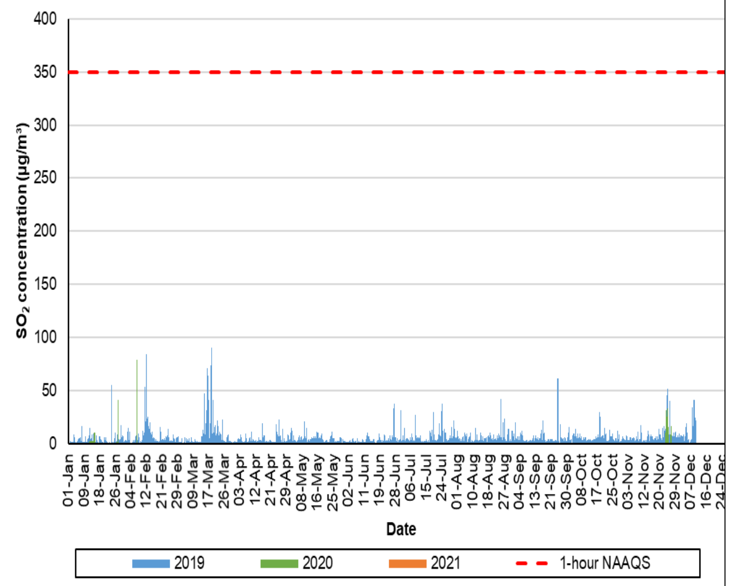

Figure 10-16 (d):1-hour SO_2 concentrations at the eNseleni station

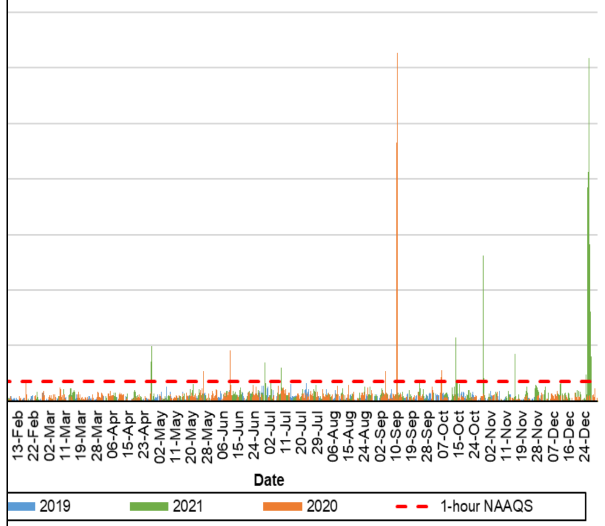

Figure 10-16 (e):1-hour SO_2 concentrations at the Harbour West station

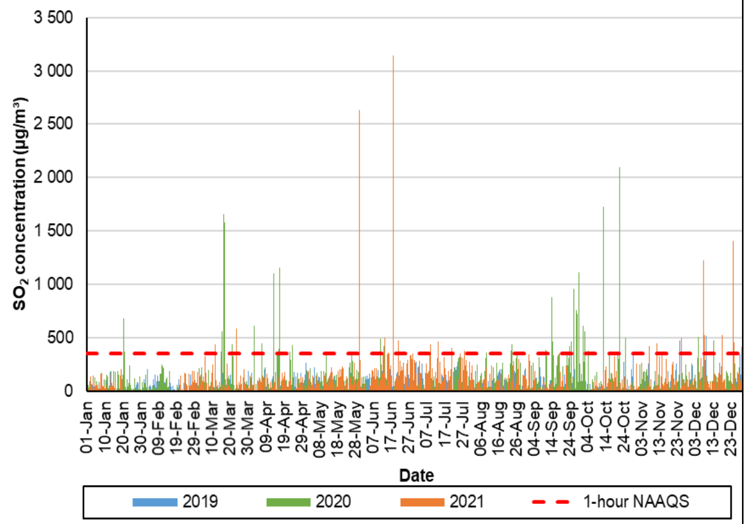

Figure 10-16 (f):1-hour SO_2 concentrations at the Scorpio station

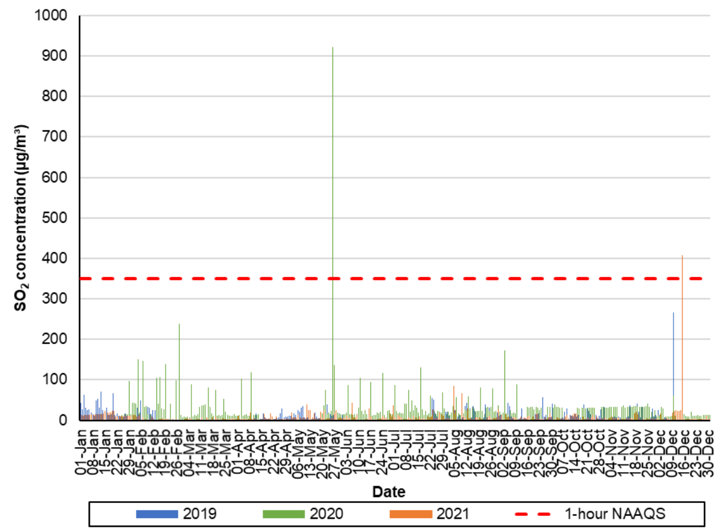

Figure 10-16 (g):1-hour SO_2 concentrations at the Felixton station

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Figure 10-16: 1-hour SO_2 concentrations monitoring stations for the period January 2019 to December 2021

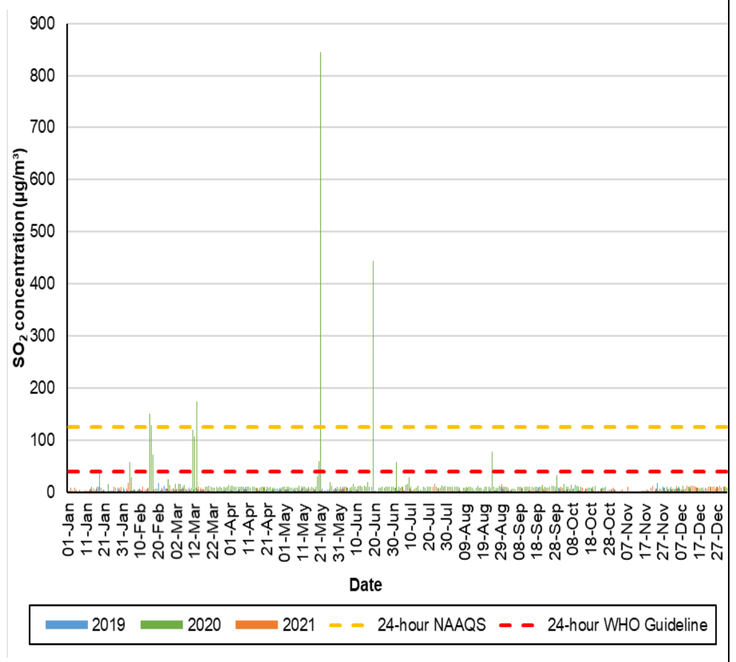

Figure 10-17 (a): 24-hour SO_2 concentrations at the Brackenham station

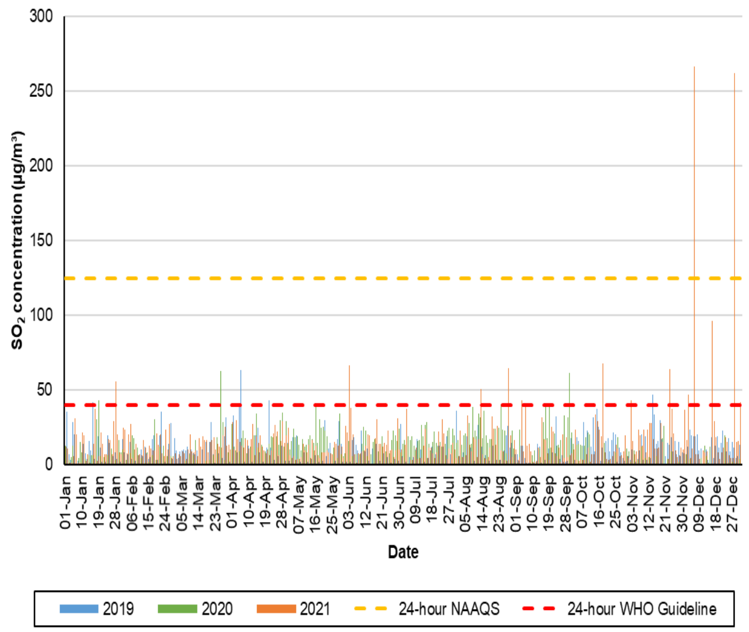

Figure 10-17 (b): 24-hour SO_2 concentrations at the CBD station

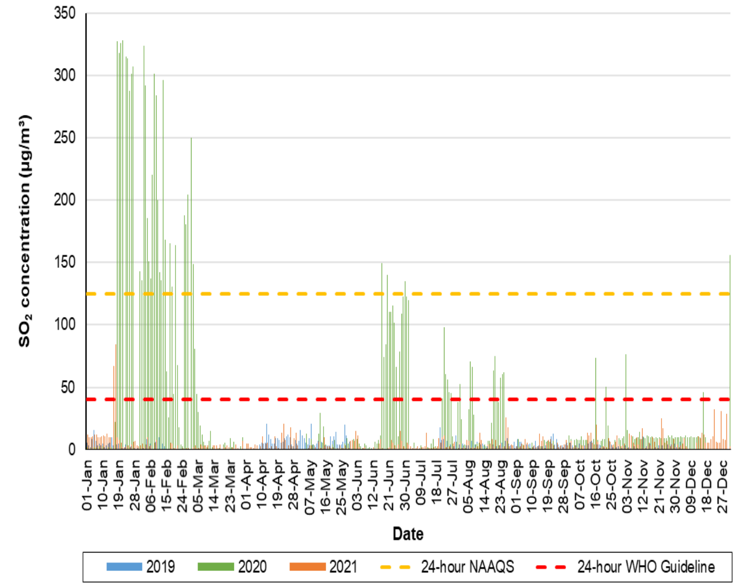

Figure 10-17 (c): 24-hour SO_2 concentrations at the Arboretum station

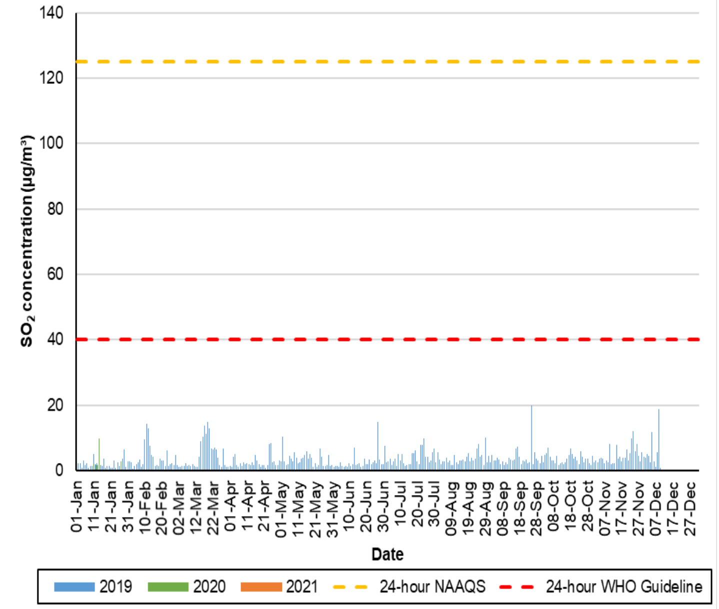

Figure 10-17 (d): 24-hour SO_2 concentrations at the eNseleni station

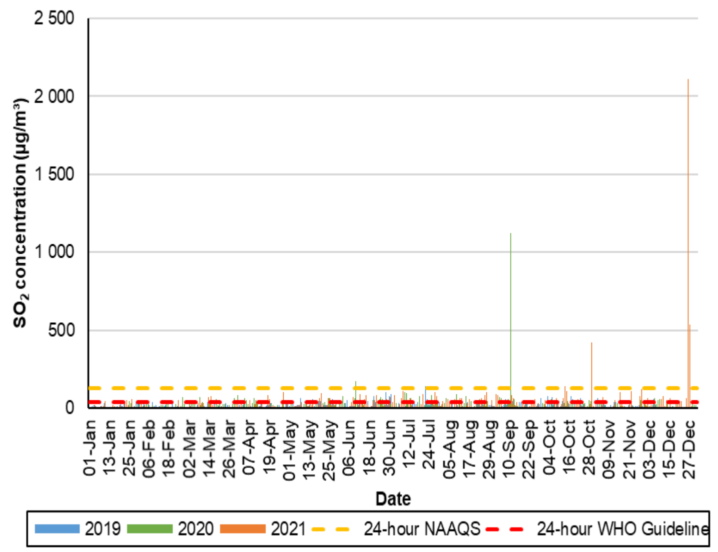

Figure 10-17 (e): 24-hour SO_2 concentrations at the Harbour West station

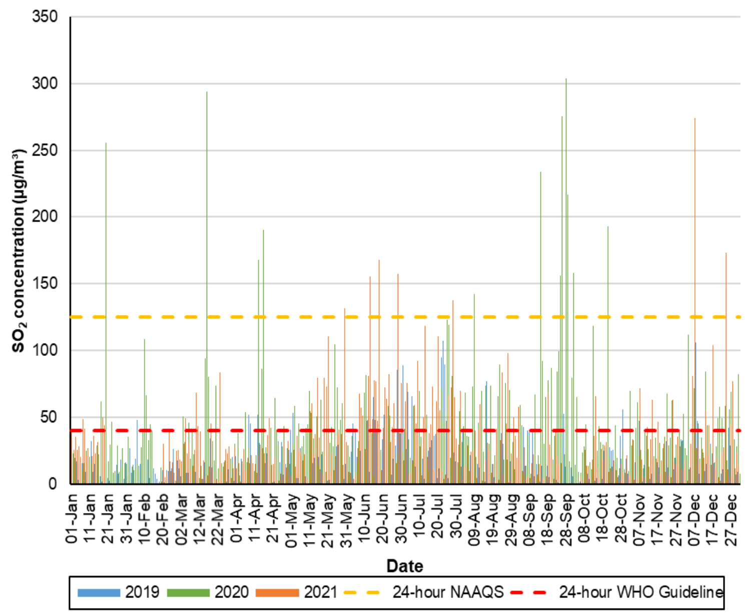

Figure 10-17 (f): 24-hour SO_2 concentrations at the Scorpio station

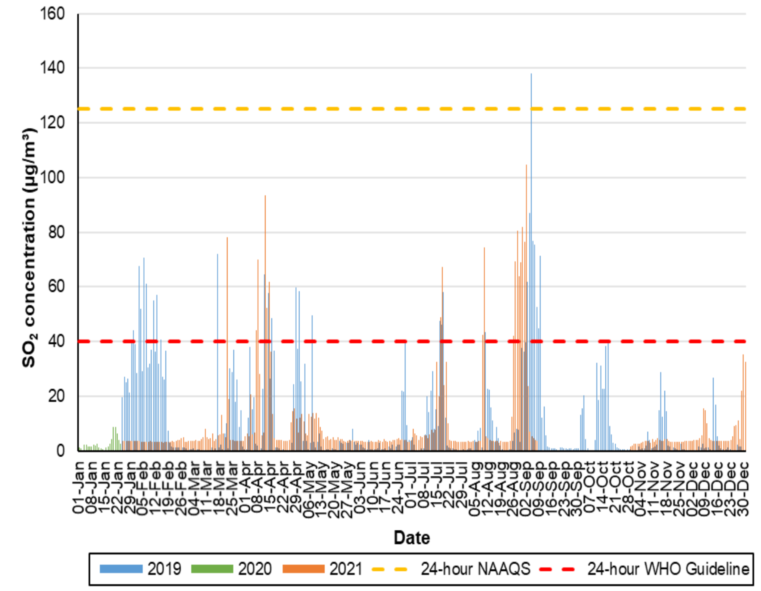

Figure 10-17 (g): 24-hour SO_2 concentrations at the Felixton station

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Figure 10-17: 24-hour SO_2 concentrations monitoring stations the period January 2019 to December 2021

10.6.4 TRS

TRS concentrations were measured at the CBD Station and eNseleni Station. The 24-hour Hydrogen Sulfide (H_2S) guideline for human health stipulated by the World Health Organization (WHO) was used to compare the measured concentrations in the absence of a South African ambient air quality standard. The 24-hour ambient H_2S WHO guideline is 150 µg/m^3.

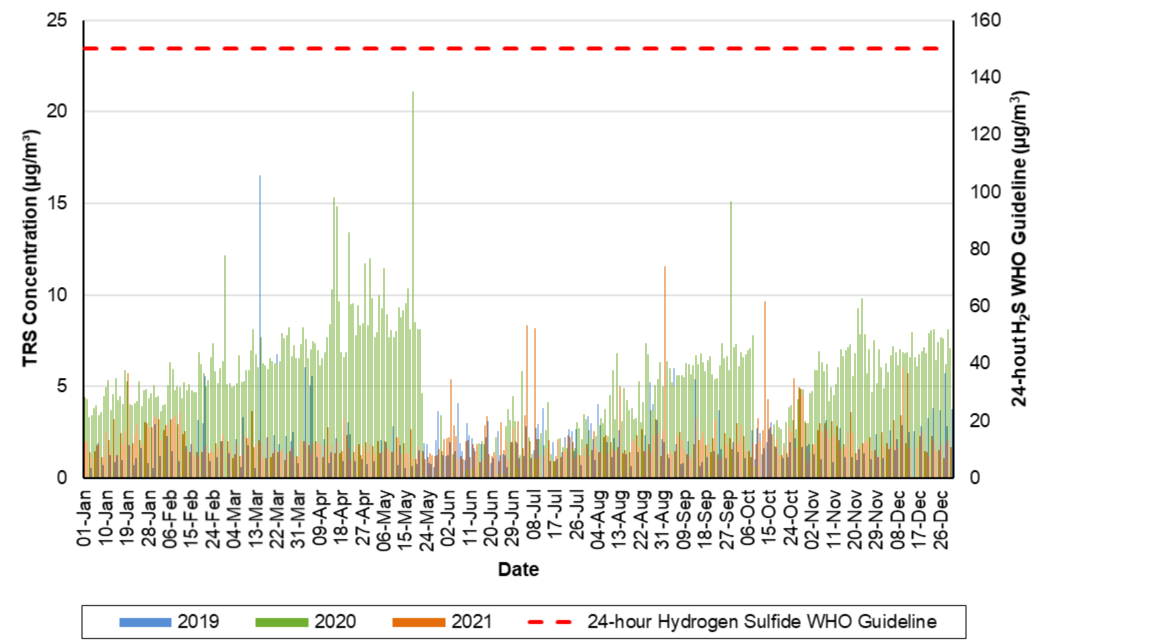
The maximum measured 24-hour TRS concentrations and number of exceedances of the 24-hour WHO guideline for the period 2019 to 2021 are presented in Table 10-5. The daily 24-hour concentrations measured at the CBD and eNseleni Station are presented in Figure 10-18 and Figure 10-19 respectively.

Table 10-5: Measured ambient TRS for 2019, 2020 and 2021

Parameter	Period	CBD	eNseleni
Maximum 24-hour concentrations (µg/m^3)	2019	16.52	2.62
	2020	21.09	ND
	2021	11.59	ND
Number of 24- hour WHO guideline exceedances	2019	0	0
	2020	0	ND
	2021	0	ND

Key observations from Table 10-5, Figure 10-18 and Figure 10-19 are as follows:

- Little to no data was available for eNseleni station, with data only available in 2019.
- Low TRS concentrations were noted at the CBD station.
- TRS 24-hour concentrations did not exceed the WHO guideline of 150 µg/m^3 at the CBD stations in 2019, 2020 and 2021.



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24-HOUR TRS CONCENTRATIONS

Project No. 585503

Figure 10-18: 24-hour TRS concentrations at the CBD station for 2019 and 2021 (RBCAA, 2022)

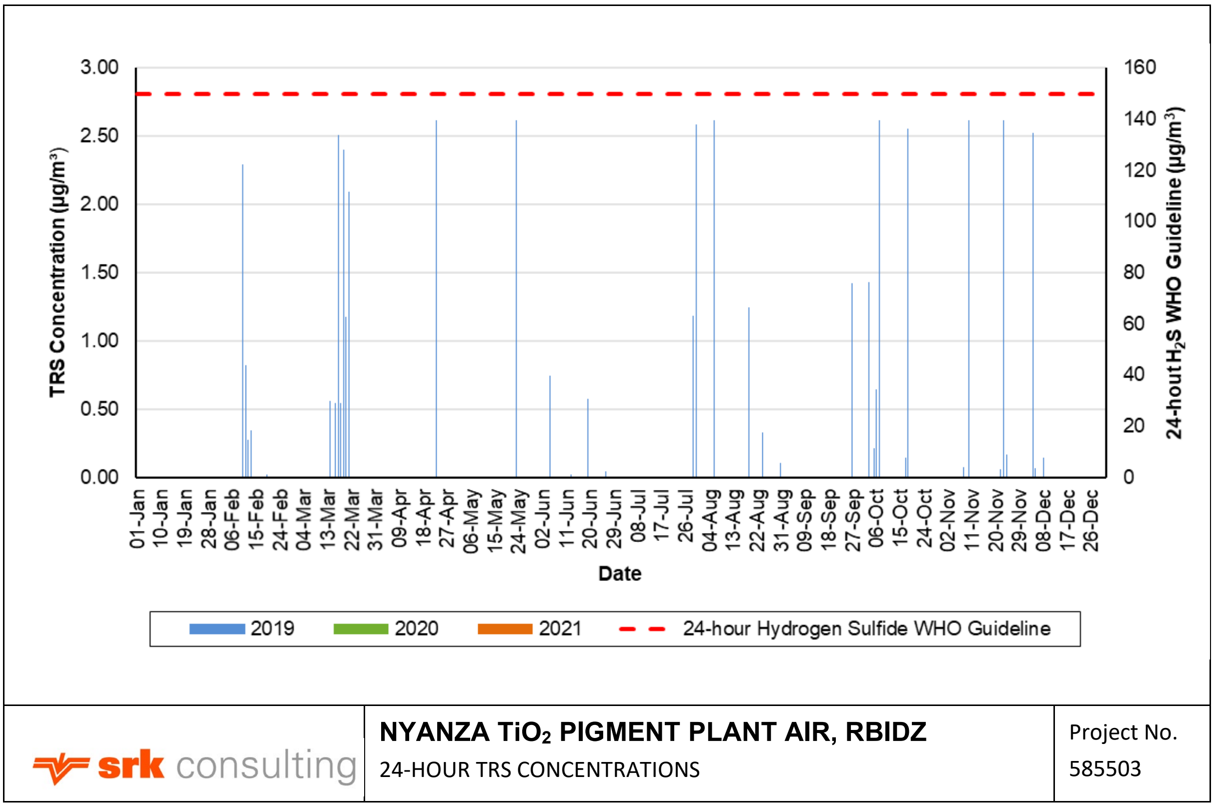


Figure 10-19: 24-hour TRS concentrations at the eNseleni station for 2019 and 2021 (RBCAA, 2022)

10.7 Noise

A noise specialist study was undertaken where ambient sound level measurements were undertaken at eight receptor locations as indicated in Table 10-6 and Figure 10-20. Receptor locations were classified according to the SANS district classification of industrial (F), Central Business District (E) or Urban (with one or more of the following: workshops, business premises and main roads) (D). Free-field measurements (i.e., at least 3.5 m away from any vertical reflecting surfaces) were undertaken at each receptor location.

Table 10-6: Locations of noise monitoring points

Receptor ID	SANS Classification	Receptor Description	Latitude (S)	Longitude (E)
M1	Industrial (F)	RBIDZ entrance	-28.743744°	32.034716°
M2	Industrial (F)	Alton-Along Betastraal road	-28.750634°	32.026418°
M3	Industrial (F)	Alton	-28.745498°	32.017679°
M4	Industrial (F)	Along Ferro Gang Road	-28.738568°	32.032889°
M5	Urban (D)	Aquadene	-28.718811°	32.032938°
M6	Urban (D)	Brackenham	-28.729847°	32.037577°
M7	Urban (D)	Wild en Weide	-28.736610°	32.043086°
M8	Central Business District (E)	Richards Bay Central	-28.748246°	32.045981°

Figure 10-20: Monitoring locations

10.7.1 Daytime Sound Levels

Results from the ambient daytime noise monitoring campaign and key sources of noise observed at each monitoring location during the day are presented in Table 10-7 and illustrated in Figure 10-21. Weather conditions during the time of measurement can be described as clear and sunny (no rain), with negligible wind conditions.

Since the proposed project is located within an industrial complex, the existing noise climate in the vicinity of the facility is classified as industrial in nature, while ambient noise at surrounding offsite receptor locations is described as urban in nature. Sources of ambient noise recorded during the monitoring campaign include road traffic, other industries, business premises, as well as birds chirping and insects.

The average daytime (L_{Aeq}) sound levels ranged from 47.4 dBA (M4) to 67.6 dBA (M6). All measured sound levels were below their respective SANS 10103:(2008) rating level and IFC guideline except for, except for monitoring points M5 and M6 which exceeded both SANS and IFC guidelines while monitoring point M7 exceeded the IFC residential guideline only.

Key sources of noise recorded at the industrial locations (M1, M2, M3 and M4) include vehicle traffic and external industrial noises. Monitoring points M5 and M6 are located at the Aquadene and Brackenham communities respectively. During the monitoring campaign, the key sources of noise observed at these locations included heavy traffic (light and heavy motor vehicles) along the R619. It should be noted that no industrial sounds were audible at these locations.

Other sources of noise at these locations include birds, leaves rustling and music from a nearby bus stop (M6). Monitoring point M7 is located at Wild en Wiede, with the main sources of noise observed being vehicle traffic and pedestrian movement. Monitoring point M8 is located in the Richards Bay Central Business District and key sources of noise at this location included vehicle traffic, people speaking and noises from surrounding businesses.

Table 10-7: Daytime sound level monitoring results

Receptor ID	SANS rating level	IFC Guideline	L_{Aeq}	L_{Amax}	L_{Amin}	Key sources of noise observed
	Industrial Locations					
M1	70 dB(A)	70 dB(A)	62 dB(A)	75.7 dB(A)	45 dB(A)	-Vehicle traffic along Alumina Allee Street (HMV and LDV). -Pressure washers from AB Sambane Services. -Industrial noise audible from Bay Galvinizers.
M2	70 dB(A)	70 dB(A)	62.9 dB(A)	82.9 dB(A)	42.7 dB(A)	-Sinosteel and Zululand industrial coatings causing industrial noise. -Consistent metal work audible. - 1 rooster (loud). -16 Light motor vehicles, 2 trucks.
M3	70 dB(A)	70 dB(A)	52 dB(A)	75.9 dB(A)	36.1 dB(A)	-Birds chirping. -Slight Industrial noise. -Sweeping audible. -1 Tractor.
M4	70 dB(A)	70 dB(A)	47.4	73.2 dB(A)	38.8 dB(A)	-Slight industrial noise audible. -1 car, 1 excavator.
	Community/Urban Locations					
M5	60 dB(A)	55 dB(A)	66.3 dB(A)	84 dB(A)	39.7 dB(A)	-Vehicle traffic along R619 (HMV and LDV) -No industrial sounds audible. -Leaves rustling from adjacent forest.
M6	60 dB(A)	55 dB(A)	67.6 dB(A)	94.3 dB(A)	38.9 dB(A)	-Vehicle traffic along R619 (HMV and LDV) -No industrial noise audible. -Birds audible.
M7	60 dB(A)	55 dB(A)	55.2 dB(A)	77. dB(A)	34.5 dB(A)	-Vehicle traffic along R619 (HMV and LDV) -Fewer vehicles on the smaller road. -Pedestrians walking with a trolly.
	Central Business District					
M8	65 dB(A)	70 dB(A)	62 dB(A)	89.8 dB(A)	49.2 dB(A)	-Moderate Traffic (+ 40 cars). -External noises from businesses (forklifts and trucks). -Rowdy area, many people walking and talking.

*Values in red exceed the SANS 10103:2008 rating levels and IFC Guidelines while values in blue exceed the IFC guidelines only.

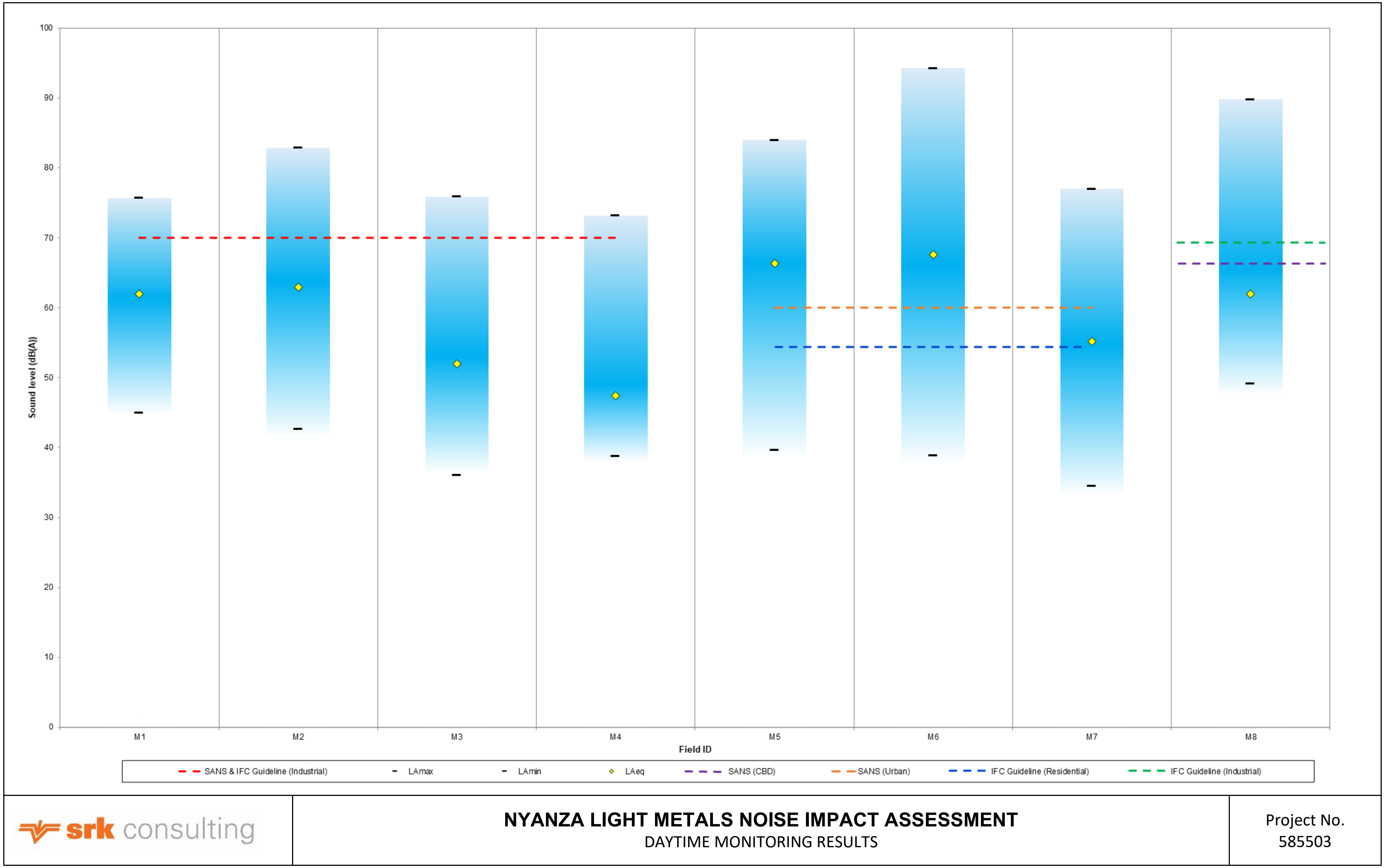


Figure 10-21: Daytime sound level monitoring results

10.7.2 Night-time Sound Levels

Results from the ambient night-time noise monitoring campaign and key sources of noise observed at each monitoring location during the night are presented in Table 10-8 and illustrated in Figure 10-22. Weather conditions during the time of measurement can be described as clear skies (no rain) with negligible wind conditions.

Night-time sound levels range from 41.7 dBA (M2) to 66.9 dBA (M5). The average night-time (L_{Aeq}) sound levels measured were below their respective SANS 10103:2008 rating level and IFC guideline except for monitoring points M5 and M6 which exceeded both SANS and IFC guidelines while monitoring point M7 exceeded the IFC residential guideline only.

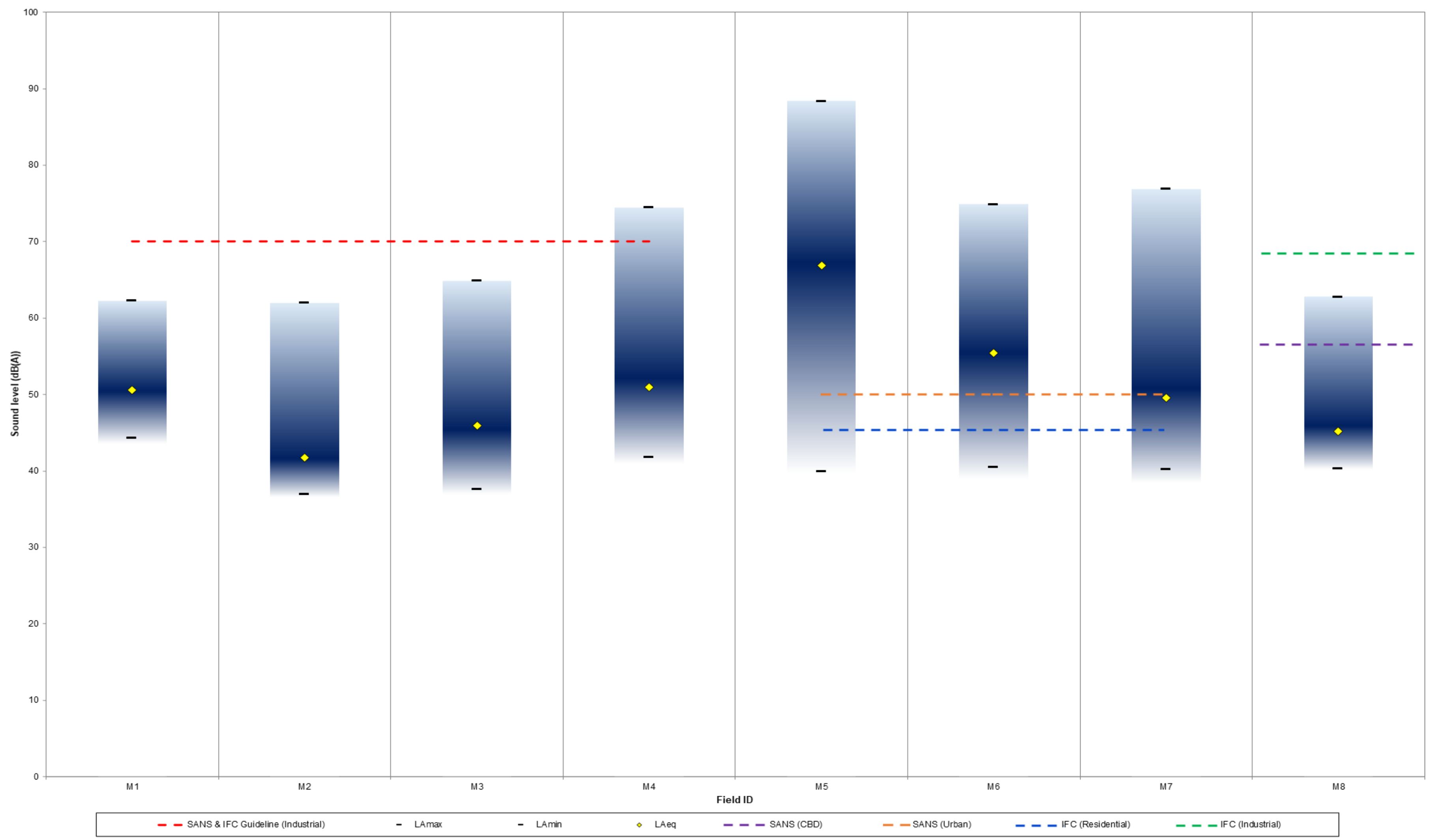
Key sources of noise recorded at the industrial locations (M1, M2, M3 and M4) include vehicle traffic and external industrial activity. While the key sources of noise observed at monitoring points M5 and M6 include moderate vehicle traffic (mostly heavy motor vehicles) along the R619 and insects. No industrial noise was audible at these locations. Key sources of noise observed at monitoring point M7 was from industrial activities and vehicle traffic from the main road. The key sources of noise at monitoring location M8 was industrial noise.

It should be noted that monitoring points M4 and M5 measured higher noise level at night when compared to their daytime measurements. This can be attributed to an increased number of heavy motor vehicle activity as compared to the daytime monitoring.

In general, the measured sound levels are lower in the night-time compared to daytime. This trend is in accordance with World Health Organisation (WHO) guidelines (1999), that states sound levels during the evening and night are typically approximately 5 to 10 dB(A) lower than during the day.

Table 10-8: Night-time sound level monitoring results

Receptor ID	SANS rating level	IFC Guideline	L_{Aeq}	L_{Amax}	L_{Amin}	Key sources of noise observed
	Industrial Locations					
M1	70 dB(A)	70 dB(A)	50.6 dB(A)	62.3 dB(A)	44.3 dB(A)	-Vehicle traffic along Alumina Allee Street (HMV and LDV). -People talking.
M2	70 dB(A)	70 dB(A)	41.7 dB(A)	62 dB(A)	37 dB(A)	-Insects audible. -Slight industrial noise audible.
M3	70 dB(A)	70 dB(A)	45.9 dB(A)	64.9 dB(A)	37.6 dB(A)	-Insects audible. -Slight industrial noise audible in background. -Truck idling nearby.
M4	70 dB(A)	70 dB(A)	50.9 dB(A)	74.5 dB(A)	41.8 dB(A)	-Traffic noise audible. -1 Truck drove close to the instrument. -Insects audible.
	Community/Urban Locations					
M5	50 dB(A)	45 dB(A)	66.9 dB(A)	88.4 dB(A)	40 dB(A)	-Vehicle traffic along R619 (HMV and LDV) -Insects audible -Many trucks. -No industrial noises audible.
M6	50 dB(A)	45 dB(A)	55.4 dB(A)	47.9 dB(A)	40.5 dB(A)	-Vehicle traffic along R619 (HMV and LDV) -Slight industrial noise audible from nearby site.
M7	50 dB(A)	45 dB(A)	49.5 dB(A)	76.9 dB(A)	40.2 dB(A)	-slight industrial noise audible. -Vehicle traffic along R619 (HMV and LDV)
	Central Business District					
M8	55 dB(A)	70 dB(A)	45.2 dB(A)	62.8 dB(A)	40.3 dB(A)	-Slight industrial noise. -No vehicles.
*Values in red exceed the SANS 10103:2008 rating levels and IFC Guidelines while values in blue exceed the IFC guidelines only.						



srk consulting

NYANZA LIGHT METALS NOISE IMPACT ASSESSMENT

NIGHT-TIME MONITORING RESULTS

Project No.
585503

Figure 10-22: Night-time sound level monitoring result

10.8 Visual

The project development is not expected to negatively impact the aesthetical value as the site is surrounded by other industries and vacant land. During the project's construction phase, the storage of equipment and material might result in potential visual impact. The EMPr has provided mitigation measures for impacts related to construction.

10.9 Traffic

The road network servicing the site was evaluated in accordance with the six-class rural and urban road classification system stipulated in TRH 26 which considers the network from two perspectives the wider arterial network; and the local road network.

10.9.1 Wider Arterial Road Network

The site is serviced by a well-connected network of mobility roads and access streets that enable efficient movement of goods and people to various land use activities (Figure 10-23).

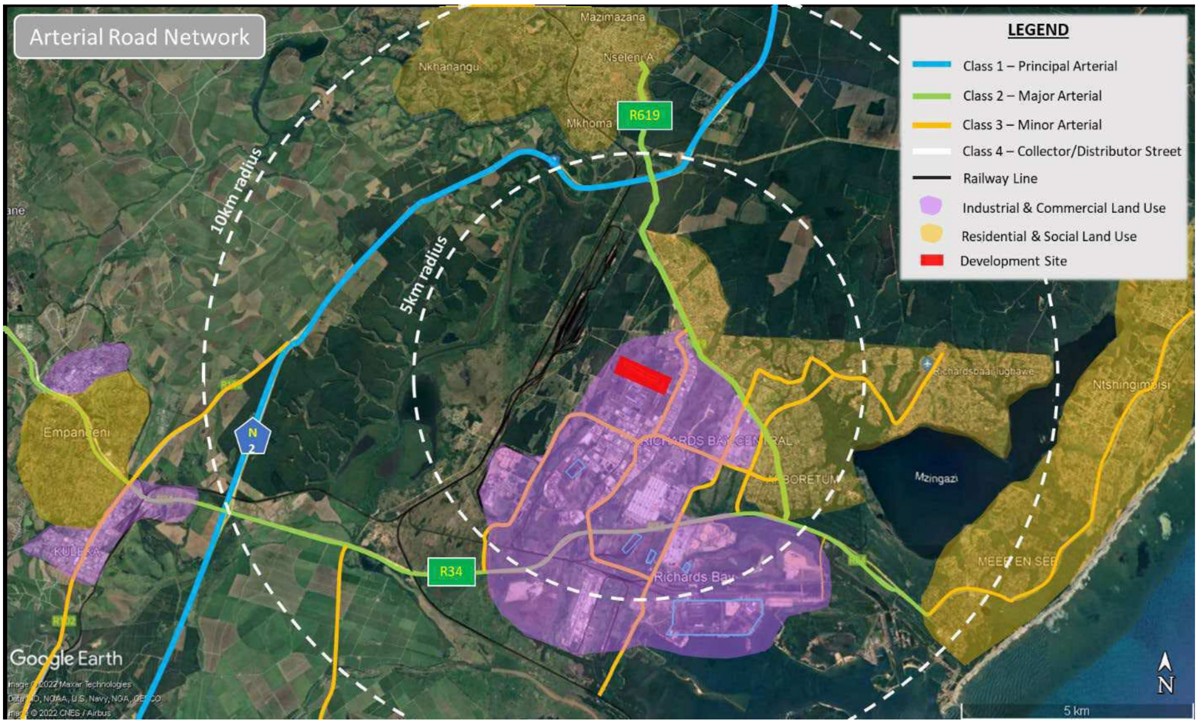


Figure 10-23: Wider Arterial Road Network in the Area

The higher-order arterial roads provide the mobility function, allowing ease of movement at relatively high speeds and with minimum interruptions or delay.

The following arterial roads exist within the road network:

- National Route 2 (N2): The N2 is a Class 1 Principal Arterial Road that carries intercity traffic in the KwaZulu Natal. The N2 links Richards Bay to Durban and Mthatha in the south, Ermelo and eSwatini in the north. The road is of strategic importance for transporting raw materials and products to/from the Nyanza Plant.

- R619: The R619 is a Class 2 Major Arterial Road that provides important mobility to the region. The road is in the Northern region of Richards Bay and links the region to the N2 highway, and provides primary access to surrounding Richards Bay residential settlement, CBD, and industrial regions. High volumes of heavy and light vehicles use this road.

- R34 (John Ross Highway): The R34 is a class 2 major arterial located in the Southern region of Richards Bay. It provides important mobility to the region, connecting to the N2 highway, and provides primary access to township settlements of Bhiliya and surrounding (through the P106), Richards Bay industrial regions and the Port of Richards Bay.

- Alumina Allee St: A Class 3 Minor Urban Arterial Road connecting the southern and northern areas of Richards Bay. The road facilitates access to the site and connects to the R34 in the south. Towards the north, the road becomes Helliumhoogte Rd and links to the R619. High volumes of heavy vehicles use this road.

- Chalk Line St: A Class 3 Minor Urban Arterial Road connecting the eastern and western areas of Richards Bay.

Other mobility arterials within the surrounding road network include Western Arterial, South Central Arterial and West Central Arterial.

10.9.2 Local Road Network

The localised road network comprises a well-connected combination of collector and distributor streets with high levels of access to the industrial and commercial developments as shown in Figure 10-24.

Figure 10-24: Local Road Network

The collector/distributor linkages are shown in white above and include Diamantpyp Rd, Bauxite Bay St and Ceramic Curve St

10.9.3 Site Access

The main entrance to the RBIDZ site, located on Alumina Alle St, is not adequate for the expected heavy vehicle trips to/from the Nyanza Plant. Therefore, two new access roads are proposed to facilitate the movement of high volumes of heavy vehicle trips that will be generated by the plant when raw materials and products are transported by road. Road-based transportation of raw materials to/from the plant will be temporary until the railway line linking to the existing Transnet rail infrastructure is constructed and commissioned. The initial heavy vehicle trips added to the road network are expected to decrease significantly within the first 2 years of plant operations.

- Access Road – the proposed heavy vehicle access road will be a surfaced road, starting at the end of Bauxite Bay St, running in the north/south direction, and linking to the existing access road within the RBIDZ development site. The road will run parallel to the planned railway line.

- Egress Road – a new link is proposed for heavy vehicles leaving the plant linking Ferro Gang St and ultimately Alumina Allee St in the north.

10.9.4 Key Intersections

The road intersections identified along primary access routes to the Nyanza Plant as shown in Figure 10-25 and described in Table 10-9 were considered critical to the study area based on the operations of the proposed Nyanza Plant.

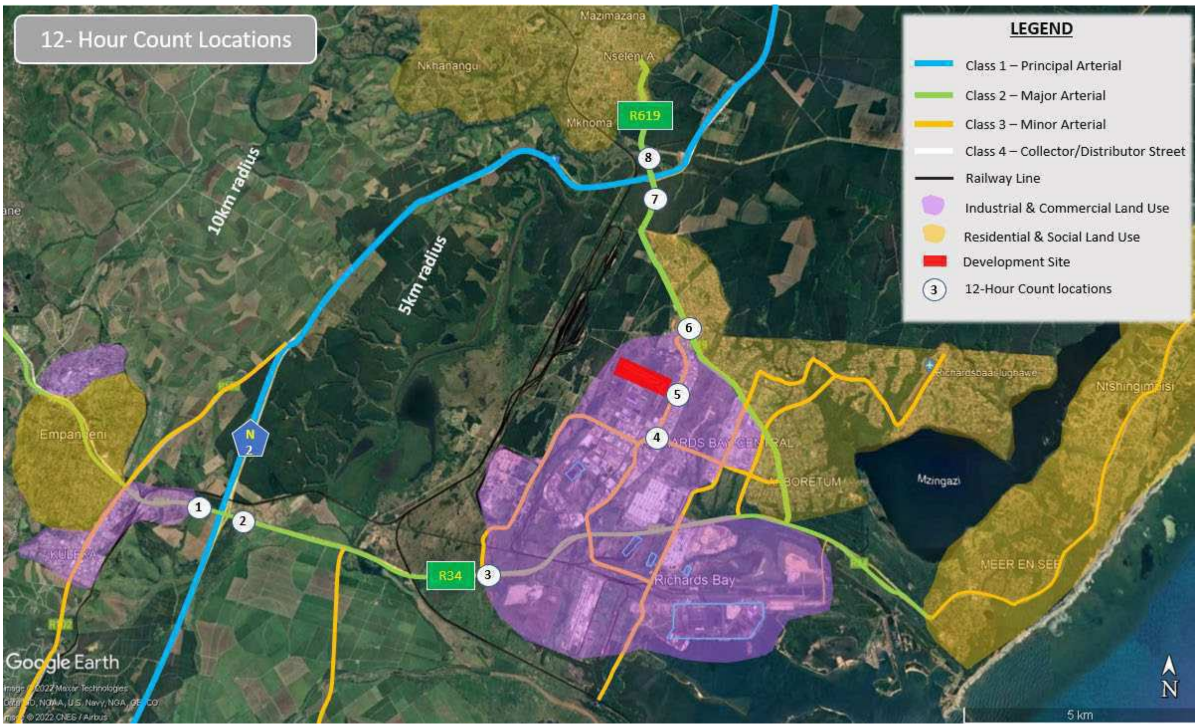


Figure 10-25: 12-Hour Count Locations

Table 10-9: Key Intersections

No.	Intersection Name	Intersection Type	Description
1	N2/R34 (East Terminal)	Signalised Full intersection	Serves as an exit off the N2 to nearby towns of Empangeni and Richards Bay
2	N2/R34 (West Terminal)	Signalised Full intersection	Serves as access to the N2 towards Durban from Empangeni and Richards Bay
3	R34/ Alumina Allee Street	Signalised Partial intersection	Primary access to the industrial region from the R34
4	Alumina Allee Street / Chalk Line Road	Signalised Full intersection	Primary access to Nyanza Plant from the Harbour and Empangeni, Durban and Pietermaritzburg
5	Alumina Allee Street/ Diamantpyp Street	Circle Stop Control	Primary access to Nyanza Plant
6	R619/ Heliumhoogte Street	Signalised Full intersection	Serves as access to Nyanza Plant from the northern areas, including Nseleni and Mtubatuba

No.	Intersection Name	Intersection Type	Description
7	N2/R619 (West Terminal)	Stop Control Full Intersection	Serves as an exit off the N2 to nearby towns of Nseleni, Mkhoma and Richards Bay
8	N2/ R619 (East Terminal)	Stop Control Full Intersection	Serves as access to N2 towards Durban in the south and Mtubatuba in the north.

10.10 Hydrology and Surface Water

According to the 2017 SANBI BGIS Strategic Water Source Areas (SWSAs) database, the project area is considered strategically important for economic and water security at a national level because it is located in both the Richards Bay ground water-fed estuary SWSA and the Zululand Coast surface water (Hatch, 2019).

The project site falls within quaternary catchment area W12F, in the Pongola-Mtamvuna Water Management Area (WMA) (Figure 10-26). This WMA includes the following large rivers: Pongola, Mhlathuze, Mkuze, Thukela, Mvoti, and Umgeni amongst others. Main water resources in the uMhlathuze Catchment are the Nseleni and uMhlathuze rivers, Goedertrouw dam, and irrigation dams and impoundments, lakes, and pans (like the Nsezi, Mzingazi, Lake-Cubhu, and Nhlabane Lake), riparian areas, hillslope seepages, valley bottom wetland systems, and Mhlathuze River Floodplain and Estuary. The Qhubu, Mzingazi, and Nhlabane Lake, Mhlatuze Floodplain, Mhlatuze Estuary and associated valley bottom wetland, and Mountainous seeps in the Mhlatuze River's upper reaches are the most important wetland systems (KZN PPC, 2016). The catchment's water resources were awarded a PES rating of C (moderately modified) (DWS, 2019).

The Bizolo perennial river is located to the South of Alton and the Nsezi River is located West of Alton. Several non-perennial pans are identified by the national spatial data in the area. There are three main stormwater drainage channels in Alton, of which two traverse the RBIDZ's 1F Estate. The proposed project site is located west of the central drainage line (Hatch, 2019).

Figure 10-27 provides a map of water resources around the project area.

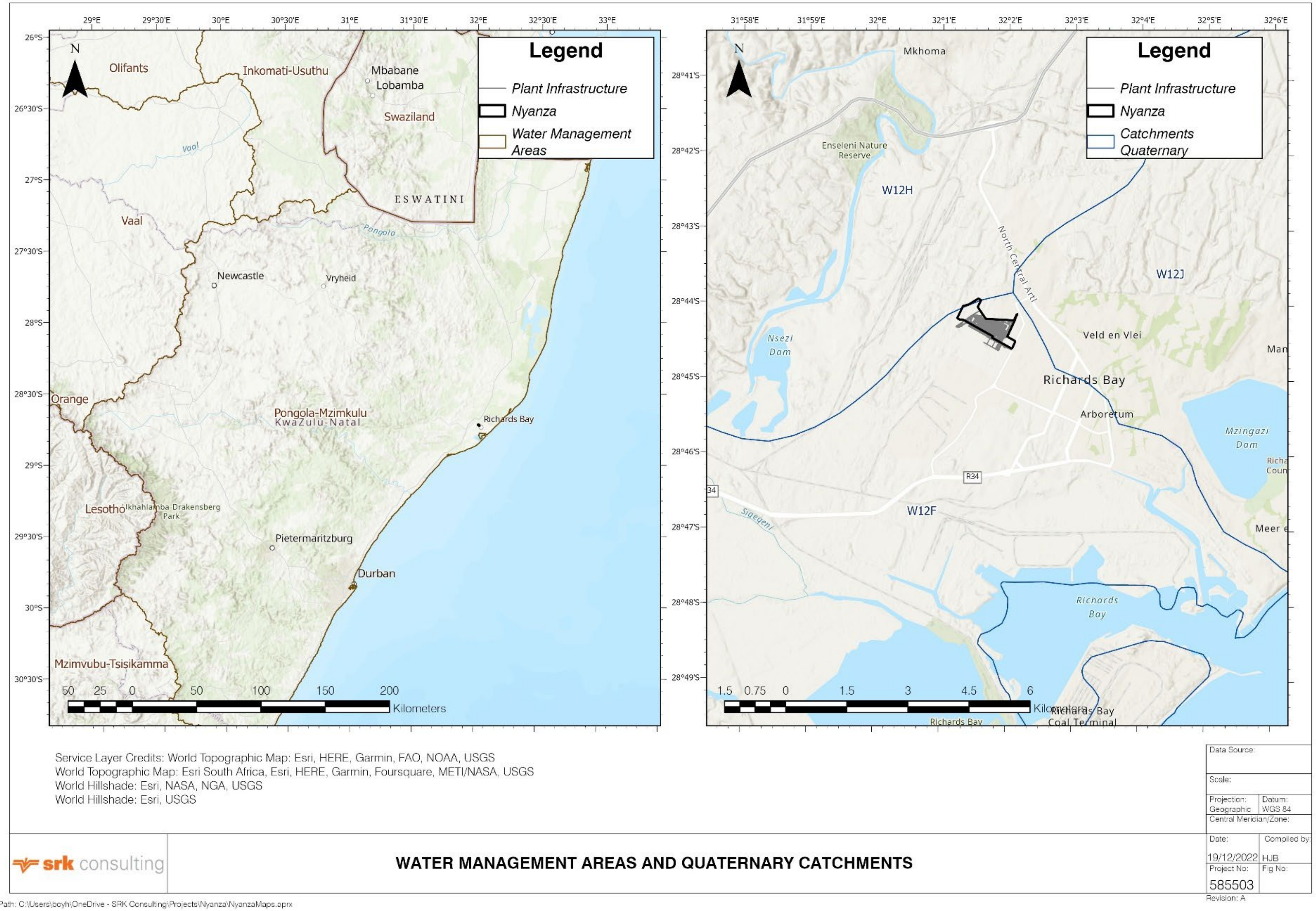


Figure 10-26: Water Management Areas

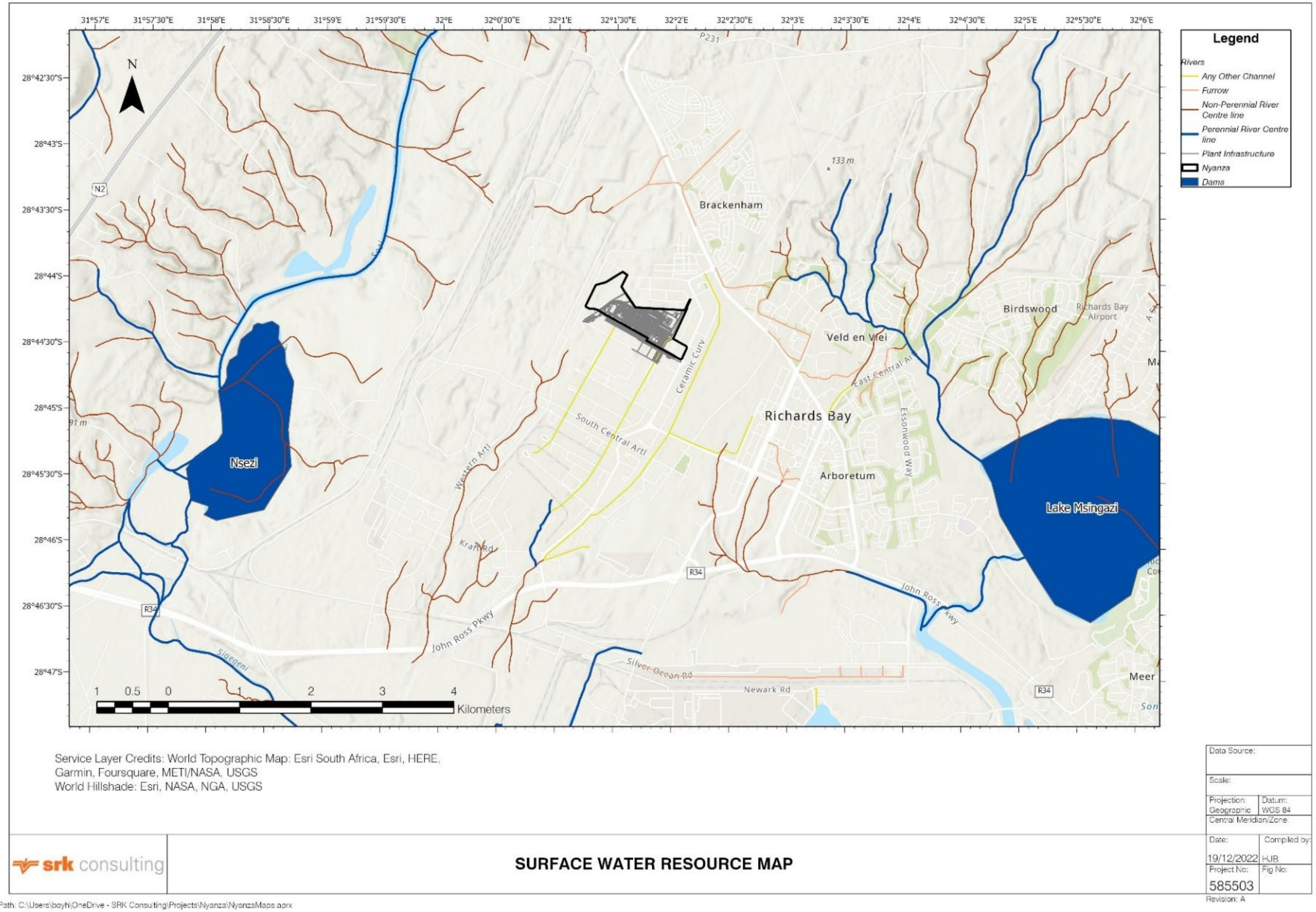


Figure 10-27: Water Resources

10.11 Geohydrology

A site-specific groundwater study was undertaken for the project.

10.11.1 Regional Hydrogeology

The regional hydrogeological map indicates that the area is underlain by type A3 aquifers characterized by intergranular aquifers. The unconsolidated primary aquifer in the Richards Bay area comprises alternating fine-grained sand and clay-rich layers which can act as aquitards. This unconfined aquifer is less than 30 m thick. Groundwater is present in the pore spaces of the unconsolidated sediments. There are no significant geological features such as faults and dykes underlying the site that may influence groundwater occurrence and flow. At the base of the Maputaland Group is a Miocene layer, the Uloa Formation, which is a significant aquifer that could be used for water supply. Recharge, mainly in the form of rainfall infiltration, is reported to range from 5% to over 20% of mean annual precipitation, which is on average 1 300 mm per annum.

Within the Richards Bay area borehole yields of 1.5 to 5 L/s are reported for the Holocene sediments that underlie the Nyanza site and yields of up to 20 L/s for the Uloa Formation. The Uloa Formation is not ubiquitously present in the Richards Bay area, however, could be investigated for water supply if required by Nyanza (Kelbe, 2002).

Many of the surface drainage features, streams and wetlands, are fed by the groundwater. The water table is generally shallow, and therefore drainage canals are constructed in part of the CBD and Alton to control groundwater. The Nyanza site is located close to and upgradient of such canals.

According to the Groundwater Resources of South Africa, the electrical conductivity (EC) of the groundwater, which is a broad indicator of groundwater quality, is expected to range from 0 – 70 mS/m in the study area. Historical water quality for the Richards Bay area is deemed Class II, which is safe for short-term consumption (Figure 10-28:).

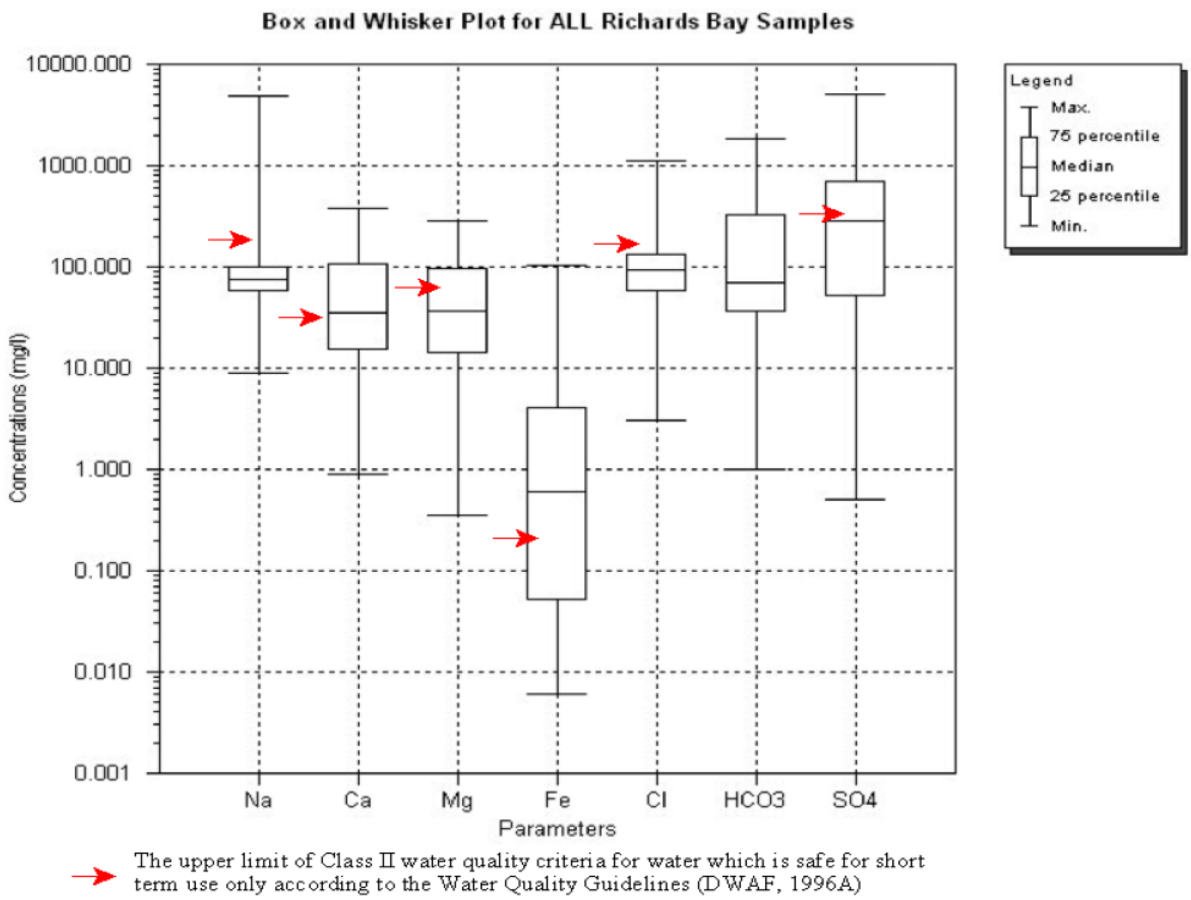


Figure 10-28: Historical Groundwater Quality for Richards Bay (Taken from Kelbe, 2010)

The Groundwater Resource Assessment Phase II (GRAII) database indicates that the exploitation potential and the recharge potential are 18 683 900 m^3/a/ and 53 372 700 m^3/a/, respectively, for the W12F catchment. This translates to an exploitation potential of 8 706 414 m^3/a and a recharge potential of 3 047 808 m^3/a for the property with an estimated size of 420 000 m^2

10.11.2 Aquifer

According to the study, the project site is underlain by an unconsolidated aquifer that is vulnerable to contamination. Groundwater levels are shallow, ranging from 0.8 to 2.97 mbgl and contribute to the wetlands in the area (Table 10-10). A clay unit separates the sandy aquifers at Nyanza. There is a slight difference between the shallow and deeper water levels which suggests the lower aquifer may be semi-confined. The deeper sands are highly permeable (approx. K is 21.3 m/day), whilst the shallower sandy unit has a lower hydraulic conductivity of 0.3 m/d to 2.1 m/day. Hence any contaminant entering the sub-surface could migrate and impact the aquatic environment in the wetland.

Table 10-10: Summary of Drilling Results

Borehole Name	Depth (m)	SWL (mbgl)	Depth (m)	Depth (m)	Thickness (m)	Formation	uPVC Casing (Solid)	uPVC Casing (Screen)
New Monitoring Boreholes								
NR-BH1	15	0.92	0	2.5	2.5	Sand	0 – 0.5 m	0.5 – 15 m
			2.5	5	2.5	Clay		

Borehole Name	Depth (m)	SWL (mbgl)	Depth (m)	Depth (m)	Thickness (m)	Formation	uPVC Casing (Solid)	uPVC Casing (Screen)
			5	6.5	1.5	Sandy Clay		
			6.5	11.5	5	Sand		
			11.5	15	3.5	Sandy Clay		
NR-BH2	6	0.84	0	1	1	Sand	0 – 0.5 m	0.5 – 6 m
			1	6	5	Clay / Sandy Clay		
NR-BH3	6	0.76	0	2	2	Clayey Sand	0 – 0.5 m	0.5 – 6 m
			2	6	4	Sandy Clay		
NR-BH4	6	1.37	0	6	6	Clayey Sand	0 – 0.5 m	0.5 – 6 m
NR-BH5	15	1.1	0	7.5	7.5	Clayey Sand	0 – 0.5 m	0.5 – 15 m
			7.5	10	2.5	Sand		
			10	15	5	Clayey Sand		
Existing Piezometers								
Geo-BH3	7.58	2.93	No details were provided by geotechnical engineers.					
Geo-BH5	2.54	0.97						

SWL – static water level

The groundwater flow direction is away from the site as the site is located across a local topographic divide (Figure 10-29).

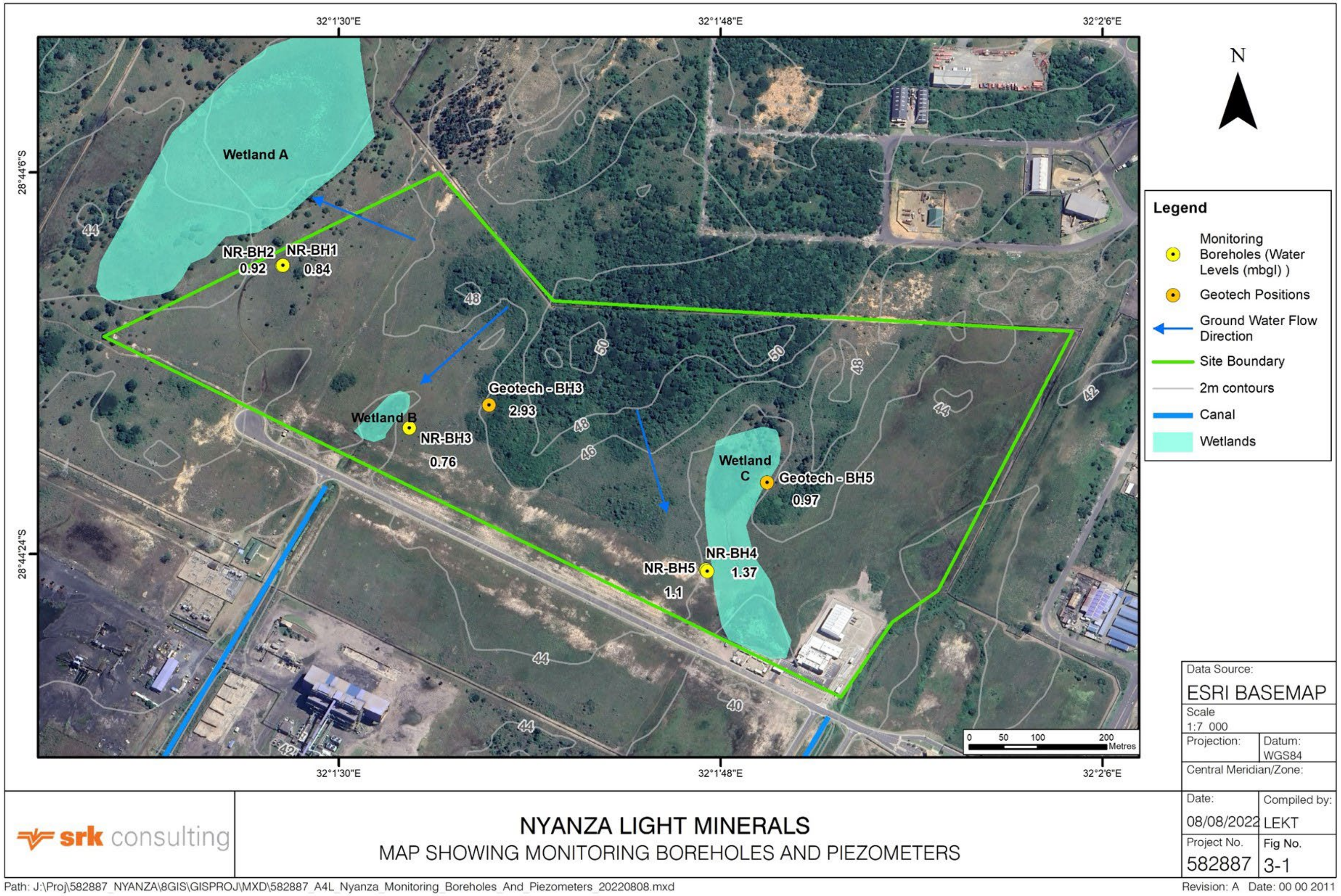


Figure 10-29: Map of Monitoring Boreholes and Piezometers

10.11.3 Groundwater Quality

The groundwater is mildly acidic, with a pH of 5.7 to 6.5, and the wetland is acidic with a pH of 4.4 to 5.3. The acidic levels at the wetlands may be due to local the nature of the soils and vegetation at the wetland. The EC levels are low, ranging from 9 to 25 mS/m for the groundwater and from 15 to 22 mS/m at the wetlands.

The water quality is characterised by low salt iron concentration but elevated iron and aluminium levels. The samples were not filtered and therefore the metals levels represent the total concentration levels. Iron concentration levels ranging from 2 232 µg/L to 5 204 µg/L, in all five boreholes as well as Wetland B, exceed the chronic limits of 2 000 µg/L. At Wetland A and Wetland C, iron levels exceed the aesthetic limits of 200 µg/L, with levels of 961 µg/L and 1291 µg/L respectively. Although the iron concentration levels are towards the upper end of the reported water quality for Richards Bay, the sands are known to contain high levels of iron. The Al levels exceed the drilling water limit, at all the shallow boreholes and at Wetland A. Like the iron concentrations, this may be due to the composition of the aquifer material. The iron may level stains on infrastructure should the groundwater be used for process use. Depending on process plant requirements the metal levels may pose an issue as could the low pH. Process engineers will need to confirm if treatment of the groundwater is needed.

From the STIFF diagrams it can be concluded that the Wetland A has the same signature as NR-BH2, which is a shallow borehole of 6 m Figure 10-31). The deeper borehole has an additional alkalinity signature that is not present in the shallow groundwater sample.

Wetland B like Wetland A has a strong Na-Cl signature. The shallow borehole, NR-BH3, close to the Wetland B, has the same alkalinity signature as the deeper aquifer borehole, NR-BH1 (Figure 10-32). Wetland C has a similar signature to NR-BH5 which is the deeper 15 m borehole (Figure 10-33). The groundwater at NR-BH4, like NR-BH1 and NR-BH2 is alkalinity dominant, which may reflect variation in soil composition.

Despite these differences, there is evidence to suggest that the groundwater is discharging to the wetlands. The samples are once-off samples and further sampling is required to understand the hydrogeochemical evolution.

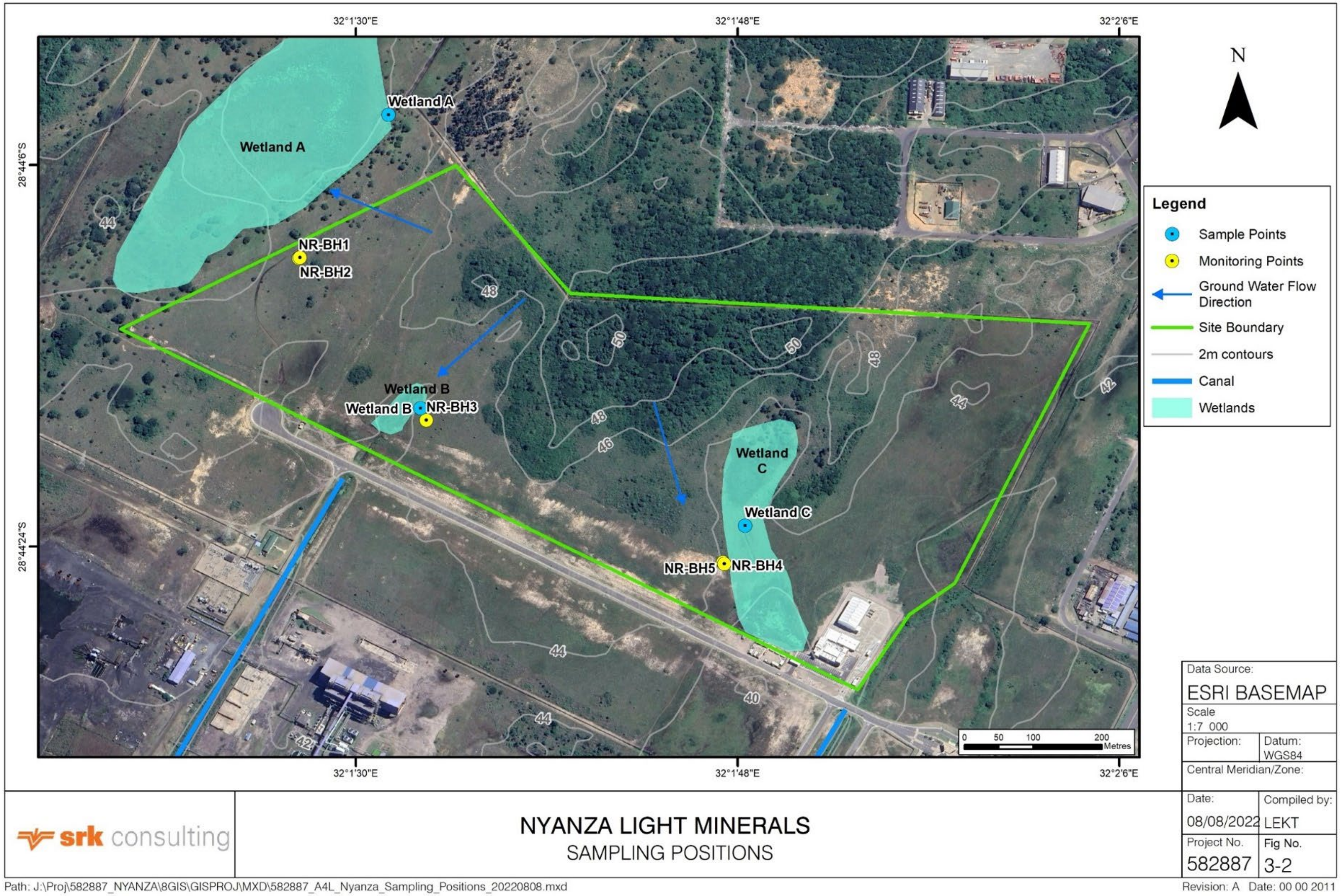


Figure 10-30: Groundwater Sampling Positions

Table 10-11: Summary of Water Quality Results

Determinant	Unit	NR-BH1	NR-BH2	NR-BH3	NR-BH4	NR-BH5	WET A	WET B	WET C	SANS 241:2015
pH at 25°C	pH units	6.5	5.5	5.7	6.0	6.0	**4.4**	5.4	5.3	≥ 5 to ≤ 9.7
Electrical Conductivity at 25°C	mS/m	20.5	19.6	9.4	24.6	12.5	21.5	10.4	15.1	170
Total Dissolved Solids at 180°C	mg/ℓ	158	99	48	198	64	108	71	96	1 200
Turbidity	NTU	**19**	2.6	3.3	**117**	**53**	4.7	**27**	**11**	5
Colour (True)	mg Pt-Co/ℓ	20	<10	63	170	10	18	77	62	15
Total Organic Carbon	mg C/ℓ	2.5	6.0	16	84	2.7	9.9	19	18	-
Dissolved Calcium	mg Ca/ℓ	<1.25	1.42	<1.25	1.41	<1.25	<1.25	1.86	1.73	150
Potassium	mg K/ℓ	1.35	0.79	0.68	0.78	0.59	1.17	0.60	0.61	50
Dissolved Magnesium	mg Mg/ℓ	2.59	2.70	0.71	1.44	1.68	3.11	1.68	2.05	70
Sodium	mg Na/ℓ	26	25	12.5	47	17.0	27	12.7	21	200
Total Alkalinity	mg $CaCO_3$/ℓ	59	5.06	46	269	17.0	<1.25	11.7	14.7	-
Chloride	mg Cl/ℓ	39	40	11.1	25	21	44	22	35	200
Nitrate	mg NO_3/ℓ	<1.1	<1.1	<1.1	<1.1	<1.1	7.1	<1.1	<1.1	11
Sulphate	mg SO_4/ℓ	5.30	15.0	4.39	8.74	12.4	9.91	<2.5	<2.5	250
Fluoride	mg F/ℓ	0.45	0.10	0.60	0.55	0.48	0.18	0.35	0.68	1.5
Aluminium	µg Al/ℓ	228	**1084**	**478**	**472**	170	**928**	275	206	300
Arsenic	µg As/ℓ	3.2	<1	2.0	4.4	1.1	<1	<1	<1	10
Boron	µg B/ℓ	20	23	11.9	12.0	12.6	18.1	12.1	15.3	-
Barium	µg Ba/ℓ	24	29	16.6	16.8	13.4	12.4	8.6	10.9	-
Copper	µg Cu/ℓ	<1	<1	<1	1.7	5.4	<1	1.3	<1	1 000
Iron	µg Fe/ℓ	**5204**	**4101**	**4823**	**2426**	**2967**	**1291**	**2232**	**961**	200
Manganese	µg Mn/ℓ	37	35	171	74	11.5	29	74	**139**	100
Nickel	µg Ni/ℓ	<1	2.0	2.2	2.5	<1	4.1	3.8	1.9	150
Lead	µg Pb/ℓ	<1	<1	<1	2.4	<1	<1	<1	<1	20
Zinc	µg Zn/ℓ	13.3	17.9	18.6	21	16.7	19.4	11.4	9.6	5 000
Total Chromium	µg Cr/ℓ	7.0	7.4	8.7	21	8.5	13.6	14.5	10.6	100

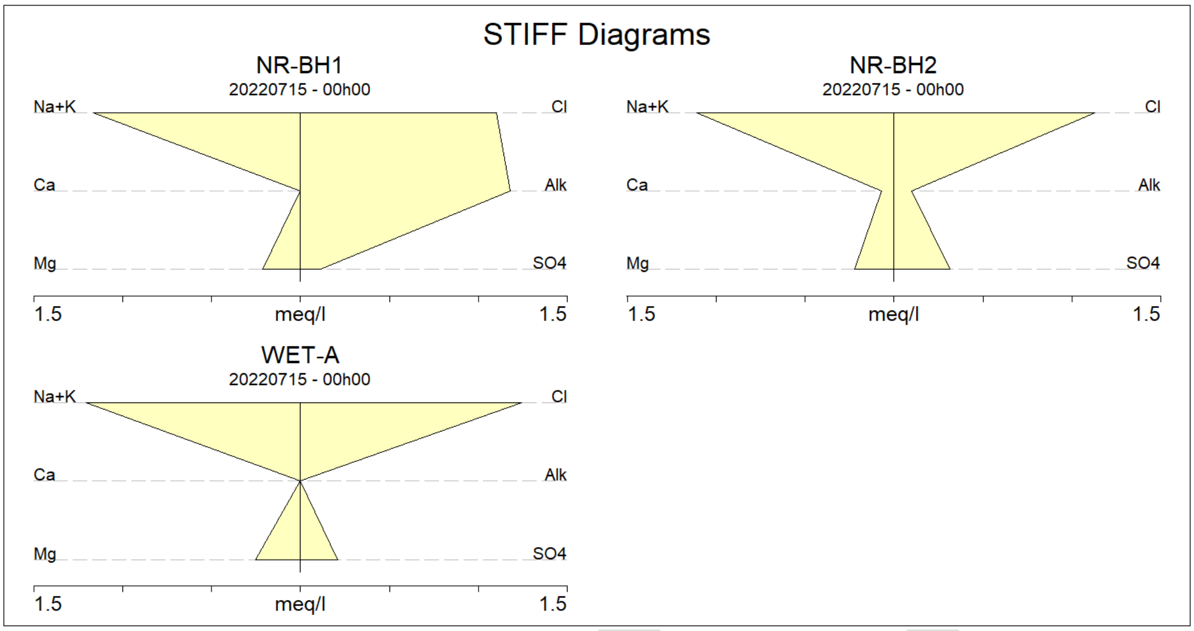


Figure 10-31: Stiff Diagram - Wetland A compared to NR-BH1 and NR-BH2

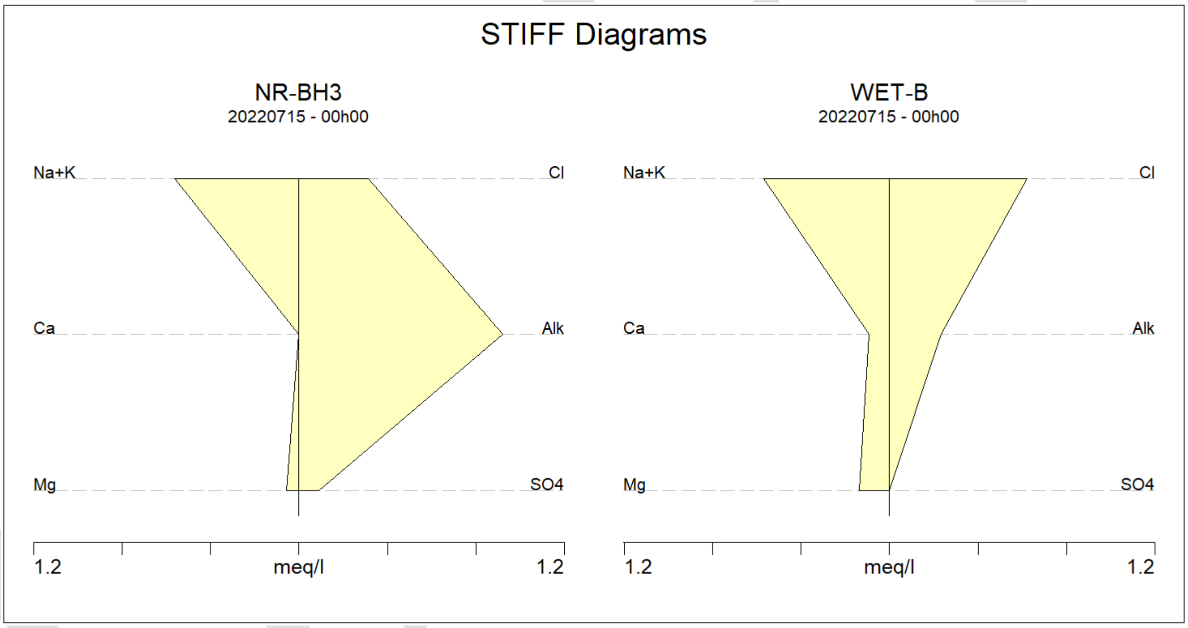


Figure 10-32: Stiff Diagram - Wetland B compared to NR-BH3

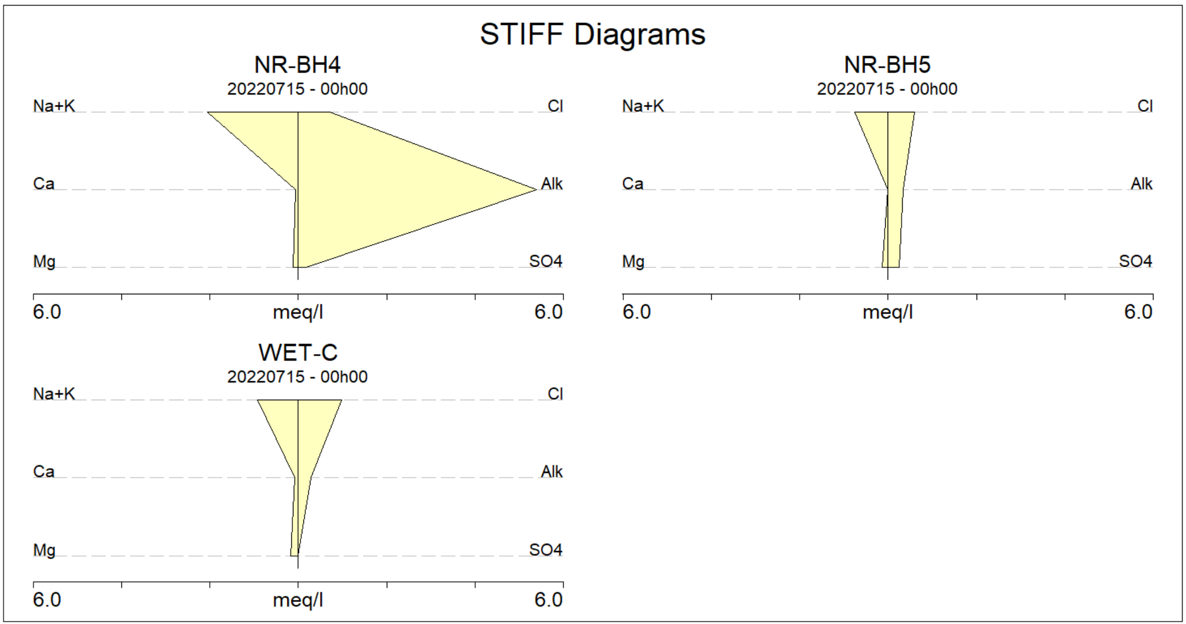


Figure 10-33: Stiff Diagram - Wetland C compared to NR-BH4 and NR-BH5

10.11.4 Aquifer Vulnerability

The highly permeable nature of the sands means infiltration to the underlying aquifer will readily occur and the shallow nature of the unconfined aquifers implies that contamination will reach the water table relatively quickly. In shallow groundwater settings (water table < 5 mbgl) can be considered as having a high probability of pollution. The aquifer is thus susceptible to potential pollution.

10.11.5 Groundwater Users

According to the National Groundwater Archive (NGA) database, there are 28 borehole records, and the Water use Authorization & Registration Management System (WARMS) database has 2 borehole records within a 5 km radius of the site but none in a 2 km radius (Figure 10-34). The closest boreholes are approximately 2 km downgradient and to the southeast of the site. The site is located close to a local topographic high, with inferred groundwater flow is towards the southwest, in the direction of the Nseleni River, south and southeast towards the harbour and local steams to the east. Although there is a registered surface water user, 3.7 km west of the site, using water from the Nseleni River for irrigation, the water user will not be affected by the proposed Nyanza project. There are several monitoring boreholes for environmental monitoring located within the various industrial facilities located in the region.

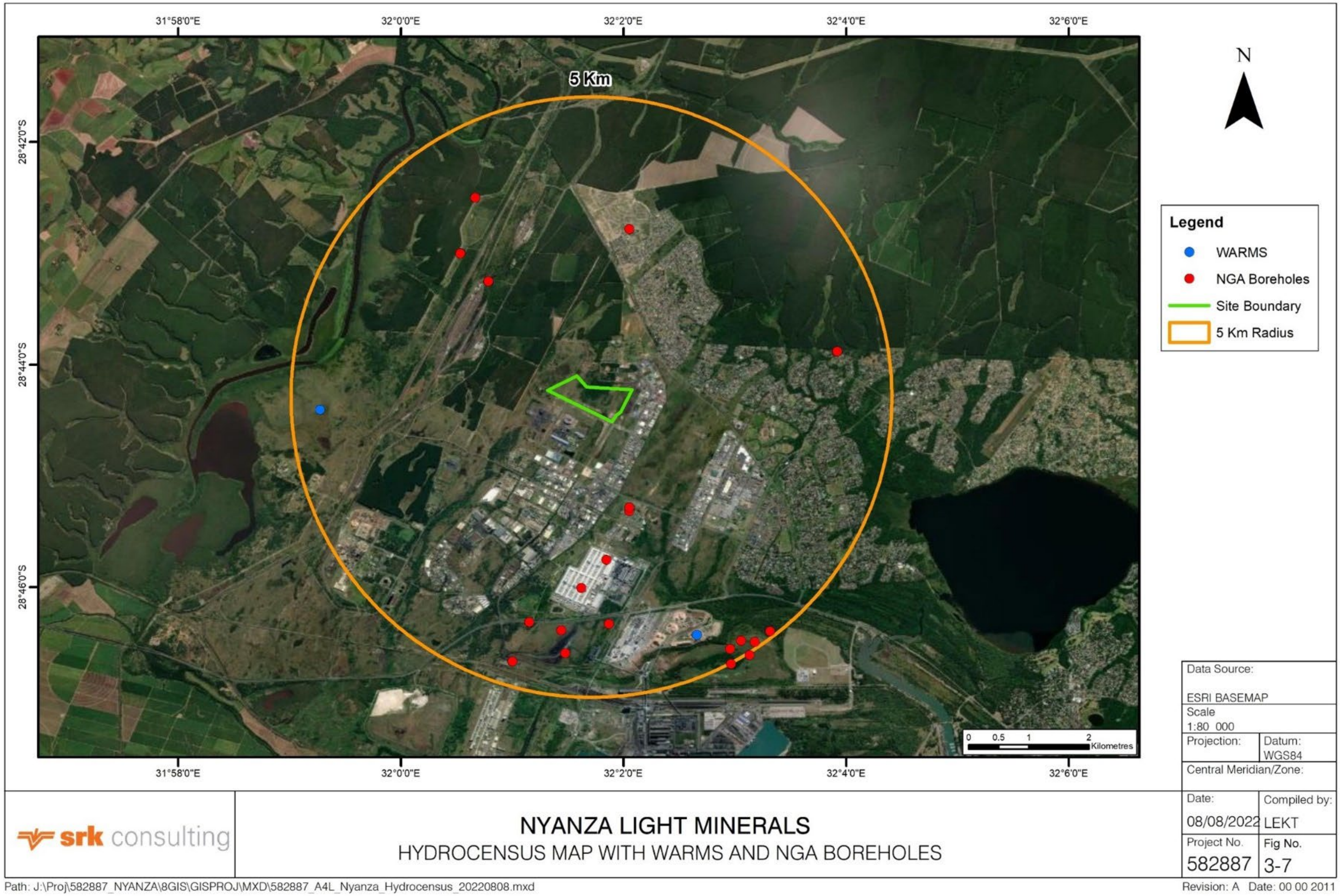


Figure 10-34: Hydrocensus Map with WARMS and NGA boreholes

10.11.6 Conceptual Model

The site is located at a local groundwater divide, and the groundwater flows is expected to be towards the local wetlands. The isotope and chemical signatures suggest the groundwater and is feeding into the surface water bodies. Recharge to groundwater is expected to be high due to the high hydraulic conductivities of the subsurface and as reported for the region (Kelbe and Germishuyse, 2001; Barath, 2015).

The underlying lithologies consists of unconsolidated clay, sandy clay, clayey sand, and sandy soils, with a hydraulic conductivity ranging from moderate for the clays, to high for the sands. The groundwater levels are shallow, ranging from 0.8 mbgl to 2.97 mbgl. The clay units could be separating the sandy aquifers. The deeper sandy unit is highly permeable, whilst the shallower sandy unit is less permeable. The aquifers are susceptible to pollution.

Seepage from effluent facilities and leachate from waste will also infiltrate and reach the water table quickly, the most important receptors are the aquatic environment associated with the wetlands.

10.11.7 Inflows into Subsurface Drains

The water table is relatively shallow, ranging from 0.76 to 1.37 mbgl. A subsoil drainage system is likely to be installed to allow for the safe construction of infrastructure and buildings, and during the operation of the site to prevent inundation of the infrastructure. The exact location of the trench is as yet unknown and will be defined during the detailed design of the plant. The stormwater management plan by Grinaker-LTA, suggests inspection sumps to be at an invert of 2.5m. A sub-surface drain length of 800m, that spans the plant is assumed.

The seepage, calculated to be 9.4 m^3/hr for an 800 m sub-surface drain, will be from the upper sand aquifer. Depending on the construction requirements a second sub-surface drain may be required, further downgradient, towards the lower end of the site. A total of 19 m^3/hr may be pumped out to keep construction areas dry and safe. The pumped-out groundwater could then be used in plant operations or discharged to the wetland.

10.12 Wetlands and Hydropedology

The wetland delineation and assessment undertaken by Scientific Aquatic Services (SAS) identified a number of wetlands located on the project site as depicted in Figure 10-35 (SAS, 2022). There are various other wetlands and bodies of water surrounding the project site.

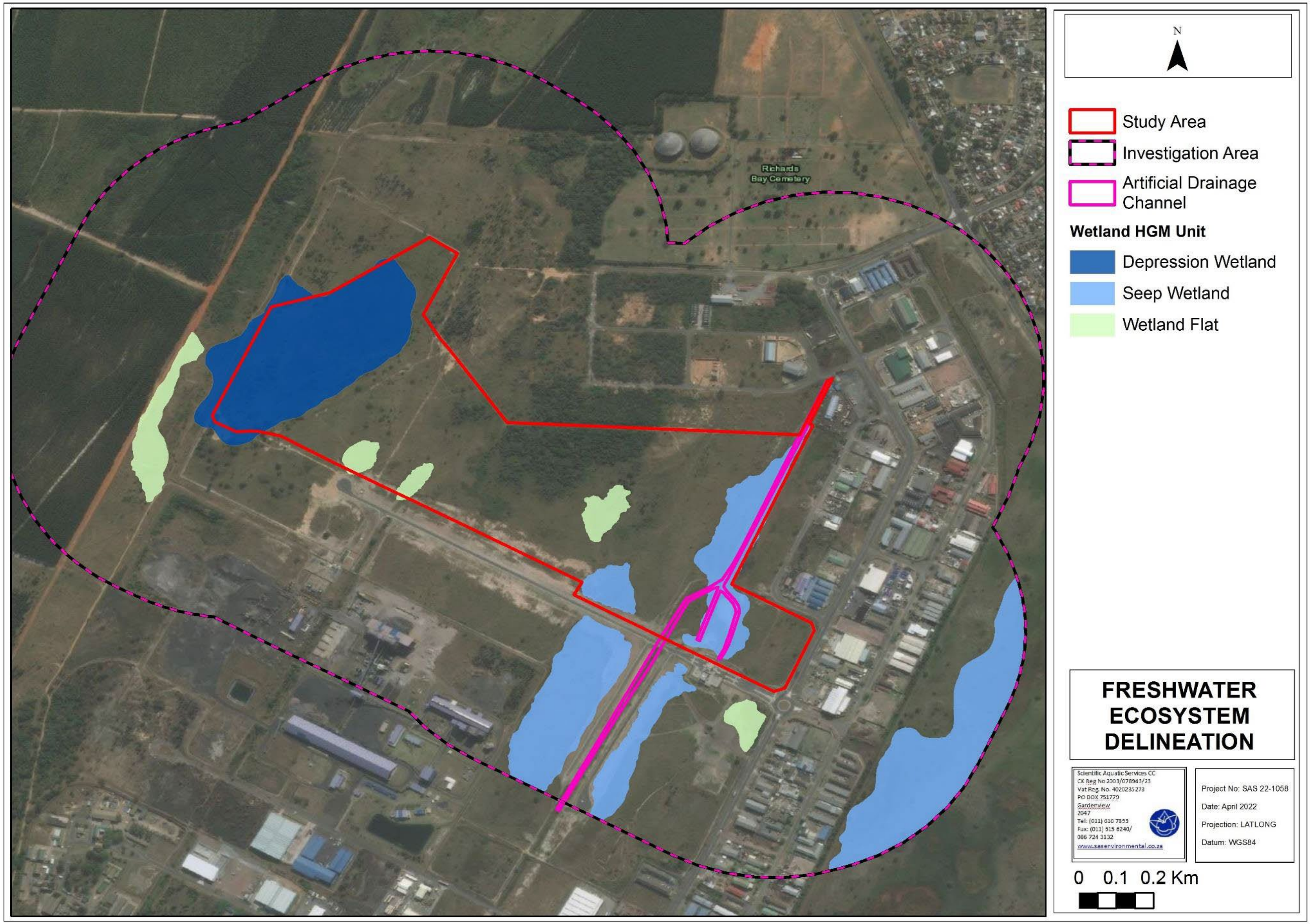


Figure 10-35: Delineated wetland within the study area

These wetlands were classified into the following hydrogeomorphic units:

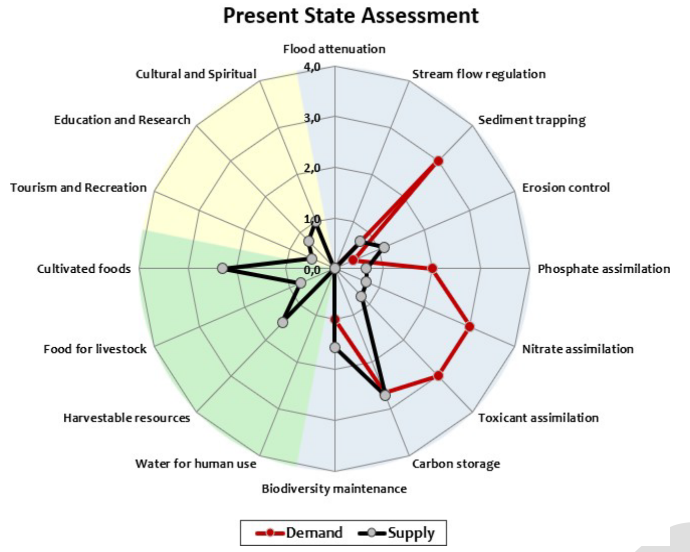
- A depression wetland – This wetland is located along the western boundary of the study area;
- Wetland flats – Three wetland flats were identified located within the central to the eastern boundary of the study area; and
- Seep wetlands – Two seep wetlands were identified along the eastern boundary of the study area.

The characteristics of the identified wetlands are summarised in Table 10-12.

Table 10-12: Characterisation of the wetlands associated with the proposed infrastructure according to the Classification System (Ollis et. al., 2013).

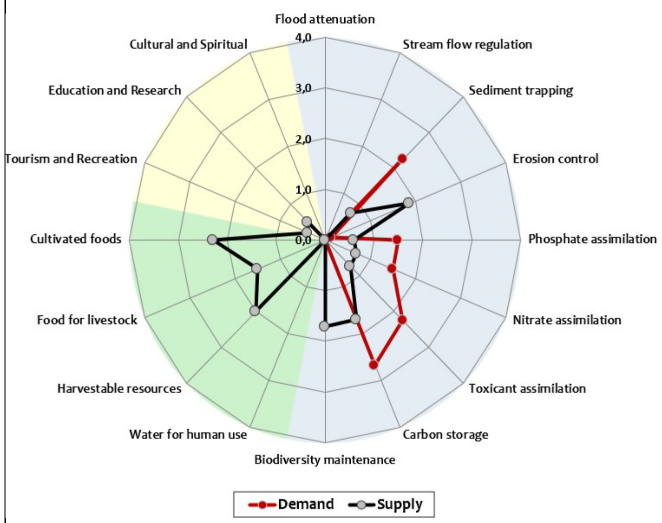
Freshwater Ecosystem	Level 3: Landscape unit	Level 4: HGM Type
Seep	Slope: An inclined stretch of ground typically located on the side of a mountain, hill, or valley, not forming part of a valley floor. Includes scarp slopes, mid-slopes, and foot-slopes.	Seep: A wetland located on gently to steeply sloping land and dominated by colluvial (i.e. gravity-driven), unidirectional movement of water and material downslope.
Depression	Plain: an extensive area of low relief. These areas are generally characterised by relatively level, gently undulating or uniformly sloping land with a very gentle gradient that is not located within a valley. Gradient is typically less than 0.01 or 1:100	Depression: A wetland or aquatic ecosystem with closed (or near closed) elevation contours which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates.
Wetland flat	Plain/ Flat: an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land.	Wetland flat: 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. Closed elevation contours are not evident around the edge of a wetland flat.

Table 10-13: Summary of the assessment of the depression wetland located along the western boundary of the study area

<table>
<tr>
<td colspan="2">Ecological & socio-cultural service provision graph:

</td>
<td colspan="2">
Figure A: Representative photographs of the depression wetland located along the western boundary of the study area.</td>
</tr>
<tr>
<td>PES discussion</td>
<td>PES Category: C (Moderately modified)
The ecological integrity of the depression wetland was assessed to be largely modified due to current and historical activities in the larger catchment. Surrounding activities have resulted in increased catchment hardening, which has over time impacted on the hydraulic regime of the wetland due to changes in the timing, timing and flows in the landscape. The increased runoff due to catchment hardening has also resulted in increased deposition of sediment within the wetland which overtime reduces the ability of the depression to provide services such as movement of water in the landscape.
In addition, this has impacted on the hydroperiod of the wetland and has augmented wetness response observed in some parts of the system. The vegetation community was largely uniform, dominated by Phragmites australis (Common reed).</td>
<td>Ecoservice provision</td>
<td>Very Low to Moderate
The ecoservice provision by the wetland was assessed to be very low to moderate. Due to the activities in the catchment (industrial and urban development), which have increased the prevalence of excess nutrients and toxicants, the demand for services such as sediment trapping, nitrate assimilation, and toxicant assimilation was considered moderate. Given the robust vegetation within the wetland, it is considered likely that it is also an important feature in the landscape for biodiversity maintenance, particularly for amphibians and avifaunal species.
However, direct benefits to people such as socio-cultural benefits and water supply were considered limited due to the industrial area which the wetland is located as well as inaccessibility to the site due to security.</td>
</tr>
</table>

<table>
<tr><td>EIS discussion</td><td>EIS Category: Moderate
The system is considered of moderate ecological importance and sensitivity (EIS) as a result of its important for the provision of ecoservices such as toxicant assimilation, flood attenuation, sediment trapping and nitrate assimilation. The wetland vegetation group within which the investigation are occurs is the Indian Ocean Coastal Belt Group 1 wetland vegetation group which is classified as Least Threatened (Mbona et al., 2015).</td><td>REC, RMO & BAS Category</td><td>REC: C
BAS: C
RMO: Maintain
The Recommended Management Objective (RMO) based on the PES and the EIS scores is to maintain the ecological integrity of the system. No further degradation should be permitted. Given the existing impacts that the wetland is subjected to, no further degradation should occur, and any future developments must ensure that they do not result in further impacts to the system.</td></tr>
<tr><td colspan="4">Wetland drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The wetlands within the study area are primarily driven by sub-surface inputs. In addition, the location of the wetland in the landscape is considered water-logged in nature comprising predominantly wetland habitat due to its position in the low lying coastal plain. The hydraulic regime of the wetland has been impacted by increased catchment hardening from the informal roads/paths and surface infrastructure which is likely to increase water inputs into the system. The presence of the informal roads has also resulted in the fragmentation of the wetland to a degree, although the impact of this is not considered to be significant at the time.
At the time of the assessment, although some surface water was observed within the depression wetland, a significant amount of rainfall had been received within Richards Bay area prior to the assessment, and as such, a water quality assessment on site was not undertaken as this would not entirely be representative of the actual surface water quality within the wetland.
The floral assemblage of the wetland consisted of robust vegetation (predominantly the Phragmites australis (common reed)) which is likely to provide habitat for faunal and avifaunal species. In addition, the reeds potentially provide breeding and feeding habitat for amphibian and less sensitive avifaunal species. The vegetation cover has been impacted to a degree by the presence of some informal access roads which fragment the habitat but remains largely intact.</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">Medium
The risk to the depression wetland was considered medium considering the proposed development plans. Although the footprint of the proposed infrastructure will not encroach directly on the delineated extent of the wetland, it is important that the infrastructure is located, at a minimum outside the 30 m KwaZulu – Natal wetland biodiversity buffer. In addition, given that the Richards Bay area is associated with periodic rainfall events, it is recommended that general ‘good practice’ mitigation measures relating to management of runoff from the active construction areas be implemented during all phases of the project to minimise sediment laden runoff reaching the depression wetland.</td></tr>
<tr><td colspan="4">Impact Significance & Business Case:</td></tr>
<tr><td>Medium</td><td colspan="3">The impact significance of the proposed infrastructure was ascertained to be of medium significance. According to the layout, the development will be located within 500m of the depression wetland which is a regulated area of the watercourse in accordance with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998). To reduce the impact significance, it must be ensured that the development footprint areas associated with the proposed infrastructure should remain as small as possible and the boundaries of footprint area, must be clearly defined and it should be ensured that all activities remain within defined footprint area. Existing roads must be utilised by construction vehicles during the construction phase of the project. Any sheet runoff from compacted areas should be slowed down by the strategic placement of berms.
In addition, it must be ensured that stormwater generated during the lifecycle of the proposed infrastructure is suitably managed according to a site-specific stormwater management plan. No water may be directly released from the proposed development into the wetland but must rather be suitably managed and released diffusely into the landscape as mentioned. As far as possible soft engineering techniques should be used to achieve this.</td></tr>
</table>

Table 10-14: Summary of the assessment of the seep wetlands located within the central and eastern boundary of the study area

<table>
<tr>
<td colspan="2">Ecological & socio-cultural service provision graph:

</td>
<td colspan="2">
Figure B: Representative photographs of the seep wetlands located within the central and eastern boundary of the study area.</td>
</tr>
<tr>
<td>PES discussion</td>
<td>PES: Largely Modified (Category D)
The seep wetlands identified were ascertained to be in a largely modified ecological condition at the time of the assessment. The ecological integrity of the wetlands has been historically impacted by transformations in the wider catchment linked to development of various industries and residential areas.
The presence of informal roads as indicated in Figure B has also resulted in the fragmentation of the wetlands and potentially subsequent desiccation of downgradient portions. The wetlands have also been impacted by presence of drainage canals which has resulted in changes the natural flow, pattern, and timing within the wetlands. The canals were likely constructed historically to mitigate flooding in the area and enable development of service buildings in the area.</td>
<td>Ecoservice provision</td>
<td>Very Low to Moderate
The ecoservice provision by the wetlands was assessed to be very low to moderate. Despite this, ecological services such as such as sediment trapping, nitrate assimilation, toxicant assimilation and toxicant assimilation was considered moderate as a result of the activities in the catchment.
The wetland system is located in a largely industrial area and the supply of ecoservice which could potentially be directly beneficial to localised communities such as socio-cultural services and harvestable natural resources is considered to be limited.</td>
</tr>
</table>

<table>
<tr><td>EIS discussion</td><td>EIS Category: Moderate
The overall ecological importance and sensitivity of the seep wetlands were defined as moderate. The ecological importance of the HGM unit was largely attributed to the provision of ecological services such as nitrate assimilation, phosphate assimilation and flood attenuation. The wetland vegetation group within which the investigation are occurs is the Indian Ocean Coastal Belt Group 1 wetland vegetation group which is classified as Least Threatened (Mbona et al., 2015).</td><td>REC, RMO & BAS Category</td><td>REC: D
BAS: C/D
RMO: Maintain
Given that the proposed infrastructure will result in the complete loss of the seep wetlands since the wetlands are going to be infilled. The offset arrangements made under the RBIDZ EA must be implemented, as part of the overall biodiversity Management Plan be implemented to compensate for the overall loss of wetland habitat and this should aim to ensure that a no net loss and/or net positive impact is achieved.</td></tr>
<tr><td colspan="4">Wetland drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The hydraulic regime of the wetlands has been impacted by current and historical activities within the wetlands and as well as its larger catchment. Since the seep wetlands are largely driven by sub-surface water input from areas upgradient of the wetlands, it is likely that activities associated with the development of industries upgradient has impacted on the water inputs into the HGM units. The wetlands have also been impacted by presence of drainage canals within the study area which were likely constructed historically to mitigate flooding in the area and enable development of service buildings in the area. The development of access roads (as indicated in the figure) along the fence line has also impacted on the natural distribution and retention patterns of water within the seep.
Significant rainfall was received on the day of the assessment and as such no water quality was sampled since the condition of the water at the time would not have been representative of the conditions of the at the site. It is however likely that the water quality will be impaired as a result of the presence of contaminants such as nitrates and phosphates, due to the surrounding activities upstream of the assessed reach.
Desiccation of the wetlands within some portions due to loss of hydrological connectivity has resulted in the loss of hydrophytic vegetation and basal cover within the wetlands. This has increased the vulnerability of the wetlands to impacts from soil erosion. Due to increased topsoil disturbances within the in the study area, preferential flow paths which further impact on the natural distribution of water and sediment within the wetlands have been created. The clearing of vegetation and increase of hardened surfaces due to presence of informal roads within and adjacent to the seep wetlands has reduced infiltration rates. This has further created standing pools of water where hydrophytic vegetation has established where it otherwise would not have. Other impacts from the cleared vegetation include general loss of wetland habitat and increase sediment laden runoff into the wetlands which is expected to be severe during periods of high rainfall.
The seep vegetation composition comprised both obligate wetland species, specifically Nymphaea nouchali which is considered to be of conservation importance, and facultative wetland species which include Cyperus denudatus, Cyperus fastigatus and Cyperus latifolious. Some stands of alien and invasive species including disturbance indicators were identified with species such as Bidens pilosa, Verbena bonariensis. Within the drainage canals, vegetation composition largely comprised stands of Typha capensis with stagnant to slow moving water.</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">High
The extent of modification to the seep wetlands was considered to be high given that the seep wetlands within the study area will be completely lost due to infilling. This will result in a complete loss of ecological functioning for these wetlands.</td></tr>
<tr><td colspan="4">Business Case:</td></tr>
<tr><td colspan="4">Authorisation has previously been granted for infilling of this wetland. In addition, there are offset arrangements that were made as part of the IDZ EIA process to ensure no net loss of wetlands and biodiversity.</td></tr>
</table>

Table 10-15: Summary of the assessment of the wetland flats located within the central portion of the study area.

Ecological & socio-cultural service provision graph:

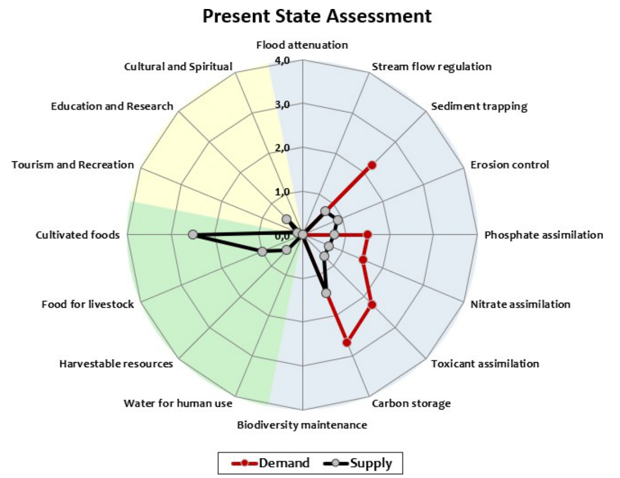


Figure C: Representative photographs of the wetland flats located within the central portion of the study area.

PES discussion	**PES: Largely Modified (Category D)** The wetland flats within the study area were ascertained to be in a largely modified ecological condition at the time of the assessment. The historical developments within the study area have resulted in changes in the ecological integrity of the wetlands through activities such as removal of vegetation, increased impervious surfaces which have impacted on runoff and water retention and distribution patterns within the wetland and within the wider catchment. In addition, these various activities have resulted in the geomorphological regime of the wetland.	**Ecoservice provision**	**Ecoservices category: Low to Moderate** The ecoservice provision by the wetland was assessed to be very low to low. The wetland system is located in a largely industrial area, and as such the demand for provision of important ecological services such as sediment trapping, nitrate assimilation, toxicant assimilation and toxicant assimilation is considered moderate, although the supply is limited to a degree due to current and historical activities which have impacted the ecological integrity of the system. The wetland is within an accessed controlled site and as such its ability to provide services linked to provision of socio-cultural benefits such as provision of harvestable resources for crafts is considered very limited.
EIS discussion	**EIS Category: Moderate** The wetland flats were ascertained to be of moderate ecological importance and sensitivity (EIS) at the time of the assessment largely because of its hydro- functional importance and provision of regulating and supporting benefits in the landscape. Due to general activities in the wider catchment, ecological services such as nitrate assimilation, phosphate assimilation and flood attenuation were considered important.	**REC, RMO & BAS Category**	**REC: C /BAS: C/ RMO: Maintain** Given that the proposed infrastructure will result in the complete loss of the wetlands since the wetlands are going to be infilled, a recommended management objective (RMO) cannot be specified for the particular wetlands.

Wetland drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):

Construction of infrastructure such as roads adjacent to and within the freshwater systems have altered the natural hydraulic regime of the wetlands. The wetland flats have also been subjected to impacts from excavations, infilling, indiscriminate disposal of waste and sediment deposition associated with historical activities in the broader catchment. The water distribution and retention patterns have been impacted as a result of the excavations and vegetation removal associated with the access roads. Given that the wetland setting, the surface water quality is likely to be impacted by the potentially contaminated runoff (in the form of runoff containing hydrocarbons and sediment amongst others) from the surrounding industrial development. Due to these disturbances, as well as soil disturbances, preferential flow paths which further impact on the natural distribution of water and sediment within the wetland have been created. In terms of habitat and biota, the vegetation composition within the wetlands has been largely impacted by vegetation clearing in portions of the wetland and significant proliferation of woody vegetation, including alien and invasive species.	
Extent of modification anticipated	**High** The extent of modification to the seep wetlands was considered high given that the seep wetlands within the study area will be completely lost due to infilling. This will result in a complete loss of ecological functioning for these wetlands.
Business Case:	
Authorisation has previously been granted for infilling of this wetland. In addition, there are offset arrangements that were made as part of the IDZ EIA process to ensure no net loss of wetlands and biodiversity.	

10.13 Areas of Conservation Concern

According to Figure 10-36 the proposed development site for the 80 000 tpa TiO_2 Pigment Plant is not situated within a Marine Protected Environment or South African Protected Area. The project site is, however, located in a Critical Biodiversity Area (areas that are required to meet biodiversity targets for species, ecosystems, or ecological processes) as shown in Figure 10-37.

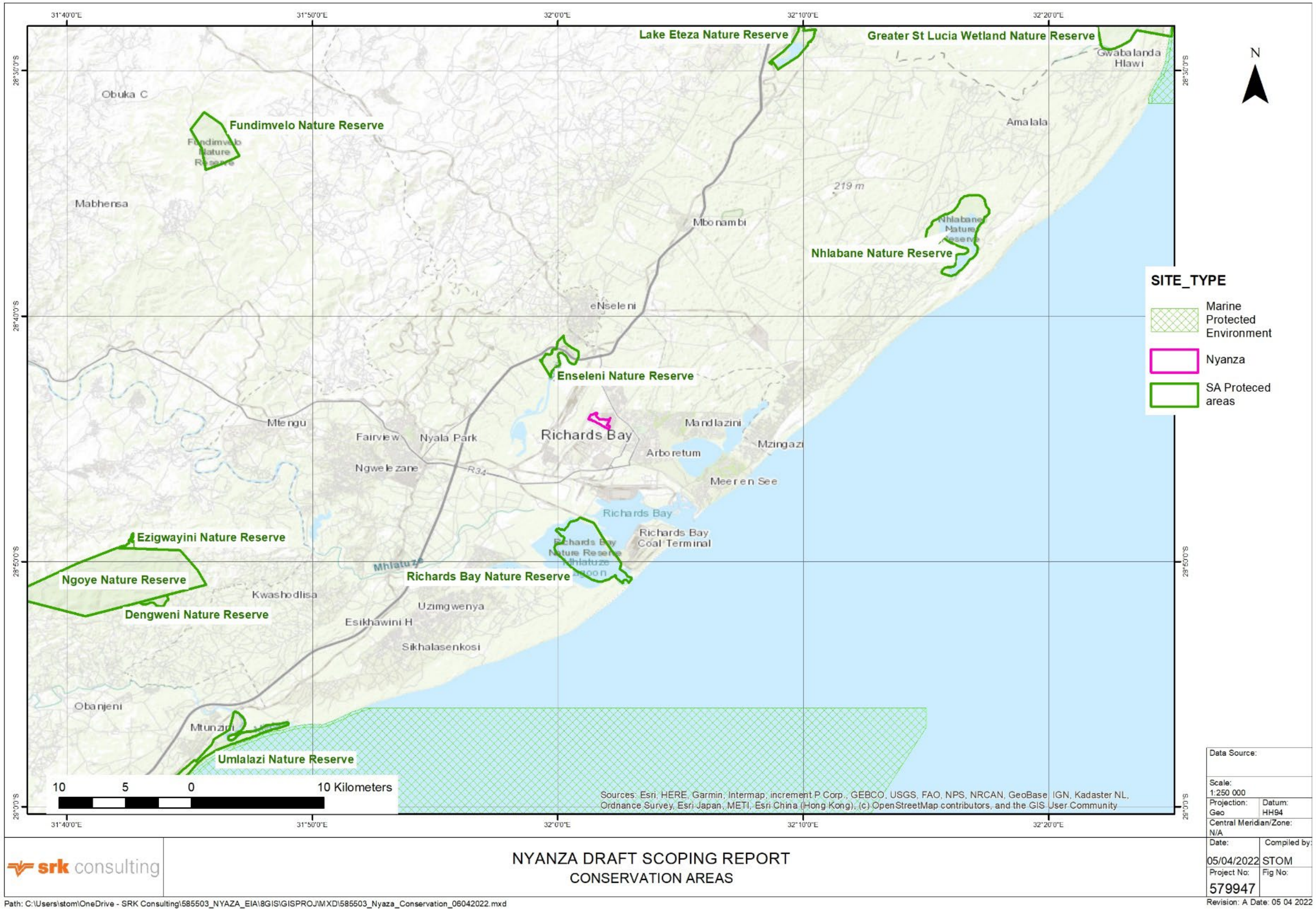


Figure 10-36: Areas of conservation concern

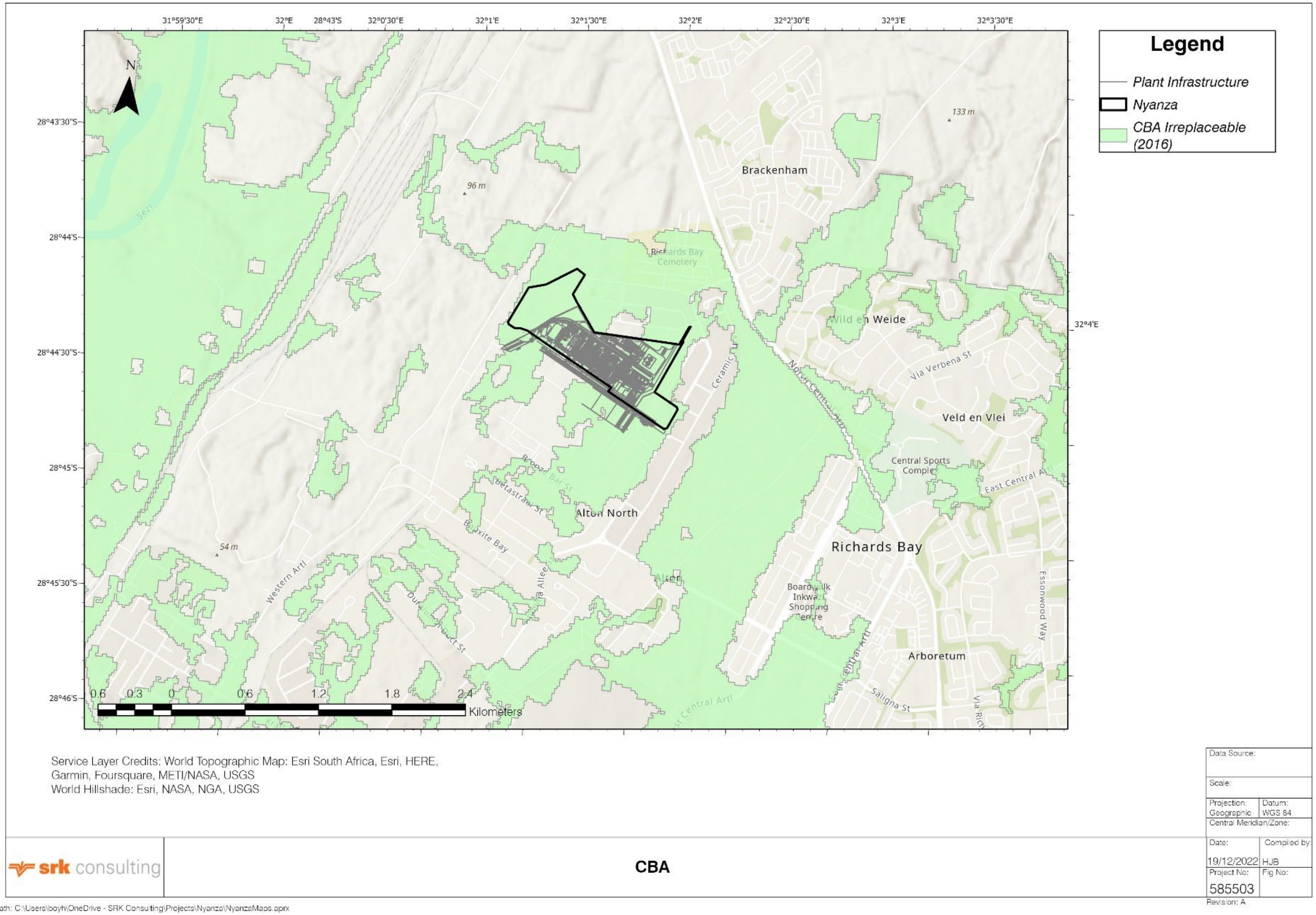


Figure 10-37: Critical Biodiversity Areas

10.14 Biodiversity

10.14.1 Flora

The floral assessment undertaken found the following:

- Broad-scale Vegetation Characteristics: The study area's vegetation type is the Maputaland Wood Grassland which is listed as endangered (Mucina & Rutherford, 2006); (SANBI, 2018). According to the KwaZulu-Natal Systemic Conservation Plan (KZNSCP), the study area consists of freshwater wetlands, KwaZulu-Natal Coastal Forests, and Maputaland Wooded Grassland. The KwaZulu-Natal Coastal Forests correlate with the Northern Coastal Forest (Mucina & Rutherford, 2006). Reference states for the study area are thus formed by the Maputaland Wooded Grassland and the Northern Coastal Forest.
- Habitat Unit Results: Five broad habitat units were identified as (1) Degraded Hygrophilous Grassland, (2) Degraded Coastal Forest, (3) Thicket Habitat, (4) Freshwater Habitat, and (5) Transformed Habitat as shown in Figure 10-38 (photographs illustrating the typical habitat associated with the four (4) main habitat units identified within the affected property) and Figure 10-39 (Conceptual illustration of the preliminary habitat units associated with the study area).
    - The Degraded Hygrophilous Grassland habitat has low floral species richness with a homogenous grassy layer consisting of scattered woody shrubs. The habitat can also be described as moist grassland. The abundance in the Degraded Hygrophilous Grassland habitat was low and the herbaceous layer was poorly developed. The unit, however, still proves habitat for an intermediate abundance of fauna and remains an important supporting unit.
    - The Degraded Coastal Forest is mostly found in the study area's northern, central regions. This habitat consists of overlapping tree canopies and poorly developed grass layer. Faunal species favoured specifically the arboreal species. The Degraded Coastal Forest habitat had a moderately high species richness. Floral diversity was lower where AIP proliferation is evident. The habitat edges transition into encroached, dense thickets.
    - The thicket habitat is situated in the northern, central regions, surrounded by the Degraded Coastal Forest habitat. This habitat is characterised by a dense shrub and tree layer and was tree-dominated. Significant AIP proliferation and bush encroachment was observed. Valuable shelter was provided by with habitat due to the encroachment but reduced floral diversity limits forage availability.
    - The Freshwater Habitat consists of natural watercourse features and artificial freshwater features. All wetlands, although different, shared similar species. The Depression Wetland also supports obligate wetland species and provides a faunal niche habitat. This wetland also functions as a corridor and provides connectivity within the landscape and should be retained where possible. The Depression Wetland's floral diversity was moderate, while that of the Seep Wetlands and Wetland Flats varies between moderate and moderately low. The Earth canal supported a moderate to moderately low diversity of flora.
    - The Transformed Habitat experienced complete transformation for the development of infrastructure. No habitat was available for plant species.

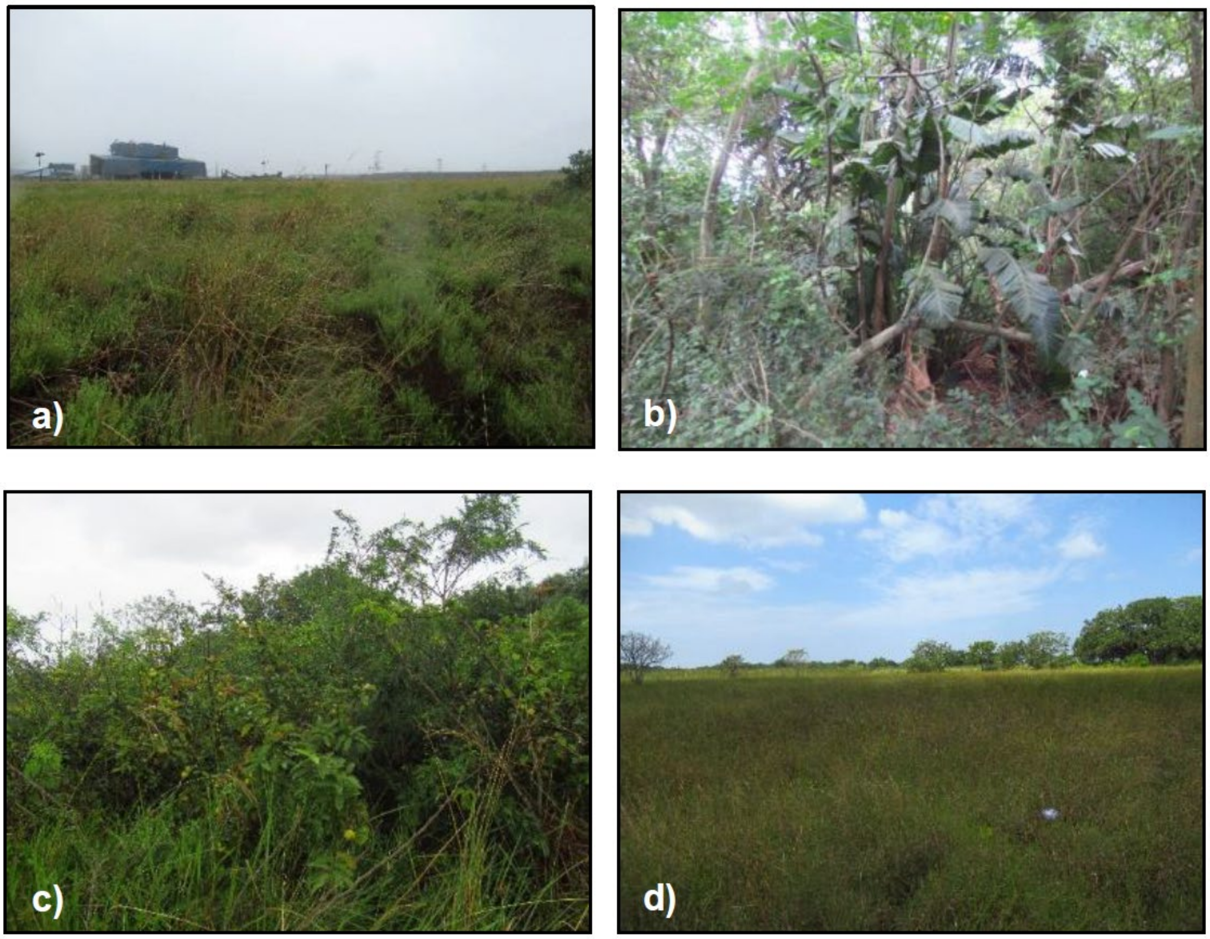


Figure 10-38: Photographs illustrating the typical habitat associated with the four main habitat units identified within the study area: a) Degraded Hygrophilous Grassland, b) Degraded Coastal Forest, Thicket Habitat, and d) Freshwater Habitat

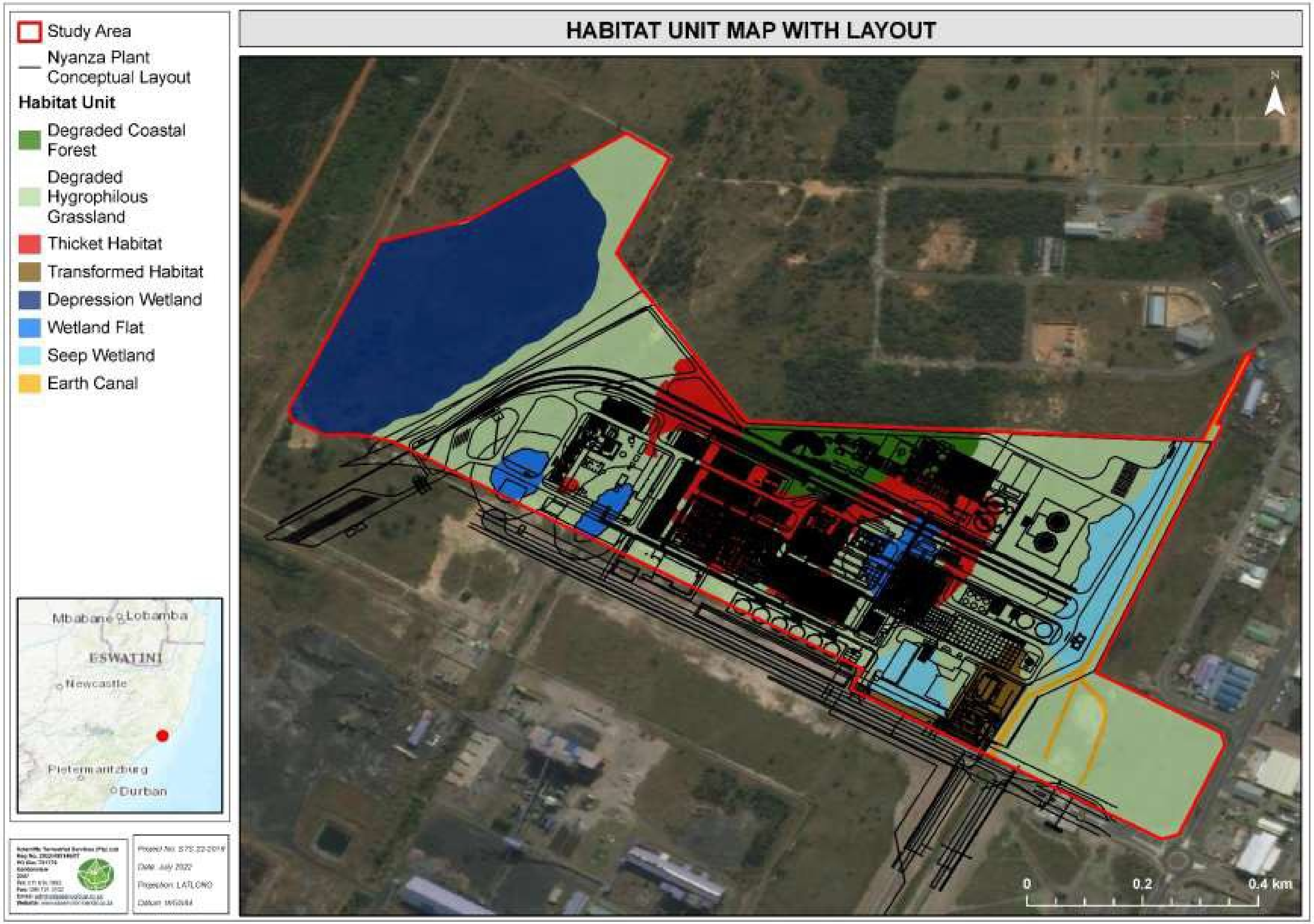


Figure 10-39: Conceptual illustration of the preliminary habitat units associated with the study area

- Species of Conservation Concern (SCC): The different habitats were characterised by different habitats and associated conditions. As such, each habitat provides different habitat for a variety of SCC. Table 2 and 3 below presents the preliminary floral and Faunal SCC assessments for the study area. Probability of Occurrence (POC; e.g., Confirmed, High, Medium, or Low) is additionally provided as an indication of the likelihood of finding each species within the study area. It should be noted that permits from Ezemvelo KZN Wildlife and authorisation from the Department of Forestry, Fisheries, and the Environment (DFFE) will be required to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

  It should be noted that during Phase 1F of the RBIDZ (refer to Nemai Consulting (2016)), several SCC were identified within the study area (namely *Boophone disticha, Crinum macowanii, Eulophia speciosa,* and *Hypoxis hemerocallidea*). Necessary permits for the relocation of these species were applied for by the proponent at the responsible authorities. Subsequent permits for the relocation of the applicable SCC were approved and issued by the Ezemvelo KZN Wildlife Permits Office (permit reference: OP 836/2022) to the proponent. During the field assessment conducted by STS in April 2022, the permitted species were relocated (when located on site) to the desired location (as stipulated in the permit) in the northeast of the study area in which future infrastructure is not planned.

Table 10-16 provides a summary of the floral SCC Possibility of Occurrence (POC) within the study site.

Table 10-16: Floral SCC assessment (including PO) within the study area for various species

Habitat Unit	Protection status	Relevant Species	POC
Degraded Hygrophilous Grassland	RDL Species[16]	None recorded during field assessment	Low
	KZNNCMA	*Crinum macowanii* (LC)	Confirmed
		Disa woodii (LC)	Confirmed
		Boophone disticha (LC)	High
		Eulophia Speciosa (LC)	High
	TOPs List	None recorded during field assessment	Low
	NFA Trees	None recorded during field assessment	Low
Degraded Coastal Forest	RDL Species	Sensitive species 1252[17] (VU)	High
		Cassipourea gummiflua var. *verticillata* (VU).	Medium
	KZNNCMA	Orchidaceae Family	High
		Sideroxylon inerme (LC; also protected under NFA)	High
	TOPs List	None recorded during field assessment	Low
	NFA Trees	*Catha edulis* (LC)	High
		Pittosporum viridiflorum (LC)	High
		Sideroxylon inerme (LC; also protected under KZNNCMA	Medium
Thicket Habitat	RDL Species	None recorded during field assessment	Low
	KZNNCMA	*Crinum macowanii* (LC)	Confirmed
		Sideroxylon inerme (LC; also protected under NFA)	Low
	TOPs List	None recorded during field assessment	Low
	NFA Trees	*Balanites maughamii* (LC)	Medium

Habitat Unit	Protection status	Relevant Species	POC
		Catha edulis (LC)	Medium
		Sclerocarya birrea subsp. caffra (LC)	Medium
		Sideroxylon inerme (LC; also protected under KZNNCMA)	Medium
Freshwater Habitat	RDL Species	*Fimbrisylis aphylla* (VU)	Medium
		Thesium polygaloides (VU)	Medium
	KZNNCMA	*Disa woodii* (LC)	Confirmed
	TOPS	None recorded during field assessment	Low
	NFA Trees	None recorded during field assessment	Low
Transformed Habitat	All	None recorded during field assessment	Low

Table 10-17: Faunal SCC assessment (including POC) within the study area for various species

Habitat Unit	Protection status	Relevant Species	POC
Degraded Hygrophilous Grassland	VU	*Circus ranivorus* (Marsh Harrier)	Medium
	NT	*Circaetus fasciolatus* (Southern Banded Snake Eagle)	Medium
	EN	*Hyperolius pickersgilli* (Pickersgill's Reed Frog)	Medium
	NT	*Hemisus guttatus* (Spotted Shovel-nosed Frog)	Medium
Degraded Coastal Forest	VU	*Dendroaspis angusticeps* (Green Mamba)	Medium
	EN	*Hyperolius pickersgilli* (Pickersgill's Reed Frog)	Medium
	VU	Sensitive species 7	Low
	NT	*Circaetus fasciolatus* (Southern Banded Snake Eagle)	Medium
	VU	*Geokichla guttata* (Spotted-ground-thrush)	Medium
	VU	*Arytropteris basalis* (Flat-necked Shieldback)	Medium
	VU	*Pomatonota dregei* (East Coast Katydid)	Medium
Thicket Habitat	VU	*Geokichla guttata* (Spotted-ground-thrush)	Low
	VU	*Arytropteris basalis* (Flat-necked Shieldback)	Low
	EN	*Hyperolius pickersgilli* (Pickersgill's Reed Frog)	Low
	VU	*Dendroaspis angusticeps* (Green Mamba)	Medium
	VU	Sensitive species 7	Low
	NT	*Hemisus guttatus* (Spotted Shovel-nosed Frog)	Medium
Freshwater Habitat	EN	*Hyperolius pickersgilli* (Pickersgill's Reed Frog)	High
	VU	*Circus ranivorus* (Marsh Harrier)	High
	NT	*Circaetus fasciolatus* (Southern Banded Snake Eagle)	Low
	LC	*Pelusios rhodesianus* (Variable Hinged Terrapin)	High
	EN	Sensitive species 1	Low
	LC but CITES	Sensitive species 2	Medium
	NT	*Hemisus guttatus* (Spotted Shovel-nosed Frog)	High

- Sensitivity: Figure 10-40 conceptually illustrates the habitats considered to be of varying ecological sensitivity (from a floral and faunal perspective respectively) and how they will be impacted by the proposed infrastructure development.

  The floral sensitivity is depicted according to the sensitivity of each habitat in terms of the presence or potential for floral SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity (compared to a reference type).The faunal sensitivity is depicted according to the sensitivity of each habitat in terms of the presence or potential for faunal SCC, faunal diversity, food availability, habitat integrity, and habitat availability.

Table 10-18 provides an indication of the sensitivity associated with each habitat unit within the study area.

Table 10-18: Floral and faunal sensitivity associated with the habitats of the study area.

Habitat Unit	Floral Sensitivity	Faunal Sensitivity
Degraded Hygrophilous Grassland	Moderately Low	Intermediate
Degraded Coastal Forest	Moderately High	Moderately High
Thicket Habitat	Moderately Low	Intermediate
Freshwater Habitat: Depression Wetland	Moderately High	Moderately High
Freshwater Habitat: Wetland Flats & Earth Canal	Intermediate	Intermediate
Transformed Habitat	Low	Low

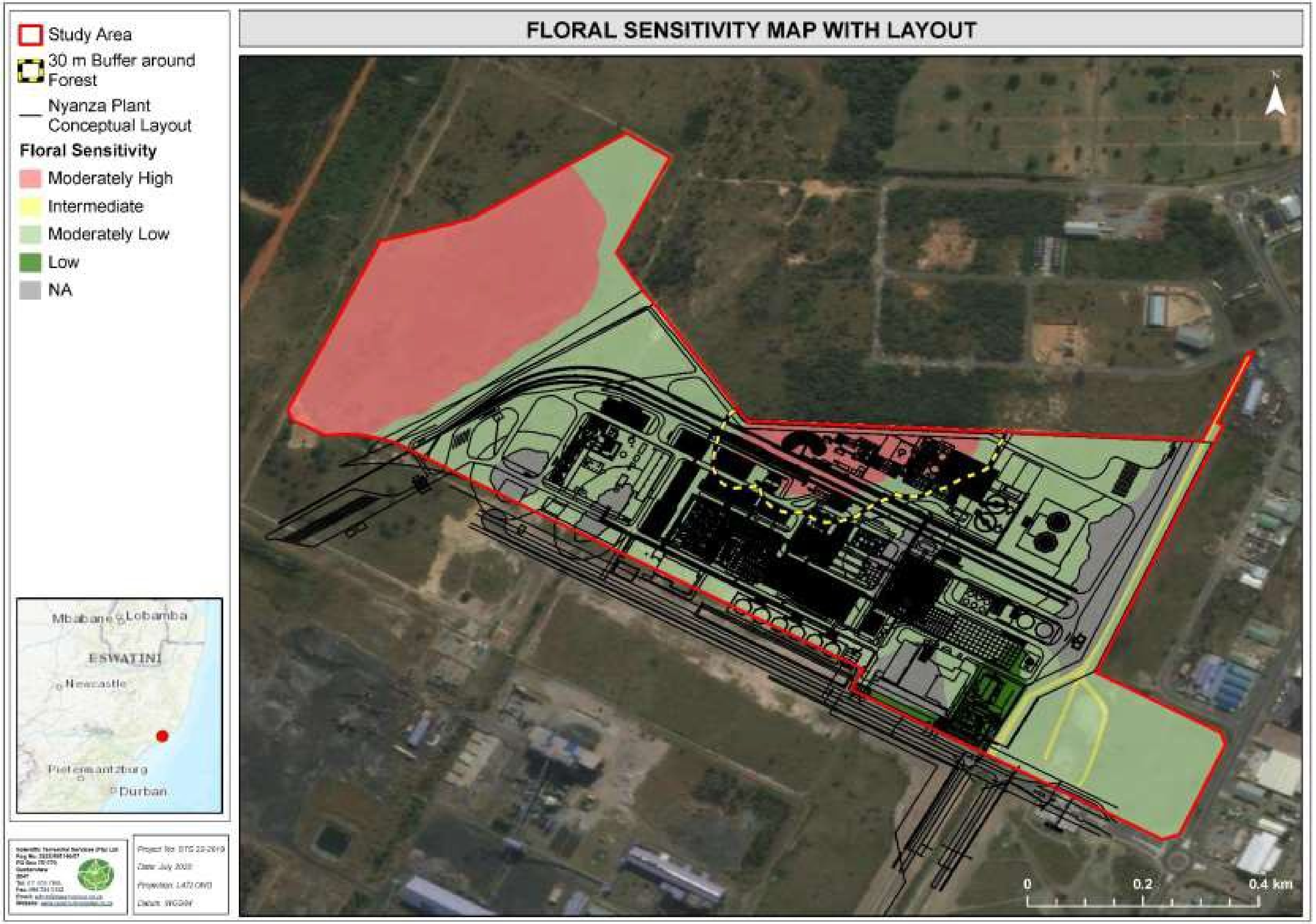


Figure 10-40: Conceptual illustration of the floral sensitivity associated with study area as identified during the field assessment

10.14.2 Fauna

The results from the faunal assessment were as follows:

- Faunal Habitats: Five broad habitat units are associated with the study area. The five broad habitat units include (Figure 10-41):
  - Degraded Hygrophilous Grassland: This habitat unit comprises of a moderately low floral species richness with reduced forage diversity for herbivorous faunal species. The habitat is generally characterised by a moist homogenous grassy layer in which scattered woody shrub species occurred, providing limited structural diversity within this unit for fauna. The habitat unit is moist and provides suitable habitat for amphibians and other species to forage within. Reduced floral heterogeneity did reduce faunal forage abundance and diversity, nonetheles0s the unit still provided habitat for an intermediate diversity of fauna. The reduced abundance of valuable niche habitat reduces the sensitivity from a faunal perspective; however, this habitat remains an important supporting unit;
  - Degraded Coastal Forest: The Degraded Coastal Forest habitat unit was located mainly within the northern-central regions of the study area. This tree-dominated habitat was characterised by the presence of overlapping tree canopies, and a poorly developed grassy layer. This unit was favoured by fauna, particularly arboreal species, where higher floral diversity and variable habitat structure provide valuable forage and shelter for fauna. This unit has experienced anthropogenic influences – historic use of the area by vagrants is evident within the habitat which may have impacted on faunal abundances through direct persecution. However, the unique characters of the unit provide niche habitat for several potential SCC. Some AIP proliferation has occurred around the borders of this unit which has degraded the habitat slightly for fauna. The edges of this habitat transition into dense, encroached thickets with lower forage abundances for fauna;
  - Thicket Habitat: The Thicket habitat unit was located mainly within the central regions of the study area in close association with the Degraded Coastal Forest habitat. This habitat consisted of a dense tree, shrub layer and graminoid layer which provides valuable shelter for most fauna, however, the homogeneity of the floral community does limit the abundance of forage within the unit for herbivorous. Smaller avifauna which show preference to dense thickets may find valuable habitat herein whilst other small faunal species are likely to utilise these dense areas for refuge. Bush encroachment within the area is likely due to the suppression of fire and the lack of herbivory;
  - Freshwater Habitat: The Freshwater Habitat was associated with 1) natural watercourse[1] features (including a Depression Wetland[2], Wetland Flats[3] and Seep Wetlands[4]), and 2) artificial freshwater features, including a man-made canal (hereafter earth canal) that runs through one of the Seep wetlands (SAS 22-1058 (2022)). The natural watercourse features provided valuable niche habitat for fauna, including potential SCC, and will be particularly favoured by amphibians, avifauna, and invertebrates. The Depression Wetland unit will also function as a corridor and connectivity within the landscape should be retained as far as possible. The earth canals, although of reduced quality, do still provide habitat for fauna and were utilised as movement corridors within the study area, particularly by avifaunal and herpetofaunal species. Although several wetland types were identified during the field assessment (i.e., Seep Wetlands, Wetland Flats, and a Depression Wetland) and are discussed in the sections below, EA (Ref: 14/12/16/3/3/2/665 and 14/12/16/3/3/1/1382) has already been granted for the infill of the Seep Wetlands and Wetland flats. As such, although these wetlands have yet to be infilled, they are only included in the habitat writeup. Given that EA has been granted for

their infill, no sensitivity will be assigned to these wetlands and associated impacts will thus not be discussed; and

- o Transformed Habitat: The Transformed Habitat was associated with the complete transformation of areas for road and/or infrastructure development. Given that faunal habitat suitability was severely reduced within this habitat (the area is mostly concreted and barren), this habitat unit is not considered important or valuable for faunal species

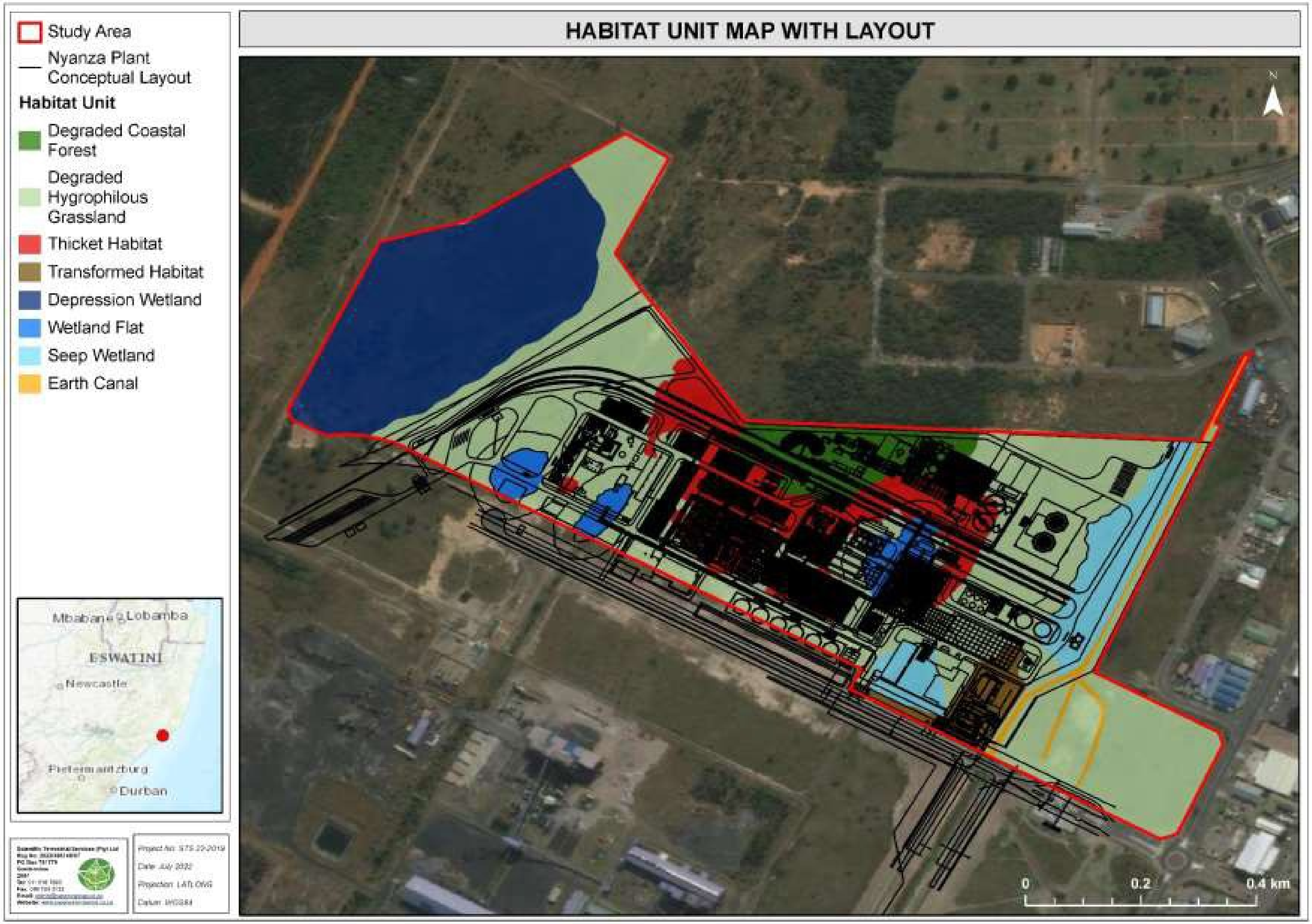


Figure 10-41: Conceptual illustration of the habitat units (with development layout) associated with the study area

- Mammals

Table 10-19: Field assessment results pertaining to mammal species within the study area

SPECIES AND HABITAT RECORDED IN THE STUDY AREA

Left to Right: A large impermeable electrified fence restricts immigration and emigration for most faunal species (even larger invertebrates). View of the study area indicating Freshwater and Degraded Hygrophilous Grassland Habitat in the foreground and Degraded Coastal Forest and Thicket habitat in the background. Likely spoor of a *Tragelaphus scriptus* (Bushbuck) or potentially a *Cephalophus natalensis* (Natal Red Duiker). Hole excavated by *Hystrix africaeaustralis* (Porcupine) foraging on roots within the Thicket Habitat.

MAMMAL HABITAT AND DIVERSITY OVERVIEW

The study area is completely encircled by a tall, electrified fence which is an impermeable barrier to all but the smallest of mammals. The study area is largely undeveloped in terms of infrastructure with only a small section of Transformed Habitat within the southeastern portion. The remaining habitat remains natural, although degraded in some portions, largely through Alien and Invasive Plant (AIP) proliferation. Fragmentation from surrounding habitat and the high degree of industrialization to the south of the study area and settlements to the east have diminished the local mammal diversity drastically, and now mostly common and widespread species persist within the environment. The study area is further located adjacent a large commercial forestry operation to the west. Some corridors through freshwater habitat do exist within this landscape matrix which will be suitable for mammal movement, though, the perimeter fencing of the study area is a notable hindrance for mammal movement. The study area comprises a mosaic of habitats which to a large degree provide valuable habitat for mammals, however, fragmentation in the larger landscape has reduced the species diversity. The vegetation, notably the Degraded Coastal Forest, Thicket and Freshwater Habitat contain adequate vegetative cover, food, and water resources to sustain the low diversity of mammals observed. The homogenous nature of the Degraded Hygrophilous Grassland reduces forage availability and limits opportunities for more habitat specific species. One SCC, Sensitive species 7 may occur within the study area, however, this is unlikely due to the electric boundary fence which restricts movement. No other faunal SCC are anticipated to utilise the study area for foraging or as breeding habitat. The above-mentioned SCC and where it will likely occur in the study area are described in finer detail below. The Degraded Coastal Forest, Freshwater and Thicket habitat are of higher sensitivity from a mammalian perspective as they have increased forage availability and provide suitable areas for shelter and breeding. The proposed development will transform the local habitat which will lead to a decline in faunal species abundance and diversity. The loss of the Degraded Coastal Forest habitat and Freshwater habitat will lead to significant impacts as a result of the sensitive and valuable characteristics they provide mammals within.

MAMMAL SCC			
Species	Habitat and Resources in the STUDY AREA	RSA Status	POC
Sensitive species 7	This species inhabits a wide range of forested habitats. It is known to survive in degraded thicket and Degraded Coastal Forest habitat along the urban fringe. Although habitat does exist within the study area the electrified fence surrounding the location restricts the potential occurrence of this species within the study area.	VU	Low
CONCLUDING REMARKS			
Overall, the study area is not considered to be of increased importance from a mammal perspective as a result of the low mammal diversity noted during the field assessment and the fragmentation resulting from an electrified fence being installed around the study area. The construction and operation of the proposed facility and associated infrastructure will result in reduced habitat favourability for mammals, although many of the smaller species will be able to recolonize locations following construction. Of concern is the threat of constructing within Freshwater habitat and the Degraded Coastal Forest habitat, although these units were not inhabited by a diverse and abundant mammal assemblage, they remain important in terms of their ecoservice provisioning, sheltering locations and as a movement and dispersal corridors for fauna. The online screening tool indicates that Sensitive species 7 may occur within the study area. Although habitat is suitable for this species within the Degraded Coastal Forest and Thicket Habitat the lack of movement corridors has likely resulted in the absence of the species from the study area. Although no signs of this taxon were observed suitable habitat remains available.			

- Avifauna

Table 10-20: Field assessment results pertaining to bird species within the study area

SPECIES AND HABITAT RECORDED IN THE STUDY AREA

Left to Right: A flock of *Ciconia apiscopus* (Woolly-necked Stork) observed flying over the study area. *Pleceus capensis* (Cape Weaver) noted within the Thicket Habitat unit. *Anthus cinnamomeus* (African Pipit) observed within Transformed Habitat. *Spermestes cucullata* (Bronze Mannikin) utilising the Hygrophilous Grassland. *Dendrocygna viduata* (White-faced Whistling Duck) and *Merops persicus* (Blue- cheeked Bee-eater) observed within the Freshwater Habitat.
AVIFAUNAL HABITAT AND DIVERSITY OVERVIEW
For avifauna vegetation structure, as opposed to actual plant species richness, is widely acknowledged as the primary determinant of bird communities (Skowno & Bond 2003; Wichmann *et al.* 2009; Burgess *et al*. 2011; Smith *et al*. 2017). The mosaic of habitats provided suitable structure to support a diverse assemblage of avifauna. Avifaunal diversity varied within the various habitats associated with the study area. Diversity was highest in the Degraded Coastal Forest, Thicket and Freshwater Habitats while intermediate within the Hygrophilous Grassland and low within the Transformed Habitat. Diversity within the Hygrophilous Grassland was likely reduced due to the homogenous structure of the natural grassland and the reduced heterogeneity yet will provide valuable habitat for specialist grassland species. The AIP proliferation within the Thicket Habitat did increase cover but likely impacts on food sustainability over longer temporal scales as AIPs outcompete indigenous flora. No large raptors were observed which may be an indication of the high degree of human activity within the study area. During the investigation mostly small passerines were observed while waterbirds occurred in higher abundances within the Freshwater Habitats. The integrity of the study area with regard to avifaunal species is considered intermediate as a result of the high degree of transformation encompassing the study area and the degree of human movement within the study area. Grassland areas comprising of herbaceous plant species will be favoured by grassland species while, the Degraded Coastal Forest and Thicket habitat consists of varying densities of woody species that will be utilised by a diverse community of avifauna. The Degraded Coastal Forest habitat only contributes a small area to the site yet may have the highest species richness on site. Together with the Thicket unit, these, provide suitable shelter and habitat for the greatest abundance and diversity of birds. Food resources are high within the study area for avifaunal species. Within the Hygrophilous Grassland and Thicket habitat grass seeds and a large abundance of invertebrates will form the staple food resources for granivorous and insectivorous species, which are likely the most abundant group. The heterogenous vegetation composition will likely enhance the year-round provisioning of food for these species, though, understandable reductions in insect abundance may occur in winter when many birds will migrate altitudinally or to other regions. Portions of the survey area are overlayed with invasive tree species which create homogenous floral communities and reduce the food availability for a range of avifaunal species. During the summer months the overall food resource production of the herbaceous and woody layer will likely increase, and as such a higher abundance of avifauna can be supported. The summer months additionally see an increase in insect abundance which provides an energy rich source of food for avifaunal species. This increase is likely mimicked by small mammals as well as lizards, skinks and amphibians which are an important food resource for raptors and some smaller bird species. During the field assessment no avifaunal SCC were observed. It is considered likely that the following avifaunal SCC, as defined by Taylor *et al*. (2015), may transverse the area: Sensitive species 2, *Circus ranivorus* (Marsh Harrier), *Circaetus fasciolatus* (Southern Banded Snake Eagle), *Geokichla guttata* (Spotted-ground-thrush), *Mycteria ibis* (Yellow-billed Stork), *Coracias garrulus* (European Roller, NT), *Falco biarmicus* (Lanner Falcon), *Stephanoaetus coronatus* (Crowned Eagle) and *Rostratula benghalensis* (Greater Painted-snipe). Species observed on site other

than those indicated in the photos above include *Dendrocygna viduata* (White-faced Whistling Duck), *Colius striatus* (Speckled Mousebird), *Apalis flavida* (Yellow-breasted Apalis), *Merops persicus* (Blue-cheeked Bee- eater), *Laniarius ferrugineus* (Southern Boubou), *Vidua macroura* (Pin-tailed Whydah) amongst others. For a full list of avifaunal species observed please refer to Biodiversity Assessment Report in Appendix F..

AVIFAUNAL SCC

Species	Habitat and Resources in the STUDY AREA	RSA Status	POC	Species	Habitat and Resources in the STUDY AREA	RSA Status	POC
Sensitive species 2	This species prefers a mix of grassland and freshwater habitat. The species forages on wetland verges and in grassland habitat. Foraging in agricultural fields also occurs. Roosts at night in utility infrastructure or trees.	EN	Low	*Coracias garrulus* (European Roller, NT)	A non-breeding migrant that prefers savanna and shrubland habitat but occurs in a variety of vegetation types which include forest, grassland, and artificial/human modified units.	NT	Medium
Circus ranivorus (Marsh Harrier)	The species relies upon permanent wetlands for breeding, foraging, and roosting. It hunts over drier adjacent floodplains, grasslands and croplands for birds, reptiles, frogs and insects.	EN	Medium	*Falco biarmicus* (Lanner Falcon)	Species favours open grassland, cleared woodlands and agricultural area where suitable perches for hunting are available. Within the study area the Hygrophilous Grassland is considered favourable.	VU	Medium
Circaetus fasciolatus (Southern Banded Snake Eagle)	This species occurs within coastal lowland thicket and forest habitat interspersed with grassland habitat. Within the study area it will utilise the Degraded Coastal Forest, Thicket and Grassland Habitat.	CR	Medium	*Stephanoaetus coronatus* (Crowned Eagle)	This species utilises forests (gallery and riverine), but also occurs in woodlands and forested gorges in savannah and woodland habitat and exotic plantations. Primary prey is mammals. Within the study area suitable habitat for the species is located within the Degraded Coastal Forest habitat but the extent is unlikely to support breeding.	VU	Medium
Geokichla guttata (Spotted-ground-thrush)	The species is found in dappled and open forest understory. They tend to avoid dense thicket habitats. Within the study area the Degraded Coastal Forest and portions of the Thicket habitat provide suitable habitat for the species.	EN	Medium	*Rostratula benghalensis* (Greater Painted-snipe)	These birds prefer freshwater habitat. The prefer secluded locations with muddy areas adjacent concealing vegetation	NT	Low
Mycteria ibis (Yellow-billed Stork)	This species utilises a diversity of permanent and seasonal wetlands. It generally utilises habitats that are free of surface vegetation. Within the study area most Freshwater habitat was covered with vegetation reducing habitat suitability.					EN	Low

CONCLUDING REMARKS

Overall, the avifaunal sensitivity associated with the study area is considered intermediate as the potential for SCC was reduced and the observed assemblage was mostly associated with common, widely distributed species. Understandably, abundance and diversity will vary within the study area in accordance with available food resources, rainfall, and seasonal changes, with some avifaunal species undertaking local migrations during the winter months. The proposed activities and associated infrastructure will result in a reduction in habitat and food resources and will likely impact on the diversity of the locality while abundance levels will decrease. Impacts to avifaunal species within the study area will result in the localised reduction in habitat, whilst edge effects such as noise and general human activities will impact on avifaunal species within the study area. Additionally, the increased movement of vehicles traveling to and from the study area as well as increased conflict with humans will likely increase the risk of persecution on avifaunal species.

- Herpetofauna

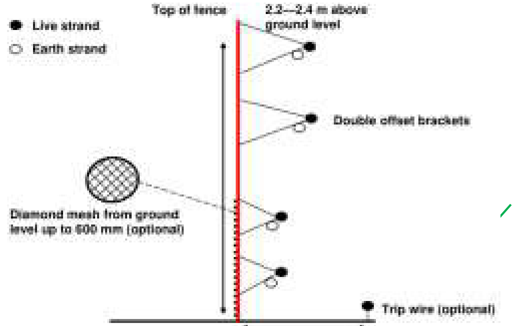
Table 10-21: Field assessment results pertaining to reptile and amphibian species within the study area

SPECIES AND HABITAT RECORDED IN THE STUDY AREA




Left to right: *Philothamnus natalensis natalensis* (Eastern Natal Green Snake) which had been electrocuted by the electric fence. *Kinixys zombensis* (Eastern Hinged-back Tortoise) observed within the Degraded Coastal Forest Habitat. *Hyperolius marmoratus* (Painted Reed Frog) observed within the Thicket Habitat. *Hyperolius argus* (Argus Reed Frog) noted within the Freshwater Habitat unit.





Left to right: *Lygodactylus capensis* (Common Dwarf Gecko) observed within the Degraded Hygrophilous Grassland habitat. Likely a *Pelusios castanoides* (Yellow-bellied Hinged Terrapin) which had been electrocuted by the electric fence (a common site observed along the boundary fence). In the image to the far right, the red arrow indicates the live wire responsible for the terrapin and tortoise motilities within the study area. A solution is indicated by the green arrow where a dead trip wire (wire without any current) is placed Infront of the live wire to act as a barrier between the faunal species and the wire with the current. Alternatively,, a small boundary fence can also be installed to impede movement to the base of the main fence and the associated live wires.

HERPETOFAUNA HABITAT AND DIVERSITY OVERVIEW

Reptile and amphibian species are notoriously hard to detect, owing to their secretive nature, nonetheless several herpetofaunal specimens were observed during the field assessment. During the sites assessment it was abundantly evident that the electric fence surrounding the property has been responsible for the electrocution of numerous herpetofauna. As such, suitable mitigation measures must be taken to avoid this situation. The Freshwater, Degraded Coastal Forest and Thicket habitat provide valuable opportunities for reptiles and amphibian. The open to sparsely treed Degraded Hygrophilous Grassland habitat does not provide valuable habitat and is likely to host mostly common and hardy reptile and amphibian species adapted to grassy habitat. This is still considered suitable supporting habitat for the community represented within the study area as foraging can be undertaken here. The Transformed habitat is not considered valuable for herpetofauna. The Freshwater Habitat, Degraded Coastal Forest and Thicket will provide suitable breeding locations for a variety of amphibians and reptiles due to the unique moist characters and reduced exposure provided. Habitat integrity for herpetofauna is diminished as a result of fragmentation, particularly as a result of the electrified fence which has resulted in high mortality of terrapins and snakes. Herpetofaunal sensitivity in the footprint is therefore deemed to be moderately high overall, with several herpetofaunal species being observed during the field assessment. Although no SCC were observed within the study area the habitat provides suitable habitat for several species which include; *Pyxicephalus edulis* (African Bullfrog), *Bitis gabonica* (Gaboon Adder), *Homoroselaps dorsalis* (Striped Harlequin Snake), Sensitive species 1, *Lycophidion pygmaeum* (Pygmy Wolf Snake), *Python natalensis* (Southern African Python), *Hemisus guttatus* (Spotted Shovel nosed Frog), *Dendroaspis angusticeps* (Green Mamba), *Chamaesaura macrolepis* (Large-scaled Grass Lizard) and *Hyperolius pickersgilli* (Pickersgill's Reed Frog). The above- mentioned SCC and where they will likely occur in the footprint are described in finer detail below. All habitat units are suitable habitat for herpetofauna to forage within as a result of their adaptable nature and feeding habits which often draw them into human dwellings.

HERPETOFAUNA SCC

Species	Habitat and Resources in the MRA	RSA Status	POC	Species	Habitat and Resources in the MRA	RSA Status	POC
Pyxicephalus edulis (African Bullfrog)	Occurs in a variety of habitats from dry savannas to open grassy woodlands and riverine woodlands where it breeds in shallow well vegetated pans. When not breeding, it can travel up to 4 km from water, foraging for insects at night. Adults may be buried beneath the soil in the dry season.	TOPS NT	Medium	*Python natalensis* (Southern African Python)	This species is found in a variety of habitats, often associated with large animal burrows. The study area does provide suitable habitat for the species, but reduced prey abundance may be a limiting factor.	LC	Medium
Bitis gabonica (Gaboon Adder)	This species occupies moist coastal forest and the surrounding moist grassland. These characters were present within the study area.	NT	Medium	*Hemisus guttatus* (Spotted Shovel-nosed Frog)	Inhabits pans and marshy ground in coastal bush and grassland habitats. Forages over extensive range of habitats.	VU	Medium
Homoroselaps dorsalis (Striped Harlequin Snake)	This species is partially fossorial and known to inhabit termitaria in grassland habitats. The Hygrophilous Grassland habitat will be most favourable for this species.	NT	Medium	*Dendroaspis angusticeps* (Green Mamba)	This species occupies low altitude forest. These characters were present within the Degraded Coastal Forest Habitat.	NT	Medium
Sensitive species 1	Prefers rivers, lakes, dams, and freshwater swamps with suitable prey resources. The absence of open water and suitable prey resources reduces the suitability of the study area for this species.	TOPS	Low	*Chamaesaura macrolepis* (Large-scaled Grass Lizard)	Occurs in Savanna, Grassland habitat and within the Indian Ocean Coastal Belt. Within the study area portions of the Degraded Hygrophilous Habitat are suitable for them species.	NT	Medium
Lycophidion pygmaeum (Pygmy Wolf Snake)	This species inhabits lowland forest, grassland, and mesic savanna habitats. It has also been recorded in pine plantations. Within the study area the species will utilise areas outside of the Freshwater Habitat.	NT	Medium	*Hyperolius pickersgilli* (Pickersgill's Reed Frog)	This species prefers densely vegetated marshy habitats in coastal bushveld and grassland.	EN	Medium

CONCLUDING REMARKS

Overall, the study area has portions of habitat which are considered sensitive from a herpetofaunal perspective, with a high diversity of herpetofaunal species observed during the field assessment. As such the proposed developments will impact on herpetofaunal species as a result of widespread vegetation clearing that will lead to the direct habitat loss and may disturb habitats that are located immediately outside of the footprint area. As a result, herpetofauna may become displaced as they are forced to migrate out of the areas of disturbance. The movement of herpetofauna out of the disturbance footprint areas will result in higher levels of competition for food resources and habitat, which can lead to a decrease in herpetofaunal abundance levels, including that of the potential occurring SCC. Additionally, the increased movement of vehicles traveling to and from the study area as well as increased conflict with humans will likely increase the risk of persecution for herpetofauna species. Please see section 5.1 below for a detailed list of mitigatory measures pertaining to herpetofauna. It is considered imperative that the existing electrified fence be installed with a tripwire and culverts or a wire mesh with culverts to prevent the current extent of terrapins and tortoise mortality resulting from electrocutions.

- Invertebrates

Table 10-22: Field assessment results pertaining to invertebrate species within the study area

SPECIES AND HABITAT RECORDED IN THE STUDY AREA

Left to right: *Brachycerus* sp. (Weevil) observed in the Transformed Habitat unit. *Zonocerus elegans* (Elegant Grasshopper) observed within the Degraded Hygrophilous Grassland. *Cynthia cardui* (Painted Lady) were mostly observed within the Degraded Hygrophilous Grassland. *Chalcostephia flavifrons* (Inspector) observed in the Degraded Hygrophilous Grassland Habitat. Large *Mantodea ootheca* and a *Mantispid (Mantispidae)* captured within the Freshwater habitat in the western portion of the study area.
INVERTEBRATE HABITAT AND DIVERSITY OVERVIEW
During the field investigation cooler temperatures were experienced which did reduce the invertebrate activity. Sampling earlier in the summer season would have yielded more accurate and robust results for invertebrate abundances and diversities. The largely untransformed habitat provides both open grassland characters as well as well wooded forested areas interspersed with valuable Freshwater Habitat. Diversity appeared to be the highest in the Thicket unit, however, it is anticipated that the Degraded Coastal Forest and Freshwater units will support the highest diversity of invertebrates within the study area. The Degraded Coastal Forest, Thicket and Freshwater habitat has remained undeveloped/transformed and have maintained a relatively diverse floral composition and therefore suitable invertebrate habitat and forage is available herein. Water dependant insects were largely restricted to the Freshwater habitat. Insects are generally the most abundant macro-organisms within landscapes and often perform services vitally important for ecosystem functioning. Therefore, high insect abundance can indicate a healthy landscape. Insects serve as pollinators, remove detritus material, bury dung and associated parasites below the surface helping to cycle nutrients back into the soil while decreasing the parasitic load within an environment, reducing the risk of disease. Additionally, insects serve as a food resource for fauna within the survey area, and as such a low insect diversity and abundance may reduce forage sustainability for other faunal species from various classes. From an arachnid perspective, these species are notoriously hard to detect over a relatively short period of time, which can often lead to the under estimation of diversity and abundance. Taking this into consideration, habitat conditions for arachnids as well as available resources were analysed, whilst additional information on arachnid occurrences and species diversity for the QDS was collected from databases such as iNaturalist and the Animal Demography Unit (ADU). A number of arachnids were observed during the site assessment, most of which inhabit the graminoid layer. No Baboon Spider burrows were observed. Online databases also indicated that an intermediate assemblage of arachnids occur within the QDS 2832CA. The information available on databases, supplemented with the observations recorded on the site and the general habitat provide sufficient information and evidence to suggest that the diversity within the locality is intermediate. The ADU website has records of two (2) baboon spider species within the QDS's, namely: *Idiothele nigrofulva* and *Brachionopus robustus* and a single scorpion, *Uroplectes formosus* (Fair Lesser Thicktail). Species within the genera *Hadogenes, Opisthacanthus*, *Opistophthalmus*, *Ceratogyrus, Harpactira* and *Pterinochilus* are protected under TOPS, and should they be discovered, suitable mitigation strategies will need to be undertaken under the guidance of a suitably qualified specialist with input from the relevant authorities.

Insect species utilise all habitat types except for arctic tundra and ice dominated landscapes and will readily inhabit transformed and altered habitats. The survey area is comprised of various habitat units, which provided various niche habitat and suitable structure and resources for a diverse assemblage of species to occur. Invertebrate abundance was considered to be intermediate, however, temperatures were not							
satisfactorily for high invertebrate activity which was taken into consideration for the scoring. Nonetheless it appeared that the Degraded Coastal Forest and Freshwater habitat were most suitable for invertebrates. Most insects observed belonged to the orders Orthoptera, Hemiptera and Coleoptera. The increased habitat heterogeneity provided habitat for a high diversity of invertebrates with variable habitat structure, fallen and dead trees and aquatic environments which numerous insects can inhabit and seek refuge.							
INVERTEBRATE SCC							
Species	Habitat and Resources in the STUDY AREA	RSA Status	POC	Species	Habitat and Resources in the STUDY AREA	RSA Status	POC
Pomatonota dregii (East Coast Katydid)	This species resides only within Indian Ocean Coastal Belt forests, a habitat type which is experiencing severe pressure by logging and cultivation with sugarcane and timber production.	VU	Medium	Arytropteris basalis (Flat-necked Shieldback)	This species occurs within coastal forest and thicket mosaics in KwaZulu-Natal Province. The Degraded Coastal Forest and Thicket Habitat will be suitable for this species within the study area.	VU	Medium
CONCLUDING REMARKS							
The proposed development will lead to loss of habitat and food resources and will likely lead to a reduction in the diversity of insects and arachnids observed within the study area. In general, species observed were commonly occurring that may persist in the surrounding landscape but will be faced with increased competition and potential lack of resources, putting strain on invertebrate populations. Development impacts will likely be highest within the Freshwater and Degraded Coastal Forest habitat as these units offer unique characteristics within the landscape. The insect SCC *Pomatonota dregii* (East Coast Katydid) and Arytropteris basalis (Flat-necked Shieldback) have a medium POC of occurring within the study area and development within the Degraded Coastal Forest may pose a high risk to these species. The loss of insect abundance and diversity will have a negative cascading effect on other faunal species in the study area.							

- Sensitivity

Figure 10-42 conceptually illustrates the faunal ecological sensitivity for the various areas. The areas are depicted according to their sensitivity in terms of the presence or potential for faunal SCC, habitat integrity, levels of disturbance and overall levels of diversity. Table 5 below presents the sensitivity of each habitat along with an associated conservation objective and implications for the proposed activities.

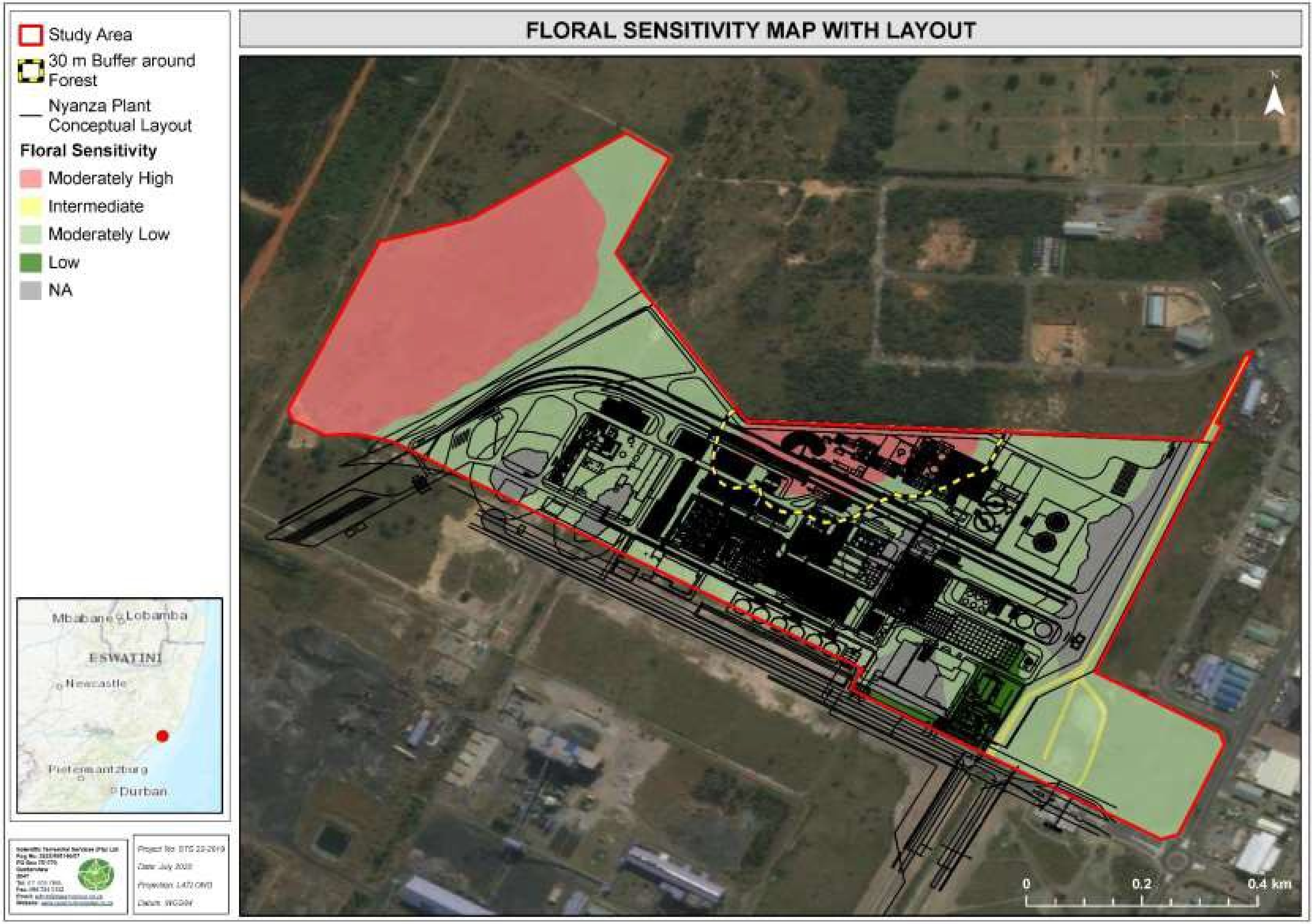


Figure 10-42: Conceptual illustration of the habitat sensitivity associated with study area identified during the field assessment. Wetlands (including the Seep Wetlands and Wetland Flats) that will be infilled do not have an assigned sensitivity. They have been mapped in grey and assigned a NA (Not Applicable)

10.15 Socio – Economic Environment

The proposed project is located within the City of uMhlathuze Local Municipality. The City of uMhlathuze Local Municipality is the third most important area in KZN in terms of primary manufacturing of economic production. The City of uMhlathuze Local Municipality houses some of the world's industrial giants. The concentration of industries is supported by activities and output of important development nodes. Most of the commercial and industrial activities are located in Richards Bay, Empangeni, and Felixton.

The area is the third most important in KZN in terms of economic production which contributes 5.5% of total formal employment and 7.6% of the total gross geographic product. Port facility development has promoted and initiated the development of manufacturing activities through the years. The RBIDZ and nearby port are import assets that can exploit opportunities to export to the world's vast markets. Policies were created to encourage investment and promote industrial growth, prioritising projects on the basis of job creation contributions.

Interventions and strategies revolve around primary industrial development promotion, while creating entry into the market for Small, Medium and Micro Enterprises (SMMEs), the informal sector, and emerging businesses (City of uMhlathuze, 2022).

The local economy is imperative to national and international economies. A large number of importing and exporting industries like aluminium smelters, Richards Bay Minerals, Mondi Kraft, Exxaro KwaZulu-Natal Sands, Bell Equipment, Foskor, Richards Bay Coal Terminal, the port of Richards Bay, and cane and timber agricultural activity means that the region's welfare is influenced by national and international market movements. 95% of economic activities are located in Felixton, Empangeni, and Richards Bay.

10.15.1 Population Demographics

The City of uMhlathuze Local Municipality consists of a population of approximately 410 465 people with 103 915 households (City of uMhlathuze, 2022). The highest levels of employment are among the employable youth (16 – 35 years). Unemployment levels are at 75.4%. This implies that the City of uMhlathuze Local Municipality has a high economic growth potential and should endeavour to speed up the provision and development of skill through initiatives. The current dependency ratio is 48.2, indicating high dependency from the youth on those that are economically active. The key issues are thus high unemployment rates, a lack of skills, and slow economic growth (City of uMhlathuze, 2022).

The project will mainly be surrounded by industrial areas. Within uMhlathuze, the following communities / residential areas occur within a 5km radius of the project and therefore are within the projects primary area of influence (AOI).

- Alton;
- Wild en weide;
- Richard's Bay Central;
- Veld en vlei;
- Birdswood; and
- Brackenham.

According to the City of uMhlathuze IDP, there are more women (187 287) than men (177 175) within the municipality.

10.15.2 Unemployment

Even though there are high levels of unemployment, a large proportion of the uMhlathuze population is involved in informal activities. It should be noted that formal employment levels are not an indicator of the generation of income. Surplus produce from subsistence farming is quickly becoming important for the generation of income in the region. Employment levels are the highest in Wards 1, 2, 3, 9, 23, and 29. This largely correlates with the development of urban areas in Empangeni and Richards Bay (City of uMhlathuze, 2022).

Unemployment levels are the highest in Wards 6, 19, and 22. These largely correlate with developing areas on the urban periphery of Nseleni and ESikhaleni (City of uMhlathuze, 2022).

10.15.3 Education

In the City of uMhlathuze Local Municipality, adults with no schooling makes up 7.2%, adults with higher education makes up 7.3%, and adults with matriculation makes up 36.9% (City of uMhlathuze, 2022). There has been a decline in persons with higher education, from 10.3% in 2001 to 7.3% in 2011.

10% children of school going age are not attending school. This has been attributed to lack of access to schools, affordability, and other poverty related factors such as HIV/Aids. The number of persons that do not have any education (no schooling) has declined between 2001 and 2011.

10.15.4 Health Conditions

The IDP identified HIV/AIDS as one of the leading causes of mortality (34.7%) in the King Cetshwayo District Municipality (City of uMhlathuze, 2022). This is followed by Tuberculosis (22.7%) and Lower Respiratory Infections (6.6%). According to the IDP, the leading cause of death for children under 5 is diarrhoeal diseases (22.5%).

10.15.4 Access to social and community services and facilities

The social and community services and facilities include:

- Water: approximately 97.3% of the population has access to water sourced from a regional or local service provider. Approximately 10 846 domestic households have access to free basic water.
- Electricity: The results from the community survey undertaken in 2016 show that 99.4% of the population in the municipality has access to electricity.
- Toilets: The community survey results show that 69.1% of the population has access to flush or chemical toilets. Approximately 1.1% of the population has no access to toilets .
- Education: Access to education within the municipality improved between 2001 and 2011, with the percentage of the population over 20 years reported to have never received formal education reducing from 18% in 2001, to 8% in 2011 (City of uMhlathuze, 2022).
- Health Services: The DM has a 430 bedded Tertiary hospital (Ngwelezane), one regional hospital (Queen Nandi), six District Hospitals (Catherine Booth, Ekhombe, Mbongolwane, Nkandla, Eshowe and KwaMagwaza), 63 fixed Clinics, 1 CHC and 19 mobile clinic teams. UMfolozi and uMhlathuze sub districts do not have district hospitals and they use Ngwelezana Hospital for district hospital services (City of uMhlathuze, 2022).
- Roads: The main access into the municipal area is via the N2 in a north south direction and in an east west direction is the provincial road, R34. Other significant roads in the area include the R43 (that provides a northerly entry into Richards Bay from the N2) as well as the Old

Main Road that straddles the N2 on its inland. A number of railway lines providing commercial/industrial service are available in the municipal area.

- Communication Systems: Radio is considered the most important and widely used form of communication. The 2011 census found that more than two thirds of the households have access to radio, less than a third of the households have access to computers, two thirds have access to a television, more than 90% of households have access to mobile phones and only 15% has access to landlines. Almost 50% of the households have no access to internet.

10.15.5 Key Livelihood activities

Most of the households in uMhlathuze fall within the lower income segment with 15.5% of the households earning between R19 201 – R38 400 per annum followed by 13.7% of households earning between R9 601 – R19 200 per annum. The high-income category (>R 2 457 601 per annum) makes up only 0.3% of all households. It is estimated that in 2020, the average household income in this region is R13 078 per month or R156 941 per annum. Very high numbers of persons in Wards 5, 6, 13, 15, 18, 25 and 29 earn less than R1600 per month (City of uMhlathuze, 2022).

There are eight sectors that dominate the economy of including metal products, machinery, and household appliances (11.02%), land and water transport (10.83%), food, beverages and tobacco (7.37%), wood and wood products (7.21%), mining of metal ores (6.42%), education (5.66%), real estate (5.57%), finance and insurance (4.4%). These eight sectors contributed 58.5% of the Gross Value Added (GVA) in 2011 (South African Cities Network, 2011). While some are primary drivers like manufacturing of metal products and machinery (BHP's smelters, Bell Equipment, Tata Steel) and wood and wood products (Mondi, etc) and mining of metal ores (Richards Bay Minerals, Tronox), others are to a large degree secondary (education, real estate, finance and insurance). The sector contribution to GVA is shown in Figure 10-43.

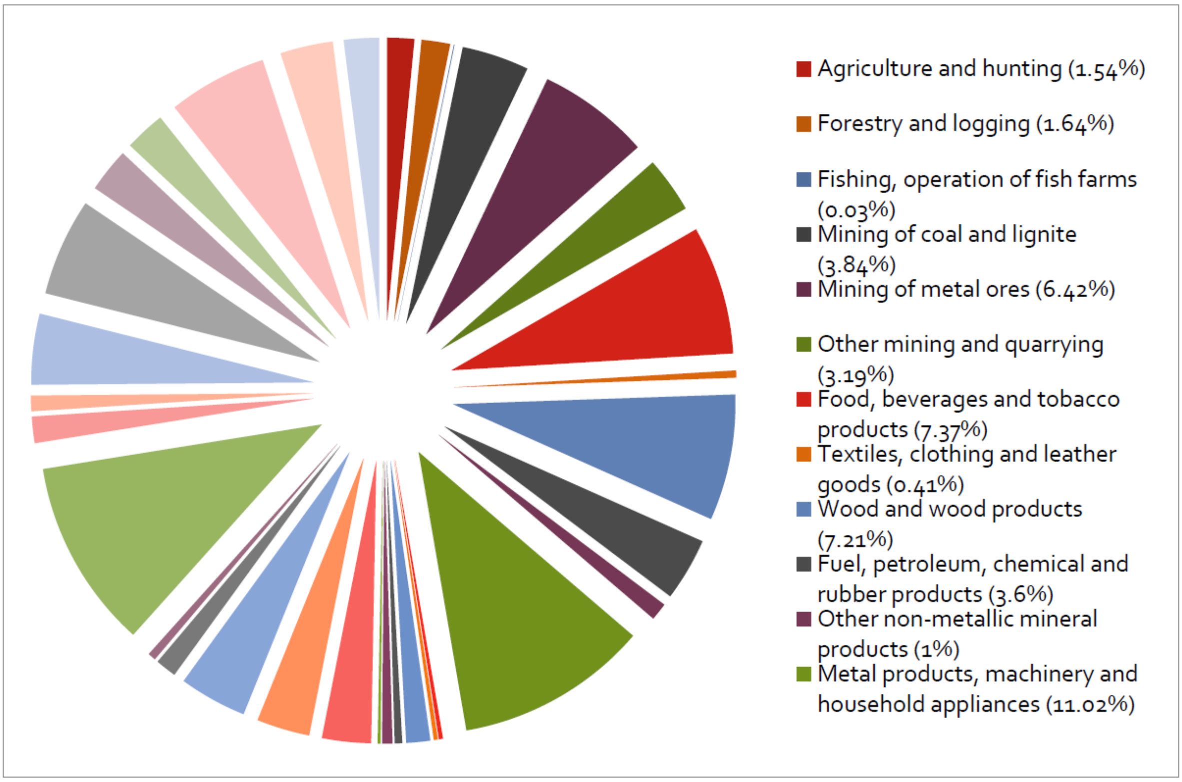


Figure 10-43: uMhlathuze sectoral contribution (%) to GVA (2011) ((City of uMhlathuze, 2022))

10.15.6 Community Land-use patterns and Land Tenure

There are a number of existing natural and man-made resources in the uMhlathuze Municipality area (Figure 10-44). These include wetland systems located to the east of the Municipality. Major rivers include the Mhlathuze and Nsezi. The municipality has areas of commercial farmlands as well as a number of areas that are significant from an environmental perspective. The municipal area includes the formal towns of Empangeni, Richards Bay, eSikhaleni, Ngwelezane, eNseleni, Vulindlela and Felixton. Rural settlements include Buchanana, Luwamba, Makwela, Mambuka, Hluma, Matshana and Mabuyela.

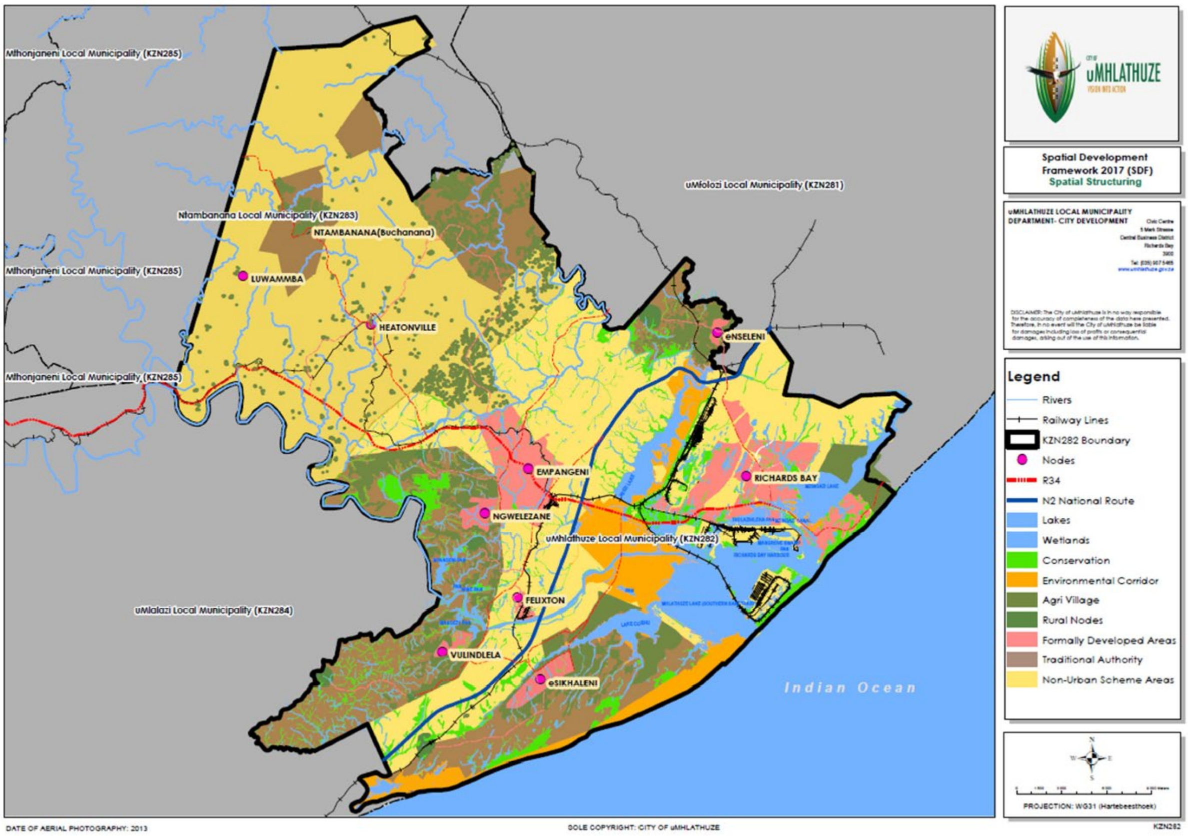


Figure 10-44: Landuses in the uMhlathuze LM per the SDF (City of uMhlathuze, 2018)

According to the City of uMhlathuze Spatial Development Framework (SDF), 26% of land within uMhlathuze Municipality is under private ownership and 51% under Ingonyama Trust Board which is normal administered by Traditional Authorities.

The City of uMhlathuze Local Municipality zoned the RBIDZ Phase 1F as noxious industry. The proposed land use is permissible as a free entry (primary right). Project Land belongs RBIDZ and therefore Nyanza is a tenant to RBIDZ, and the project will not displace any community. The IDZ provides for industries of lower impact to be developed. No local communities are currently making use of local resources (water, forest etc) within the IDZ.

Occasional protests in respect of service provision, job opportunities and economic opportunities. These have never been targeted at Nyanza and the IDZ usually deals with such issue as they occur.

10.15.7 Political and Institutional environment

The Constitution of South Africa sets the rules for how government works. There are three spheres of government in South Africa:

- National government

- Provincial government
- Local government

The structure of the political and institutional environmental in the project area are as follows:

- Province (KwaZulu Natal Provincial Government): The provincial government is led by a Premier who elects Members of the Executive Council to be the political heads of each of the provincial departments. The Provincial government is responsible for the co-ordination, monitoring and support of municipalities in each province. The KwaZulu Natal Province id divided into 10 DMs and one (1) Metropolitan Municipality.
- Local Government: The local government consists of the district and the local municipalities. The project is located within the King Cetshwayo DM. The DM is led by an executive Mayor and council and is responsible for the co-ordination of development and service delivery in the whole district. The local municipality (City of uMhlathuze Local Municipality) is also led by a City Mayor (elected) and City Manager (appointed). The role of municipalities is to provide basic services such as water, garbage removal, sanitation etc, as well as promote a safe and healthy environment, and community development.
- Ward system: The local municipality is sub divided into wards. There are 33 wards in the City of uMhlathuze who are led by elected ward councillors. The role of the ward councillors is to act as the interface between the communities they represent and the municipality. Ward councillors also assist their communities in identifying needs and priority areas of development which feed into the municipality's planning processes.
- IDP process: a consultative process of generating priorities and resource allocation in the municipal area. The current available IDP was published in March 2022 and provides the city’s plan for the period 2022 - 2027.
- Spatial Development Framework (SDF): A process of visually presenting the spatial distribution of current and desirable land used within the municipality to give effect to the vision, goal and objectives of the municipal IDP, taking into account the principles of land development.
- Richard’s Bay Environmental Resource Committee (ERC): The ERC consists of the KZN EDTEA (environmental representatives- local office and Provincial); KZN Ezemvelo wildlife, RBIDZ (Chair), City of uMhlathuze representatives (Spatial planning as well as Environmental unit) and Richard’s Bay Clean Air Association (RBCAA). The committee is most active on environmental issues.
- Traditional Councils: In addition to the local and district municipalities, there are traditional councils that are responsible for the responsible for the co-ordination of development and service delivery in the rural areas.

10.16 Major Hazard Installations

The Occupational Health and Safety Act defines a Major Hazard Installation as

(a) where more than the prescribed quantity of a substance is kept or maybe kept (The listed substances are provided in General Machinery Regulations Schedule A) and

(b) where the substance is processed, produced, used, handled, or stored which has the potential to cause a major incident.

To date, no neighbouring MHIs (current and planned) have been identified. SRK is however awaiting confirmation from the municipality.

10.17 Heritage and Cultural Aspects

A cultural heritage survey was done in 2015 as part of the EIA for RBIDZ Phase 1F (NEMAI Consulting, 2016). This survey concluded that there are no heritage sites present at the RBIDZ Phase 1F area.

Heritage information regarding Richards Bay was extracted for background purposes from the NEMAI EIA (NEMAI Consulting, 2016). The project site is not located within any World Heritage Sites.

A site specific HIA was undertaken as part of the impact assessment phase of the Nyanza Project.

According to the HIA, previous surveys in the general Richards Bay area noted that there is an extensive scatter of stone tools below the surface. These are lag deposits, which are stone tools that filter down through the soft sand, and rest on the harder layers, resulting, the last 2 million years of stone tools all resting on the same layer. This means that they have low significance and are just noted for their occurrences. These layers occur throughout Richards Bay and are therefore considered to be a continuous lag deposit of artefacts.

The desktop assessment of historical aerial photography and maps identified area with potential for heritage resources. The area identified from previous studies and aerial photography and maps are summarised in Table 10-23 and shown in Figure 10-45.

Table 10-23: Potential Heritage Resources

Site Name	Latitude	Longitude	Description
a1	28.732234252	32.025485194	1937 Settlement
a2	28.737850325	32.024525341	1937 Possible settlement
a3	28.736390	32.024438	1937 Possible settlement
a4	28.735179276	32.024496513	1937 Possible settlement
a5	28.734418934	32.026622814	1937 Settlement
h1	28.738721437	32.026804912	1964 settlement
h2	28.739182276	32.025441814	1964 settlement
h3	28.741117740	32.027517692	1964 settlement
h4	28.730859202	32.023558383	1964 settlement

These sites were surveyed by the specialist and the following findings were made:

- The site of H2 was surveyed and no evidence of human occupation could be found (Figure 12). There are modern post-1950 artefacts in the area, but they were not dateable, e.g. teacup fragment, glass bottle top with screw on lid. This is partially due to the dense ground vegetation.
- Although sites H1 and H3 are outside of the boundary, an assessment of the area found no artefacts at the sites.
- Sites A1 and H4 are located outside the project boundary.
- Site A3, A4 and A5 were too densely vegetated to make an assessment.
- An *Erythrina spp* was found growing in the vicinity of Site A2. These trees are traditionally indicative of human graves. According to the study, while this tree is small, it could be regrowth from and older broken tree. Its occurrence near a site from the 1937 aerial photograph suggests that it could be associated with a grave. It is also the only visible *Erythrina spp* in the

grassland part of the study area. Should the grave be confirmed, a chance find procedure must be implemented.

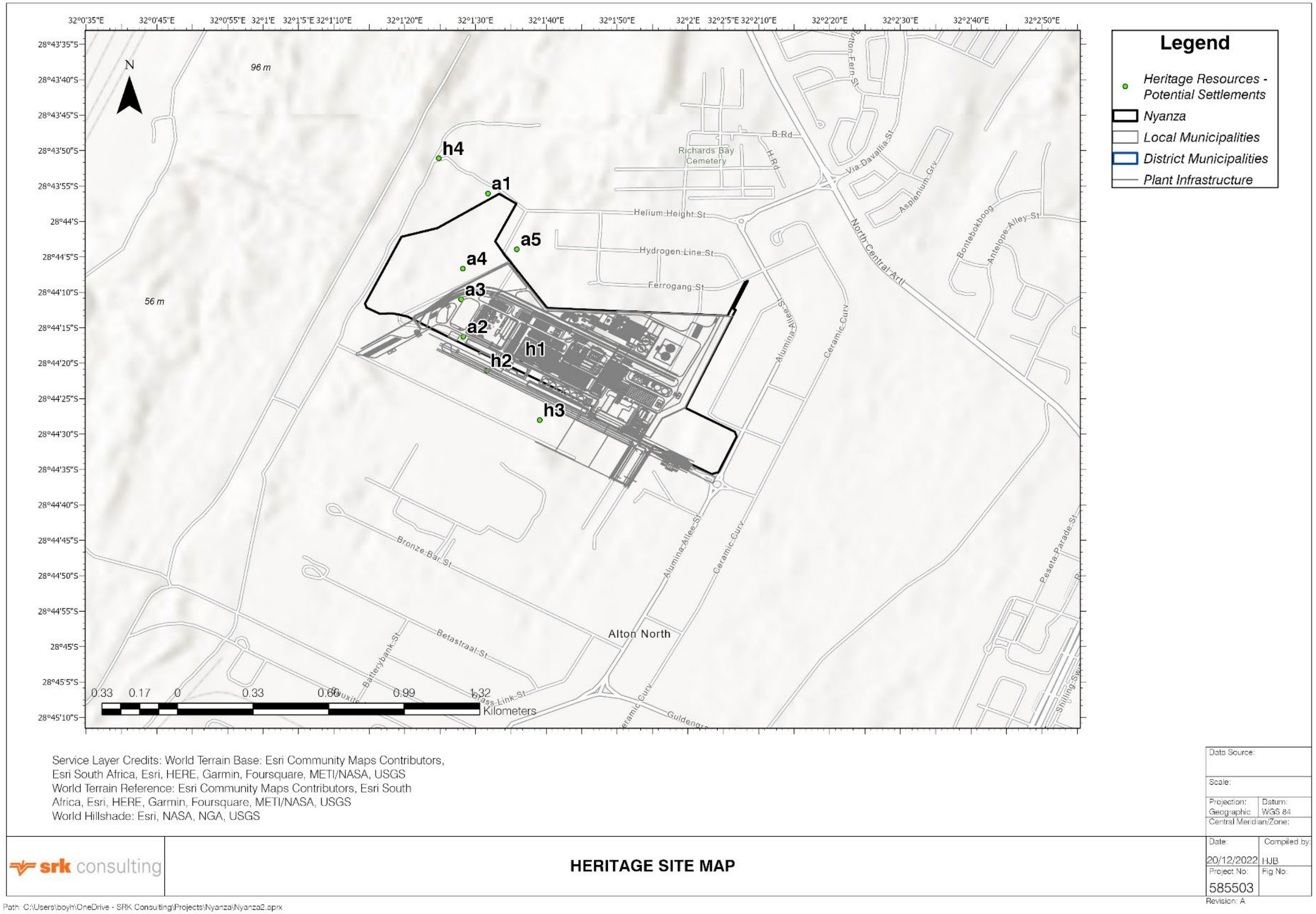


Figure 10-45: Potential Heritage Resources Identified from Literature

10.18 Palaeontology

The area is of low palaeontological sensitivity (Figure 10-46). PIA work undertaken in the Richards Bay Harbour suggests that the Cretaceous layers are ~10m below the current surface (van Jaarsveld 2006). These will not be affected by the development. The small orange segment within the study area on the map is incorrect as this is a raised sand dune.

COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 10-46: Palaeontological Sensitivity

10.19 Environmental Attributes and Sensitivity

Figure 10-47 provides a map of all the sensitive environments and associated buffer areas that are associated with the proposed projects.

A composite map showing areas of high sensitivity is provided in Figure 10-48. The higher the value, the more sensitive layers are overlapping each other.

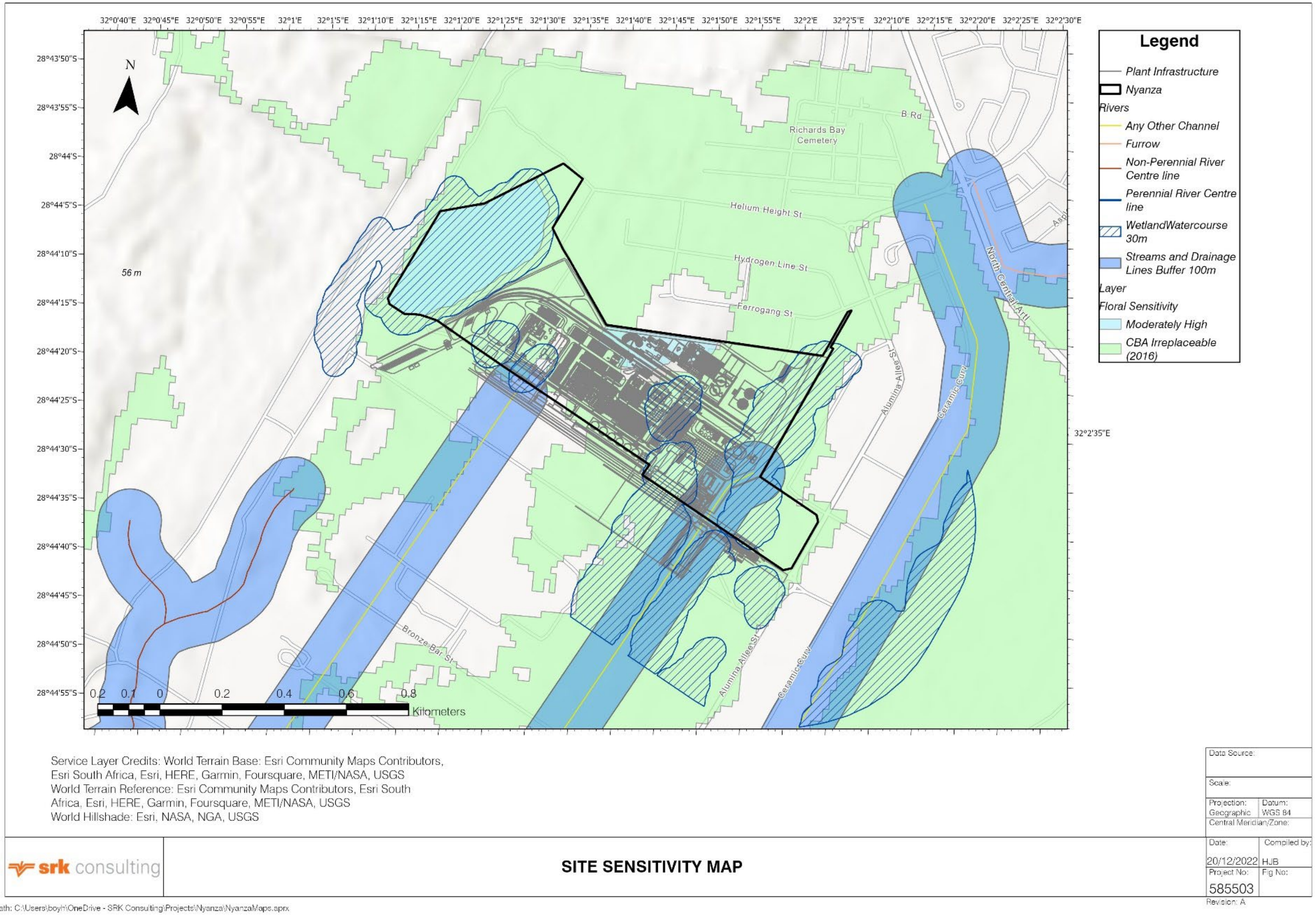


Figure 10-47: Environmental Attributes

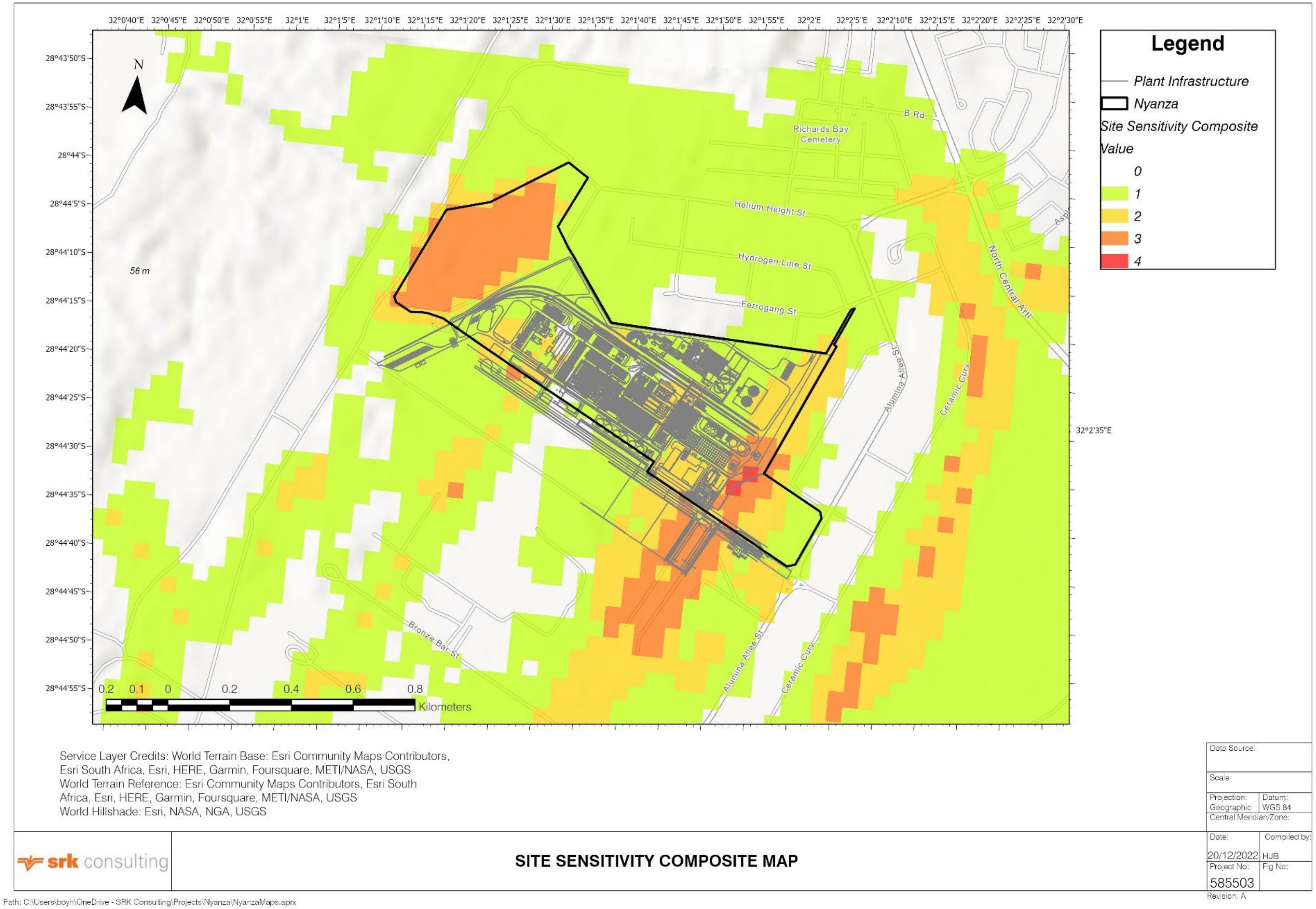


Figure 10-48: Environmental Sensitivity

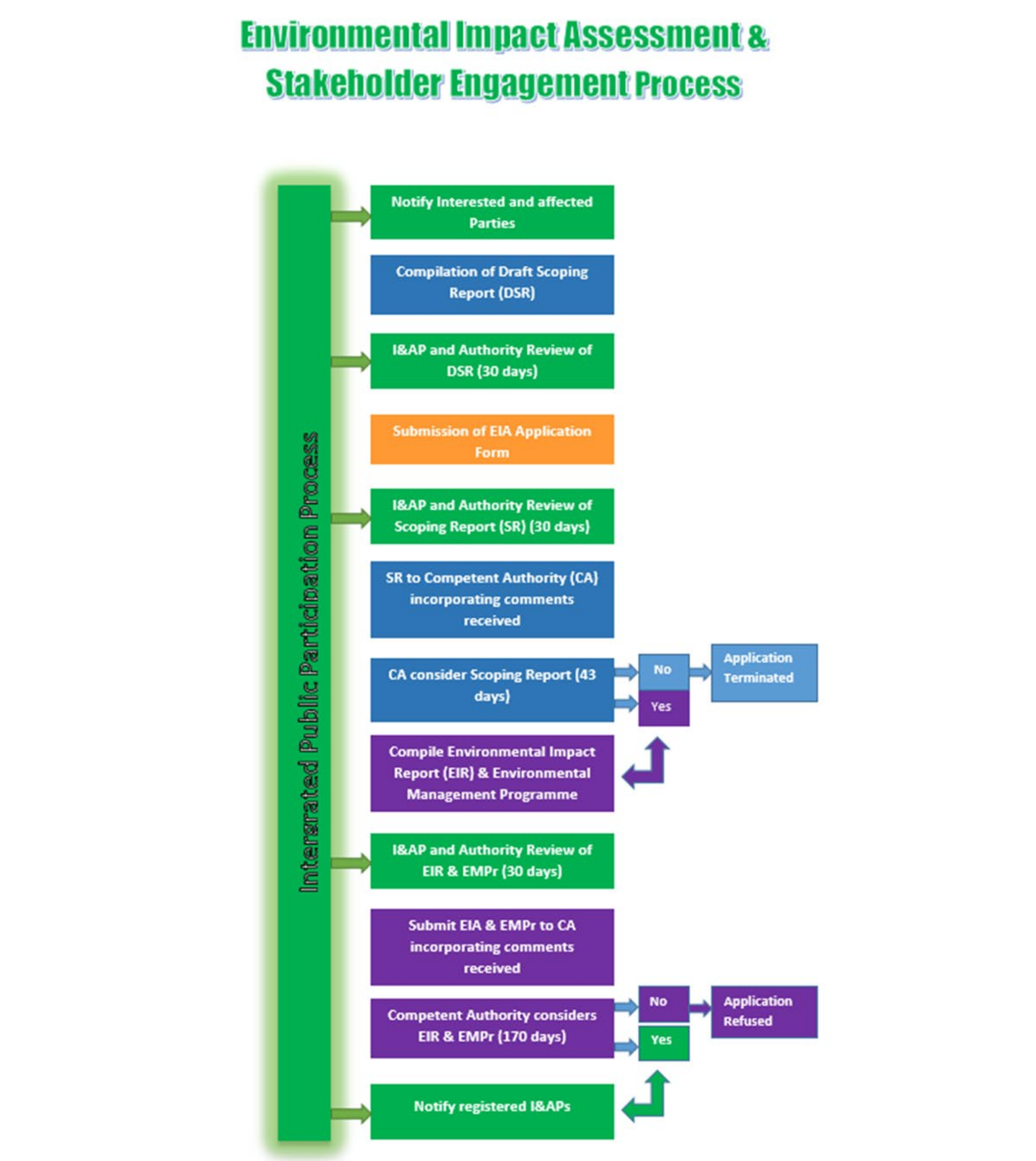
11 Stakeholder Engagement Process

The public participation and stakeholder engagement process forms an important part of the scoping phase of the project. The public participation and stakeholder engagement process is primarily aimed at affording I&APs the opportunity to gain an understanding of the proposed project. In addition, the purpose of consultation with the landowners, key stakeholders, and I&APs is to provide them with the necessary information about the proposed project so that they can make informed decisions as to whether the project will affect them and provide the EIA team with local knowledge of the area and raise concerns relating to the biophysical, socio-economic, and cultural impacts that may arise.

The stakeholder engagement process was conducted in terms of NEMA, which provides clear guidelines for stakeholder engagement during an EIA as summarised in Table 11-1. Figure 11-1 provides a diagram of an Integrated Stakeholder Engagement Process for the proposed project.

Table 11-1: NEMA Stakeholder Guidelines

NEMA Section	Applicability to Stakeholder Engagement
Chapter 1	Outlines the principles of environmental management, several pertaining to public consultation (e.g., Chapter 1, subsections (2), (3), (4) (f), (g), (h), (k), (q), and (r).
Chapter 6	Regulations 39 – 44 of the amended EIA Regulations GNR 326, promulgated on 8 December 2014, amended on 7 April 2017 and 11 June 2021, specify the minimum requirements for stakeholder engagement in an EIA process conducted under the NEMA.
Section 24J of the NEMA	In 2017, the Minister of Environmental Affairs published, Section 24J of the NEMA in terms of, Public Participation Guidelines which guide the Public Participation Process in order to give effect to Section (2)(4)(f), (o), and 24 (1A)(C) of the NEMA.



srk consulting	NYANZA DRAFT EIA REPORT INTEGRATED EIA AND STAKEHOLDER ENGAGEMENT PROCESS	Project No. 585503

Figure 11-1: Integrated EIA and Stakeholder Engagement Process

All the above guidelines have been incorporated into this stakeholder engagement process. The KZN EDTEA was identified as the competent authority for the EA application and the DFFE as the competent authority for the WML. Identified commenting authorities on this application include:

- DWS – KZN Regional Office;
- SAHRA – KZN Provincial Department (AMAFA);
- Department of Agriculture, Land Reform and Rural Development (DALRRD)

- City of uMhlathuze Local Municipality; and
- King Cetshwayo District Municipality.

11.1 Authority Pre-Application Consultation

Pre-application consultation meetings were held with the KZN EDTEA on 2 February 2022 and DFFE on 21 February 2022 respectively. Authority consultation documents are attached in Appendix G 1. The purpose of the meetings was to:

- Notify the KZN EDTEA and DFFE of the project and application;
- To discuss and confirm the applicable activities which will be triggered as a result of the development of the project;
- To discuss the stakeholder engagement process to be followed; and
- To discuss any other KZN EDTEA and DFFE requirements.

A meeting will be held with the King Cetshwayo District Municipality to discuss the AEL application process once the EIA process has been concluded.

11.2 Stakeholder Identification Interested and Affected Parties

The database for Interested and Affected Parties (I&APs) was developed based on an existing database from the PTDC EIA process. This together with the use of GIS and the surveyor general website was used to verify the I&APs for the current EIA process. The I&AP database will be updated as an ongoing process throughout the EIA process.

A copy of the database is provided in Appendix G 2.

11.3 Project Announcement

Stakeholders were provided with the opportunity to participate and register as I&APs during the announcement phase of the project. SRK made use of various methods to inform stakeholder of Nyanza's intention to undertake the required and environmental processes and EA application including newspaper advertisements, onsite notices, emails, and notification letters.

11.3.1 Distribution of Notification Letters and Background Information Document

Notification letters were sent to identified I&APs on 20 April 2022, informing I&APs of the proposed project. A copy of the notification letter and background information is attached as Appendix G 3.

The notification letter provided further information on the project, the environmental processes required for the project and a summary of the stakeholder engagement process to be followed.

11.3.2 Site Notice Placements

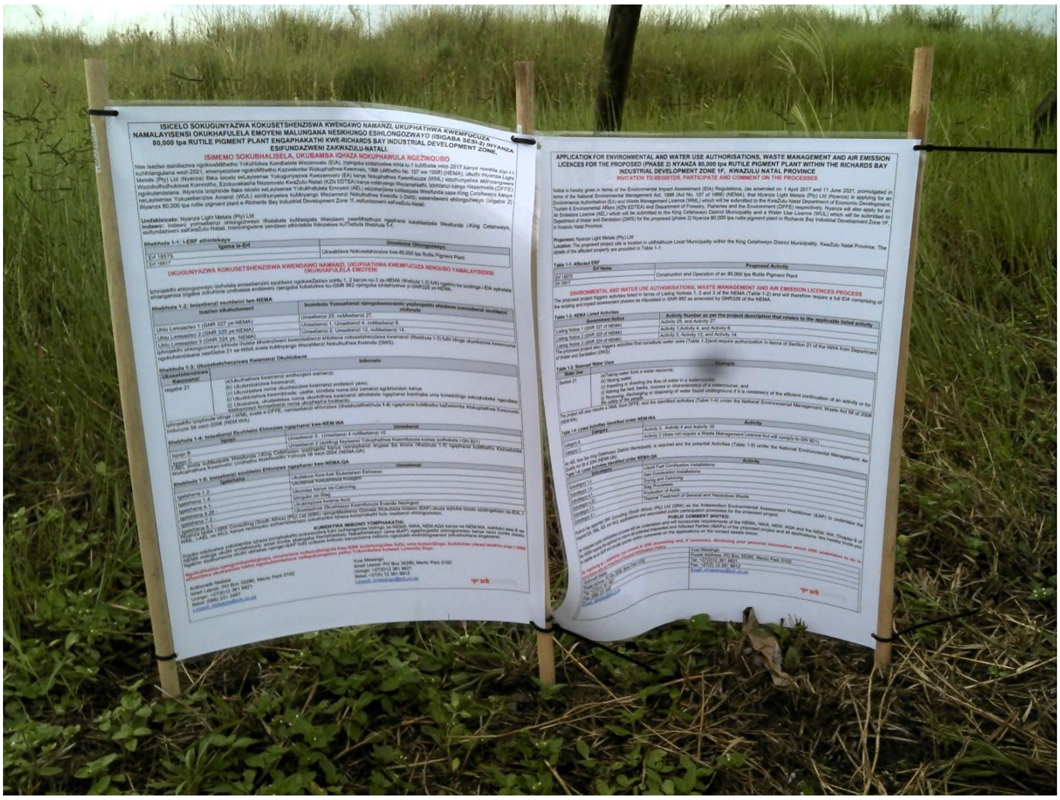
Site notices of A2 size were placed on the road leading to the RBIDZ and entrance gates on 7 April 2022. The site notices were written in English (5) and Zulu (5). Table 11-2 provides the coordinates of each site notice. Photos of the two site notices are provided in Table 11-3. A copy of the site notices is attached in Appendix G 4.

Table 11-2: Site notice placement

Site Notice Locations		Coordinates	
		Latitude	Longitude
1	RBIDZ Site entrance	28°44'35.80"S	32°2'3.75"E
2	Product Testing and Development Facility entrance	28°44'30.09"S	32°1'52.10"E

Table 11-3: Photos of site notices

Site Notice No	Photos of Site Notices
1	

2	

11.3.3 Newspaper Advertisements

English and IsiZulu newspaper advertisements notifying stakeholders about Nyanza's intention to apply for and EA, WML, WUL, and AEL were placed on 22 April 2022. The advertisements notified the public of the application and the opportunity to participate in the EIA process. The details of the newspapers are provided in Table 11-4 and a copy of the advertisements can be found in Appendix G 5.

Table 11-4: Newspaper advertisements

Newspaper	Languages	Date
Zulu Observer	English and Zulu	22 April 2022

11.3.4 Presentations to the Environmental Review Committee

The EAP makes progress presentations to the Environmental Review Committee (ERC) on a quarterly basis. The ERC consists of the KZN EDTEA (environmental representatives- local office and Provincial); KZN Ezemvelo wildlife, RBIDZ (Chair), City of uMhlathuze representatives (Spatial planning as well as Environmental unit) and KZN Clean Air Association. Presentations to the ERC will be done on a quarterly basis until the EIA process is finalised. Recommendations from the meetings were incorporated into the scoping report and, where required will be incorporated into the EIR and EMPr that will be compiled during the impact assessment phase of the process.

11.4 Draft Scoping Report Phase

11.4.1 Notification of the Availability of the Draft Scoping Report for Public Review

The availability of the draft Scoping Report was announced by means of SMSs, letters, and emails to registered I&APs on 11 July 2022.

11.4.2 Public Review of the Draft Scoping Report

The draft Scoping Report was compiled in terms of the requirements of GNR 326 and made available for a 30-day commenting period from 13 July 2022 to 12 August 2022. Copies of the Draft Scoping Report were placed at the following venues provided in Table 11-5.

Table 11-5: List of places the Scoping Report was placed for public review

Public Place	Locality	Telephone
Richards Bay Public Library	Richards Bay Central, Richards Bay, 3900	035 907 5840
SRK Website	www.srk.co.za	(012) 361 9821

The Draft Scoping Report was also made available to the competent and commenting authorities during the stakeholder engagement process as summarised in Table 11-6.

Table 11-6: List of Commenting Authorities Provided with a copy of the Draft Scoping Report

Name	Stakeholder
Ms Zama Mbanjwa / Ms. Fikelephi Mthembu	KwaZulu-Natal Department of Economic Development, Tourism & Environmental Affairs
Muzi Mdamba	Department of Economic Development, Tourism & Environmental Affairs
Ntombezinhle Buthelezi	King Cetshwayo District Municipality
Philani Sibiya; Municipal Manager	King Cetshwayo District Municipality
Sharin Govender	uMhlathuze Local Municipality
Zipho Zondo	uMhlathuze Local Municipality
Nkosenye Zulu; Acting Municipal Manager	uMhlathuze Local Municipality
Ndala Mngadi; Provincial Director	DWS – KZN Regional Office
Zama Hadebe	DWS
Dr William Mngoma / Pinky Sithole	KZN Ezemvelo Wildlife
Bernadet Pawandiwa	AMAFA
Dr S Tshabalala	Department of Health
Siboniso Mbhele	Department of Transport
Mr Tando Tubane	COGTA
Siza Sibande	KZN – Department: Agriculture and Rural Development

11.5 Environmental Impact Assessment Phase

The EAP engaged with stakeholders throughout the process. The Final Scoping Report was submitted to the KZN EDTEA and DFFE for review and the DFFE approved the Scoping Report and associated Plan of Study on the 06th of September 2022, whereas EDTEA approved the Scoping Report and associated Plan of Study on the 28th of September 2022, allowing the impact assessment phase of the process to commence. The EIR was compiled in terms of Appendix 3 of GNR 326 promulgated in terms of the NEMA and includes an EMPr that has been compiled in terms of Appendix 4 of GNR326.

11.5.1 Notification of the Availability of the Draft EIR/EMPr Report

The draft EIR and EMPr will be made available for a 30-day review and comment period between 25/01/2023 to 24/02/2023. Registered I&APs were notified of the availability of the draft EIR and EMPr Report through email, posted registered letters, and uploading the report on the SRK website.

11.5.2 Key Stakeholder Meeting/s

Public and key stakeholder meetings will be held during the draft EIR/EMPr phase. The purpose of the meetings will be to discuss the findings from the impact assessment process and specialist studies.

11.6 Authority Consultation

Authority consultation is considered an on-going process until a decision is made on the EA and WML.

Other authorities that were included were the local and district municipalities, ward councillors, and others identified during the scoping phase of the project. The draft reports were submitted to all the identified authorities for review and comment.

11.7 Key Comments Received

The main comments received from the stakeholders that have been incorporated in the EIR are provided in Table 11-7. Stakeholder communications and commenting authority correspondence are provided in Appendix G 6 and Appendix G 7 respectively.

Table 11-7: Key comments received

Comment Date	Comment raised by	Comment	SRK Response
16 May 2022	ERC/EDTEA	Some members of the ERC expressed concern with respect to the use of internal SRK specialists. A DFFE IQ was provided to SRK and the EDTEA requested that SRK provide a response to the IQ.	SRK submitted a response to the EDTEA stating that the matter the IQ was based on was not applicable to the use of internal specialists but the use of the same engineering company as EAPS. SRK has not been appointed for the Engineering inputs of the project, Hatch is undertaking the Engineering work. According to the NEMA regulations: *13. (1) An EAP and a specialist, appointed in terms of regulation 12(1) or 12(2), must-* *(a) be independent;* Where: *"independent", in relation to an EAP, a specialist or the person responsible for the preparation of an environmental audit report, means-* *(a) that such EAP, specialist, or person has no business, financial, personal, or other interest in the activity or application in respect of which that EAP, specialist or person is appointed in terms of these Regulations; or* *(b) that there are no circumstances that may compromise the objectivity of that EAP, specialist, or person in performing such work;* ***excluding -*** ***(i) normal remuneration for a specialist permanently employed by the EAP; or***
26 May 2022	RBCAA	Same comment on the use of internal specialists was raised during the meeting with the RBCAA.	

Comment Date	Comment raised by	Comment	SRK Response
			(ii) fair remuneration for work performed in connection with that activity, application, or environmental audit; SRK is of the understanding of the concerns raised by the ERC are in connection with the independence between the EAP and the specialist. According to SRK's understanding of the requirements of Regulation 13 of NEMA, the EAP and specialist must be independent of the applicant to ensure a fair and accurate assessment of impacts. As such, if one is to accept that SRK as an EAP is independent of Nyanza as the applicant, then it stands to reason that SRK as a specialist is also independent of Nyanza as defined above. In fact in the definition exclusions, the NEMA regulations contemplate the situation where a specialist may be permanently employed by an EAP (Exclusion (1) above, emphasis by SRK).
16 May 2022	RBCAA	The RBCAA requested a meeting with the Air Quality Specialist to discuss the proposed Scope of Works for the study	A meeting was organised and held on 26 May 2021. Minutes of the meeting are included in Appendix G 7.
12 August 2022	City of uMhlathuze Local Municipality	The applicant is requested to analyze the potential cumulative effects of the proposed pigment plant in relation to development that are existing and those already under development, and the municipality would like to further engage the Environmental Impact Report with the specialist's report for this application.	An assessment of cumulative impacts was undertaken and is included in Section 12.5 of this EIR.
12 August 2022	City of uMhlathuze Local Municipality	The specialists report must assess the cumulative impacts particularly on the water resources within the catchment this must include the stormwater management plan for the property and the management of wastewater generated on site from the stockpiles of slag.	The specialist reports included an assessment of cumulative impacts which have been incorporated into Section 12.5 of this EIR. The slag will temporarily be stored in an enclosed warehouse in bays separated by concrete walls and there will be no wastewater generated from the slag stockpiles.
12 August 2022	City of uMhlathuze Local Municipality	The aquatic/freshwater specialists study must address the effects of TiO_2 nanoparticles on the aquatic ecosystems.	The aquatic specialist studies included an assessment of the impacts of nanoparticles on aquatic ecosystems. The assessment has been included in Section 12.3. The specialist studies reports are included in Appendix F.

<table>
<tr><th>Comment Date</th><th>Comment raised by</th><th>Comment</th><th>SRK Response</th></tr>
<tr><td>12 August 2022</td><td>City of uMhlathuze Local Municipality</td><td>The applicant must in the specialist studies for the Environmental Impact Assessment include the cumulative impacts on the air quality of the area in relation to the proposed project.</td><td>The air impact assessment included modelling and assessment of cumulative impacts. The findings have been incorporated into Section 12.5. The specialist studies report has been included in Appendix F.</td></tr>
<tr><td>29 August 2022</td><td>KZN EDTEA, Pollution & Waste Management</td><td>According to the Waste Act, Activity 10 is in relation to the construction of only activities mentioned under category B. In this case it is associated with construction of activity 3 and 4.</td><td></td></tr>
<tr><td>29 August 2022</td><td>KZN EDTEA, Pollution & Waste Management</td><td>Section 7.1 must indicate all the waste regulations that are associated with the proposed project, as provided in the table below:
<table>
<tr><th>Legislation</th><th>Relevance</th></tr>
<tr><td>The Norms and Standards for the storage of waste 2013.</td><td>This will be triggered by all the waste storage areas on site with a capacity of 80m^3 and more.</td></tr>
<tr><td>Waste Classification and Management Regulations 2013</td><td>All the waste streams generated on site must be classified before being given to the third party.</td></tr>
<tr><td>Norms and Standards for the Assessment of Waste for Landfill Disposal 2013</td><td>All the waste streams generated on site must be assessed before landfill disposal.</td></tr>
<tr><td>Regulations regarding the exclusion of waste stream from the definition of waste 2018</td><td>All the waste streams generated on site which will be diverted away from the landfill for third part beneficiation.</td></tr>
<tr><td>National Waste Information Regulations 2012</td><td>To register as a Hazardous waste generator and Waste treatment facility</td></tr>
</table></td><td>Section 7.1 - Policy and legislative has been updated to include other waste management legislations, and legislation.</td></tr>
<tr><td>29 August 2022</td><td>KZN EDTEA, Pollution & Waste Management</td><td>The report must also be clear if there will be any central storage area for hazardous or general waste onsite and if so at what capacity will this be?</td><td>There will be a central storage area for the HSS that will be used as feedstock. The HSS will be stored in an enclosed warehouse and provision has been made for 14 days' worth of storage (22 107m^3).</td></tr>
</table>

Comment Date	Comment raised by	Comment	SRK Response
			Please refer to the attached plant layout plan for the position of the storage area.
29 August 2022	KZN EDTEA, Pollution & Waste Management	The report must indicate how the rags and hydrocarbon contaminated soil be managed on site? The rags – will these be oil or diesel contaminated? Resulting from operations or spill incidents? Will there be any used oil on site, at what capacity will this be?	The handling of contaminated ragas and soil is included in Section 12 and the accompanying EMPr.
29 August 2022	KZN EDTEA, Pollution & Waste Management	Page 23 of the draft scoping report has grouped a list of products, co-products, and waste. The report must clearly distinguish the list of waste streams generated on site and specify how it will be managed on site (if stored, at what capacity) till its final destination which could be recycling, landfill, disposal, or intended customers for other beneficiation purposes. For example, Gypsum is classified as a co-product yet there is also gypsum which is waste that will be slurried with liquid effluent and discharge through the pipeline. The report must clearly describe whether gypsum is a waste stream which can be excluded from the definition of waste as it can be used for other beneficiation purposes. If it is waste stream the report must specify its storage capacity on site and detail its final destination based on the water content.	Section 5.4.7 of the report provided details of how each waste stream will be managed at the site. It must be noted that although some of Nyanza's waste will be sold to other end users (e.g. Gypsum), where there is excess, this will be disposed of as described in Section 5.4.7.
29 August 2022	KZN EDTEA, Pollution & Waste Management	According to pg. 23 of the draft scoping report the digester sludge storage on site will be 2 592m^3 however page 24 further explains that it is waste that will be disposed to a landfill site or be sent to customers for beneficiation purposes. The report must clearly specify whether the digester sludge is a waste and how it will be managed on site.	There will be temporary storage of digester sludge, which will be sold to customers for beneficiation and the excess will be sent to a landfill site.
29 August 2022	KZN EDTEA, Pollution & Waste Management	Section 4 project location provided shows a map with coordinates and property Erf numbers however on the green park activity is located on the Map. The locations of HSS storage area, location of the recovery facility where HSS will be processed, and the location of the highly dangerous waste treatment facility must be indicated clearly.	Please refer to the attached layout plan for the HSS storage area.
29 August 2022	KZN EDTEA, Pollution & Waste Management	A Layout plan provided in the document is not clear. Labels are not clear for possible analysis on where the waste activities will be located in the layout plan. The ground water flow as indicated as North Westerly; the report must also indicate how was this considered in terms of locating waste activities that will be containing hazardous waste.	The HSS will be stored an enclosed warehouse in bat areas separated by concrete walls. The groundwater study found that the HSS storage is not expected to have significant impacts on groundwater. Please refer to Section 12 and the groundwater specialist report.
29 August 2022	KZN EDTEA, Pollution & Waste Management	The report must also include detailed measures that will be in place to ensure that ground water is not contaminated which must include: • Designs by professional engineers – storm water management system for the contaminated surface water and the one which must be diverted away from the site	Appendix E incudes the plant design drawings which include the stormwater management infrastructure that was incorporated into the design. No emergency dams form part of the project. The HSS (hazardous waste) will be stored in an

Comment Date	Comment raised by	Comment	SRK Response
		• Designs by professional engineers of liners for waste effluent on site and cater for emergency dams as well • Designs for the construction of activity 3 and 4 • Secondary containment system for wastewater treatment facility • Control measures for containing wastewater onsite such as bunded wall where applicable • Ground water monitoring systems in place	enclosed warehouse with concrete walls and will not require liner systems. The engineering design basis report has been included in Appendix F.

11.8 Comments and Response Report (CRR)

All issues and concerns raised by I&AP's during the Scoping and EIA process, have been recorded and responded to in the Comments and Responses Report (CRR). A copy of the CRR is included as Appendix G 8.

12 Quantitative Impact Assessment Results

Environmental impacts on the biophysical and socio-economic environment, which could potentially occur throughout the construction and operational phases of the proposed project are described in the following sections.

12.1 Planning/Pre-construction Phase

The potential impacts associated with the planning stage (pre-construction phase) of the project include:

- Infrastructure placement and design leading to overall loss of floral and faunal SCC; and
- Poor planning leading to an increased construction footprint.

The potential failure to design and implement an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities, will result in the spread of AIPs from the development footprint to surrounding natural habitat, leading to potential loss of floral species diversity from surrounding natural habitat.

The results from the quantification of the identified potential impacts associated with the planning phase of the project are summarised in Table 12-1.

Table 12-1: Impact on the (1) floral habitat and diversity, and (2) SCC (across all habitat units*) associated with the proposed development activities for the Pre-construction & Planning Phase. *Excluding the Wetland types that EA has been granted for infill

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on floral habitat & diversity across the habitats: Degradation and modification of the receiving environment, loss of floral habitat and species diversity resulting from: • *Inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an AIP control and management plan, and/or erosion or stormwater control plan or poor infrastructure design leading to increased risk of hazardous chemical leakage into surrounding areas.*	Without mitigation	Regional	Medium	Long-term	High	Probable	HIGH	– ve	High
		2	2	3	7				
	Essential mitigation measures: • Minimise loss of natural vegetation where possible through effective planning and limiting the development footprint to what is essential. The designs must further adhere to all legislation and all reasonable precautions must be taken to prevent potential spills and /or leaks; • Ensure development layouts are designed to ensure that hazardous chemical leakage and/or spills do not occur. Layouts should include infrastructure to house spill kits etc.; • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, are not placed outside of the authorised footprint, especially within the freshwater habitat (i.e., the Depression Wetland that is to be left as open space); • The area in which construction activities is to take place has been fenced off and clearly demarcated. The fence should be checked regularly to ensure no holes have been created etc.; • An AIP Management/Control Plan should be compiled by a qualified professional and implemented prior to the start of construction activities. No chemical control of AIPs to occur without a suitably trained professional and no chemical control to be permitted near the Depression Wetland. Also, only the use of certified chemicals should be allowed; • Nyanza must ensure that the RBIDZ obtains the deforestation permit required for the destruction of the forest prior to commencement of construction activities; and • Appropriate Rehabilitation measures, Erosion Control, stormwater management, and Bush Encroachment Control Plans should be implemented to ensure control thereof.								
	With mitigation	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on SCC across the habitats: loss of floral SCC and/or habitat because of: • *Failure to conduct an additional site walkdown for additional SCC observed during the 2022 field assessment; and* • *Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate floral SCC to suitable habitat outside of the surface infrastructure footprint.*	Without mitigation	Local	High	Long-term	High	Definite	HIGH	– ve	High
		1	3	3	7				
	Essential mitigation measures: • A walkdown of the footprint area should take place prior to vegetation clearing and should be conducted by a suitably qualified specialist. A walkdown (and associated rescue and relocation) has occurred within the Degraded Hygrophilous Grassland habitat and thicket habitat. However, a walk-through of the remaining areas within the study area, particularly the Degraded Coastal Forest Habitat is recommended; • Permits from Ezemvelo KZN Wildlife and authorisation from the DFFE should be obtained to remove, cut, or destroy any provincially and/or nationally protected species before any vegetation clearing may take place; • The identification and marking of floral SCC must take place prior to the commencement of the construction phase where vegetation clearing will occur. Rescue and relocation activities of the identified SCC should occur during the construction phase, before the commencement of vegetation clearing (refer to tables below); and • It is recommended that for species that cannot be relocated, seedlings and /or seeds of these species are harvested form the development footprint area before clearing activities commence and grown under nursery conditions with the purpose to use these species for rehabilitation at a later stage.								

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
	With mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	– ve	High
		2	2	2	6				

Table 12-2: Impact on the (1) faunal habitat and diversity, and (2) SCC (across all habitat units) associated with the proposed development activities for the Pre-construction & Planning Phase

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Impact on Faunal Habitat & Diversity across the habitats: loss of faunal habitat and diversity because of inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an AIP control and management plan, and/or erosion control plan	Without mitigation	Regional	High	Long-term	High	Definite	VERY HIGH	– ve	High
		2	3	3	8				
	Essential mitigation measures:								
	• Minimise loss of natural vegetation where possible through effective planning and limiting the development footprint to what is essential. The designs must further adhere to all legislation and all reasonable precautions must be taken to prevent potential spills and /or leaks; • A walkdown, conducted by a faunal specialist, of the footprint area should take place prior to vegetation clearing to rescue and relocate all small and slow-moving fauna, particularly amphibians and reptiles. These individuals should be relocated within the study area where no development is proposed; • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, are not placed outside of the authorised footprint, especially within the freshwater habitat that has been designated as open space; • A stormwater management plan should be designed and implemented for all phases of the development, this in order to minimise potential erosion and sedimentation of the remaining freshwater habitats that will not be infilled and developed; • An AIP Management/Control Plan should be compiled by a qualified professional and implemented prior to the start of construction activities. No chemical control of AIPs to occur without a certified professional and no chemical control to be permitted in Freshwater habitat; and • Appropriate rehabilitation measures and a bush encroachment control plan should be implemented to ensure control thereof.								
	With mitigation	Local	Medium	Long-term	Medium 6	Definite	MEDIUM	– ve	High
		1	2	3	6				
Impact:		**Extent**	**Intensity**	**Duration**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Impact on SCC across the habitats: Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate faunal SCC to suitable habitat outside of the surface infrastructure footprint.	Without mitigation	Regional	High	Long-term	Very high	Definite	VERY HIGH	– ve	High
		2	3	3	8				
	Essential mitigation measures:								
	• A walkdown of the location should be undertaken and all SCC invertebrate or vertebrate nests or burrows should be marked. Should any protected faunal species be noted within the development footprint which cannot be moved off the site without potential harm, a permit will have to be obtained from the relevant provincial or national authority for their translocation; • Permits from Ezemvelo KZN Wildlife and authorisation from the DFFE should be obtained to remove or convey any provincially or nationally protected species before any vegetation clearing (destruction of faunal habitat) may take place; and • The relocation of faunal SCC must take place prior to the commencement of the construction phase where vegetation clearing will occur.								
		Local	Medium	Long-term	Medium	Definite	MEDIUM	– ve	High

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
	With mitigation	**1**	**2**	**3**	**6**				

Table 12-3: Summary of the impact assessment conducted for the proposed infrastructure activities for the Pre-construction and Planning Phase due to site preparation prior to commencement of construction

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Potential impacts associated with site clearing prior to commencement of construction activities related to the proposed infrastructure: • *Vehicular transport and access to the site, site clearing;* • *Removal of vegetation and associated disturbances to soils;* • *Miscellaneous activities by construction personnel.*	Without mitigation	Local	High	Medium-term	Medium	Possible	LOW	– ve	High
		1	3	2	6				
	Essential mitigation measures:								
	• It is highly recommended that all construction and site clearing should ideally take place during the dry season to limit potential impacts of sedimentation as a result of the construction activities; • Contractor laydown areas and stockpiles must be established outside of the delineated boundary of the conservation area wetland and associated 30 m buffer zones which should be demarcated as "no go" areas; • Construction personnel must be informed that all litter and waste must be disposed of immediately and only in closed dustbins and demarcated waste disposal facilities.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	2	1	4				

12.2 Construction Phase

12.2.1 Socio Economic

The project will result in the generation of some employment during the construction phase. It is expected that contractors will be appointed by Nyanza for the construction of the proposed plant. It is expected that the project will lead to the creation of about 1 200 jobs during its construction phase and 550 job during its operational phase. Approximately 680 of these jobs will be for skilled labourers, while 1 070 of these jobs will be for unskilled labourers. People from the Richards Bay area will be preferably employed as this will be the most economically viable option. Should the project not proceed, a large negative socio-economic loss will be a consequence for the region.

Commencing with the construction of investment projects and the persistent partnership between Nyanza and the RBIDZ, will contribute to stimulating and restoring the KZN economy as well as the national economy (ZO, 2021).

The proposed project could potentially result in the following negative social impacts:

- Generation of dust potentially resulting in a health and nuisance impact;
- Impact on safety and security as a result of theft, the occurrence of additional trucks on the roads, uncontrolled lighting of fires on site, littering and driving irresponsibly;
- Health and safety risk as a result of the movement of construction vehicles increasing the risk of accidents; and
- Influx and unlawful occupation of the area by job seekers.

Table 12-4 provides the results of the quantitative socio-economic impacts of the proposed project.

Table 12-4: Socio-Economic Impact Assessment Results for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Possible boost in short term employment and local small business opportunities.	Without mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	+ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Nyanza Metals will appoint contractors who will be responsible for recruitment. Where possible, encourage the local employment • Revenue for local businesses which will be supplying the contractors with materials (i.e. construction materials) and increased use of the surrounding businesses. The use of the local businesses is recommended especially in occasions where they can provide what is needed for the project. • Where possible, enforce a tender procedure requirement that bidders (contractors) commit to a recruitment process that includes a preference for local recruitment and promotion of local SMME's.								
	With mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	+ve	High
		2	2	2	6				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential impact on safety and security because of theft, the occurrence of additional trucks on the roads, uncontrolled lighting of fires on site, littering and driving irresponsibly.	Without mitigation	Regional	Medium	Medium-term	Medium	Possible	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Keep the speed limits to 40 km/h or less when driving. • No fires are allowed on the site, unless in areas demarked and managed for this purpose. • During induction, all site personnel will be made aware of fire risks • All workers must be provided with Personal Protective Equipment (PPE) and Nyanza Metals and contractors must ensure that their personnel make use of PPE								
	With mitigation	Local	Medium	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	2	1	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Health and safety risk because of the movement of vehicles increasing the risk of accidents	Without mitigation	Local	Medium	Short-term	Very low	Probable	INSIGNIFICANT	– ve	High
		1	2	1	4				
	Essential mitigation measures:								
	• Keep the speed limits to 40 km/h or less when driving. • Site personnel to use designated pedestrian routes								
	• Induction on health and safety to be held for all site personnel (including visitors)								

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential influx and unlawful occupation of the area by job seekers and influx of workers	Without mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
	Essential mitigation measures:								
	• Nyanza Metals will appoint contractors who will be responsible for recruitment. Where possible, encourage the local employment • Security personnel to be contracted to maintain a safe environment • No unlawful occupation of the site by job seekers should be allowed • All job seekers to apply as per Nyanza's and the RBIDZ’s employment and recruitment procedure • Nyanza must develop and implement an influx management plan. • Nyanza must implement the Local Hiring and Training Plan to ensure that Contractors are implementing the plan. • Where possible, encourage the local employment • Security personnel to be contracted to maintain a safe environment • No unlawful occupation of the site by job seekers should be allowed • All job seekers to apply as per Nyanza's and the RBIDZ’s employment and recruitment procedure								
	With mitigation	Local	Low	Short-term	Very low	Improbable	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.2.2 Groundwater

Potential discharges to groundwater, and subsequent impact on the groundwater system, could potentially occur because of the use of earth moving machinery and construction vehicles on site which poses the risk of chemical spillages including fuel and oils. According to the groundwater specialist studies, the groundwater is considered to be a viable transport pathway and is able to transport potential contaminants from surface sources to beyond the site boundary.

The potential receptors identified from the study are summarised in Table 12-5.

Table 12-5: Potential Receptors

Type	Distance and Direction	Description
Wetland	~300 m, Northwest	Wetland A
Surface water drainage	Downstream	Canal, streams
Shallow and Deeper Aquifers	No existing current users within 500m of the site	Potential source for water supply

The impacts on groundwater due to the proposed project can be mitigated to be of insignificant significance as provided in Table 12-6.

The cumulative impact on groundwater during the construction phase of the project will be negligible.

Table 12-6: Groundwater Impact Assessment Results for the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Possible groundwater contamination from hydrocarbons from vehicles during the construction and operation phase	Without mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	-ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Ensure relevant standards such as the IFC EHS Guidelines and good practice is adhered to for all installations and when handling hydrocarbons • Spill and leak protocols must be in places supported by spill kits and emergency clean-up training • Disposal bins on site to dispose of contaminated materials • Service and maintain vehicles as per manufacturers' specifications • Use drip trays when machinery is in a fixed position								
	With mitigation	Local	Low	Short-term	Very low	Possible	VERY LOW	– ve	Medium
		1	1	1	3				

12.2.3 Surface Water

The potential impacts on surface water during the construction phase of the proposed project are as follows:

- Accidental spillages of hazardous substances from construction vehicles used during construction, as well as from hazardous storage areas.
- Contamination of runoff by poor materials/waste handling practices which may enter into the canal and other water resources;
- Debris from poor handling of materials and/or poor waste management practises; and
- Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality.

It is expected that without the implementation of mitigation measures, the impacts on the surface water quality and the hydrology of the area will be of medium (-) significance, which can be reduced to low (-) significance with the implementation of mitigation measures.

Table 12-7: Surface Water Impact Assessment Results for the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Potential deterioration in water quality due to accidental spillages of hazardous substances such as hydrocarbons from vehicles and machinery used during construction.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Nyanza shall ensure that clean and dirty water are kept separate. • Spill kits to be made available at areas of possible spillages of hazardous substances. • Remediation of spillages must be conducted on a continual basis. • Contaminated runoff will be contained and re-used where necessary. • No direct discharge of polluted water to the environment is permitted.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Possible contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• No washing of vehicles shall be allowed outside demarcated areas. Washing bays for vehicles and other equipment will be clearly demarcated and will not be allowed to contaminate any surface runoff. • Nyanza shall ensure that clean and dirty water are kept separate. • Remediation of spillages must be conducted on a continual basis. • Spill kits to be made available at areas of possible spillages of hazardous substances. • No activities shall be allowed within 100 metres from the nearby steams and 500 meters from riparian areas without consent from the DWS.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Poor stormwater management leading to runoff from stockpiled material removed causing pollution of the water resources.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Ensure clean and dirty water segregation.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.2.4 Air Quality, Odours and Climate Change

It is anticipated that the construction phase of the project will be undertaken in a phased approach During the site preparation and construction phase, respirable dust (PM_{10} and $PM_{2.5}$) is of concern as it has a potential impact on health. Dust emissions generated from construction of the plant are likely to arise as well as dust entrainment from vehicles transporting the required materials. The emissions may affect the immediate project area and adjacent facilities within the project study area but will decrease further away from the site. Furthermore, the disturbed area required onsite is expected to be small, resulting in minimal dust emissions. Emissions during this phase are deemed to be temporary in nature therefore this was not included in the dispersion modelling. The movement of vehicles and earth moving machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.

Improper handling and storage of waste can result in odours. Putrescible waste must be handled, stored and disposed of before the probability of it generating odours and chemical toilets must be emptied / serviced on a regular basis.

A summary of the air quality and climate change impact assessment results (before and after mitigation) as well as the mitigation measures required to avoid/minimise significance of the impacts are provided in Table 12-8.

The no-go option will result in no additional air quality and climate change impacts since this option means that the air quality and climate change impacts associated with the construction of the plant will not occur.

Table 12-8: Air Quality Impact Assessment Results for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Possible increase in nuisance and potential health impacts associated with dust generation, PM_{10} and $PM_{2.5}$, because of earthworks, operation of heavy machinery, and vehicle movement.	Without mitigation	Local	Medium	Short-term	Very Low	Probable	VERY LOW	-ve	Medium -High
		1	2	1	4				
	Essential mitigation measures:								
	• Installation of wind barriers around construction area to contain dust emissions. • Wet dust suppression on unpaved roads during construction. • Limit vehicle access to reduce dust entrained by vehicles transporting material to and from the site. • Speed limits should be adhered to at all areas within the site. • Awareness training on air emissions should be carried out at all levels for the workforce (workers, foremen, managers), and can be included in induction courses. Training should focus on promoting understanding as to why mitigation measures are in place. • Develop and implement a complaints system and make the community aware of the complaints procedure (if not already in place).								
	With mitigation	Local	Low	Short-term	Very Low	Probable	VERY LOW	-ve	Medium -High
		1	1	1	3				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Emissions of Green House Gases because of the use of vehicles and machinery used during the construction activities.	Without mitigation	Regional	Low	Short-term	Very low	Probable	VERY LOW	– ve	High
		2	1	1	4				
	Essential mitigation measures:								
	• All the vehicles shall undergo maintenance on a regular basis to ensure the combustion engine vehicle efficiency.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Possible production of odours due to improper handling, storage, and management of waste of site	Without mitigation	Local	Medium	Short-term	Very Low	Probable	VERY LOW	-ve	Medium -High
		1	2	1	4				
	Essential mitigation measures:								
	• Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; and • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.								
	With mitigation	Local	Low	Short-term	Very Low	Probable	VERY LOW	-ve	Medium -High
		1	1	1	3				

12.2.5 Noise

The construction phase will initially include the clearing of land where if required and the actual construction of the required infrastructure of the proposed plant. Key sources of noise expected during the construction phase are the arrival and departure of construction vehicles and the construction equipment (such as hammering, grinders, welding). The proposed steel fabrication plant to be used during the construction phase also has potential to increase ambient noise in the vicinity of the plant. The noise impact assessment found that the closest noise receptor to the plant site is Alton, which is approximately 1.2km from the site. Noise generated during the construction phase is considered temporary in nature and the extent, probability, consequence, and significance can readily be managed through standard construction techniques (Table 12-9).

The no-go option will result in no additional noise impacts since this option means that the nuisance noise impacts associated with the construction of the plant will not occur.

Table 12-9: Noise Impact Assessment Results for the Construction Phase

<table>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="6">The use of the steel fabrication plant, construction vehicles and machinery during the construction phase may generate nuisance noise in the immediate vicinity</td><td rowspan="2">Without mitigation</td><td>Local</td><td>Medium</td><td>Short-term</td><td>Very Low</td><td rowspan="2">Probable</td><td rowspan="2">VERY LOW</td><td rowspan="2">-ve</td><td rowspan="2">Medium -High</td></tr>
<tr><td>1</td><td>2</td><td>1</td><td>4</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">Planning construction activities in consultation with local communities to ensure activities with the greatest potential to generate noise are planned during periods of the day, thereby less likely resulting in a disturbance. Information regarding construction activities should be provided to all local communities.
All equipment, machines, and vehicles to be used onsite during the construction phase are to be the quietest reasonably available and are to be routinely maintained to ensure the effectiveness of the noise suppression systems.
Through site induction programmes, all construction personal (including contractors) should be informed of their responsibilities and the importance of managing noise levels during the construction phase of the project.
When working near a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible; and
Any noise-related complaints received during the construction phase are to be registered and result in the implementation of appropriate modified practices.
Reduce project traffic routing through community areas wherever possible</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Local</td><td>Low</td><td>Short-term</td><td>Very low</td><td rowspan="2">Possible</td><td rowspan="2">INSIGNIFICANT</td><td rowspan="2">– ve</td><td rowspan="2">Medium -High</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>3</td></tr>
</table>

12.2.6 Visual

The following potential impacts on the visual character of the area because of the proposed project are envisaged during the construction phase:

- Visual intrusion because of the movement of construction vehicles and machinery; and
- Indirect visual impact due to dust generation, because of the movement of vehicles and materials, to and from the site area.

It is expected that due to the proposed location of the Nyanza project, in an industrial area where significant activities associated with the other plants and industries are already taking place, the significance of the visual impacts will be of low (-) and very low (-) significance before the implementation of mitigation measures. With the implementation of mitigation measures, the significance of the impacts can be reduced to be insignificant as summarised in Table 12-10.

The cumulative visual impact during the construction phase will be negligible.

The no-go option will result in no additional visual impacts since this option means that the visual impacts associated with the construction phase of the project will not occur.

Table 12-10: Visual Impact Assessment Results for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Visual intrusion because of the movement of machinery and the establishment of the required infrastructure.	Without mitigation	Local	Medium	Medium-term	Low	Probable	LOW	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• Where possible, movement of vehicles and construction machinery must be kept to a minimum.								
	With mitigation	Local	Low	Medium-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	2	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Indirect visual impact due to dust generation because of the movement of vehicles and materials, to and from the site area.	Without mitigation	Local	Medium	Short-term	Very low	Probable	VERY LOW	– ve	High
		1	2	1	4				
	Essential mitigation measures:								
	• Dust control measures shall be implemented to make sure nuisance dust is kept at a minimum.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.2.7 Soils, Land Use and Land Capability

The disturbance of original soil profiles and horizontal sequences of these profiles during earthworks is considered to be a measurable deterioration. This impact is considered to be permanent but will be localised within the site boundary.

Soil chemical pollution as a result of potential oil and fuel spillages from vehicles is considered to be a moderate deterioration of the soil resource. This impact will be localized within the site boundary and have moderate significance on the soil resource when not managed. However, with proper waste management and immediate clean-up, the significance of this impact can be reduced to a low. Soil compaction will be a measurable deterioration that will occur as a result of the heavy vehicles moving around the site.

Soil erosion is also anticipated due to vegetation clearance. The impacts of soil erosion are considered to be both direct and indirect. The direct impacts are the reduction in soil quality which results from the loss of the nutrient-rich upper layers of the soil and the reduced water-holding capacity of severely eroded soils. The off-site indirect impacts of soil erosion include the disruption of riparian ecosystems and sedimentation. Soil erosion is a permanent impact for once the resource has been lost from the landscape it cannot be recovered. Although there are off-site indirect impacts associated with this, the impact is mainly considered to be local. The consequence and significance of the impact are considered as high. With proper mitigation measures, it is anticipated that the significance of this impact can be reduced to moderate. In areas of permanent changes such as areas where the plant will be erected, the current land capability and land use will be lost permanently.

12.2.8 Geology and Topography

Excavations for the plant foundation can lead to erosion which may result in minor changes to the geology and topography. The impact is expected to be minimal and of a short duration.

12.2.9 Heritage

According to the heritage impact assessment, the impact on the stone tools will be very low regardless of mitigation. There is a plant species that was identified on the site indicative of historical grave sites. At the time of the assessment, it was not possible to verify the presence of graves on the site. Should there be a grave on the site, a chance find protocol will be implemented to avoid impacting the grave.

Table 12-11: Soils, Land Use and Land Capability Impacts During the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Localised chemical pollution of soils as a result of vehicle hydrocarbon spillages and compaction.	Without mitigation	Local	Low	Long-term	Low	Probable	LOW	– ve	High
		1	1	3	5				
	Essential mitigation measures:								
	• Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEM: WA or can be removed by a service provider that is qualified to clean the soil.								
	With mitigation	Local	Low	Short- term	Low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Localised clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	*Without mitigation*	Local	High	Long-term	Low	Probable	LOW	– ve	High
		1	1	3	5				
	Essential mitigation measures:								
	• The time in which soils are exposed during construction activities should remain as short as possible. • Erosion control measures shall be implemented where deemed necessary. • In general, all steep slopes steeper than 1:3 or where the soils are more prone to erosion must be stabilised. • If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion. • Runoff from stockpiles shall be detained to support growth of vegetation. • Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels. • Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff. • A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity. • If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation. • Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes. • Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.								
	With mitigation	Local	Low	Short- term	Low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

Table 12-12: Geology and Topography Impacts During the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Removal of local geology as a result of construction activities.	Without mitigation	Local	Low	Long-term	Low	Definite	LOW	– ve	High
		1	1	3	5				
	Essential mitigation measures:								
	• The footprint of the construction activities shall be kept to a minimum.								

	With mitigation	Local 1	Low 1	Short- term 1	Low 3	Possible	INSIGNIFICANT	– ve	High

Table 12-13: Heritage Resources Impacts During the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential impacts on Stone Tools	Without mitigation	Local 1	Low 1	Long-term 3	Low 5	Definite	LOW	– ve	High
	Essential mitigation measures:								
	• None required								
	With mitigation	Local 1	Low 1	Long- term 3	Low 5	Definite	LOW	– ve	High
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential impacts on human graves.	*Without mitigation*	Local 1	High 3	Long- term 3	High 7	Possible	MEDIUM	– ve	Low
	Essential mitigation measures:								
	• Monitor earthmoving activity Should any human remains be found, then the necessary steps to commence grave removal must be initiated • All excavations within a 20m boundary must stop • The area needs to be clearly demarcated and is out of bounds to everyone. • KZNARI and the SAPS need to be informed immediately • Human remains may not be removed until approval from KZNARI has been obtained • Developer can apply for an emergency permit to remove the remains for temporary storage. Alternatively a PPP pertaining to human remains must be initiated • An archaeologist with expertise in human remains removal needs to be appointed.								
	With mitigation	Local 1	Medium 2	Long-term 3	Medium 6	Probable	MEDIUM	– ve	High

12.2.10 Wetlands and Aquatic Ecosystems

There are a number of wetlands located on or within 500m of the proposed Nyanza Project site. It is expected that the following impacts will occur during the construction phase of the proposed project:

- Potential impacts associated with vegetation clearing of vegetation within the footprint of the proposed infrastructure:
  - Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and
  - Potential continued proliferation of alien and invasive vegetation species due to disturbance.
- Potential impacts associated with excavation and concrete works:
  - Removal of vegetation and associated disturbance to soil within the construction footprint;
  - Increased likelihood of dust generation;
  - The movement of construction machinery, personnel, and equipment directly;
  - Mixing and casting of concrete to facilitate construction; and
  - Proliferation of alien and invasive vegetation species within the footprint areas associated with the proposed infrastructure.
- Potential impacts associated with vegetation clearing of vegetation within the footprint of the proposed infrastructure including:
  - Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and
  - Potential continued proliferation of alien and invasive vegetation species due to disturbance.
  - Hydropedological losses that occur through the reduction in lateral flow and percolation.

The results from the quantitative impact assessment are provided in Table 12-14.

Table 12-14: Wetlands Impacts Results for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential impacts on the depression wetland associated with vegetation clearing of vegetation within the footprint of the proposed infrastructure including: • *Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and* • *Potential continued proliferation of alien and invasive vegetation species due to disturbance.*	Without mitigation	Local	High	Medium- term	Medium	Definite	MEDIUM	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• It must be ensured that sediment control devices adjacent to the delineated wetland in place prior to the start of the construction activities and these must be maintained in order to minimise the risk of sedimentation and silt entering the freshwater habitat; • All alien and invasive vegetation species, debris and litter removed from the road reserve must be removed from site; and • Removed materials must be stockpiled outside the delineated extent of the wetland and must be disposed of at a registered disposal facility								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential wetlands impacts associated with excavation and concrete works associated with the proposed infrastructure (processing plant, ground-mounted solar panels, and non-process water buildings such as offices and workshops and storerooms including: • *Removal of vegetation and associated disturbance to soil within the construction footprint;* • *Increased likelihood of dust generation;* • *The movement of construction machinery, personnel, and equipment directly;* • *Mixing and casting of concrete to facilitate construction; and* • *Proliferation of alien and invasive vegetation species within the footprint areas associated with the proposed infrastructure.*	Without mitigation	Local 1	High	Long-term	High	Definite	HIGH	– ve	High
		1	3	3	7				
	Essential mitigation measures:								
	• All exposed soil must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the wetland habitat which may be located in close proximity to the stockpiles; • During excavation activities, any topsoil as well as the vegetation (should any indigenous vegetation be present) that may need to be removed must be stockpiled outside of the delineated wetland and associated buffers; • Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up with stockpiles not exceeding 2m in height. This material can later be used as backfill material; **<u>Control measures specific to concrete works:</u>** • Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, however, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete; • No mixed concrete shall be deposited directly onto the ground within the watercourses (outside of the designated area) or associated riparian habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; • A washout area should be designated outside of the wetland, and wash water should be treated on-site or discharged to a suitable sanitation system; • Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and • Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.								
	With mitigation	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***

Potential wetlands impacts from Clearing of vegetation and soil specifically within the footprint of the proposed infrastructure including: • *Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and* • *Potential continued proliferation of alien and invasive vegetation species due to disturbance.*	Without mitigation	Local 1	High 3	Long-term 3	High 7	Definite	HIGH	– ve	High
	Essential mitigation measures:								

	• It is recommended that all construction works be undertaken during the driest period of the year when runoff within the site is limited to minimise risk of sedimentation of the depression wetland;
	• It is recommended that stormwater systems are constructed at the commencement of the construction phase;
	• Training with regards to stormwater management of construction personnel must be undertaken as part of their induction;
	• A drainage channel was noted along the eastern boundary of the study area conveying water from the southern to the northern portion of the study area. This drainage channel must be considered as part of the stormwater management and must be incorporated into a suitable and site-specific Stormwater Management Plan (SWMP);
	• The SWMP must have input from a suitably qualified freshwater specialist to ensure that no contaminants as a result of the construction site and, the operational activities associated with the TiO2 pigment plant and other pollutants that may runoff the hardened surface enter into the wetland;
	• Any stormwater runoff from the processing plant must be contained within a suitable attenuation area and may not be released into the wetland habitat due to the high possibility of contaminants and pollutants from the surface;
	• Given that the land use activity in the area will be heavy industries it is recommended that the following mitigation measures be applied:
	  ○ Unpolluted water must be confined to the clean water system and separated from dirty water; and
	  ○ Water associated with processes considered dirty water must be collected, kept within dirty water area or pollution control dam, and not discharged into the receiving freshwater environment.								

	With mitigation	Local 1	Medium 2	Medium-term 2	Low 5	Probable	LOW	– ve	High

12.2.11 Traffic

Most of the traffic will be associated with the delivery of construction material to the site. The material will be transported to the site via public roads, but that will only require a few trucks a day. The following likely transport impacts related to the proposed Nyanza Plant development have been identified:

- Road and Intersection Capacity: The proposed Nyanza Plant will generate an additional 193 trips/hr along Alumina Allee St during construction.

The results of the quantitative traffic impact assessment for the construction phase are provided in Table 12-15.

Table 12-15: Traffic Impact Assessment Results for the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Increase in traffic volumes due to transportation of materials may lead to an increase in traffic congestion on roads around the project area increasing the chances of road accidents.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Speed limits will be reduced to 40 km/h or less to reduce dust and noise generation. • All the vehicles shall undergo maintenance on a regular basis to ensure the combustion engine vehicle efficiency.								
	With mitigation	Regional	Low	Medium-term	Low	Possible	VERY LOW	– ve	High
		2	1	2	5				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
The increase in vehicles results in an increased potential for road degradation of the road network in the vicinity of the project.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Speed limits will be reduced to 40 km/h or less to reduce dust and noise generation. • All the vehicles shall undergo maintenance on a regular basis.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.2.12 Biodiversity

Potential biodiversity impacts were identified as follows:

- Impact on Floral Habitat and Diversity: The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development activities. The proposed development activities will result in the clearance of vegetation (> 30 ha), which will lead to a loss of floral habitat and diversity within the study area. The proposed development activities within the Degraded Hygrophilous Grassland (of moderately low floral sensitivity) will result in the extensive loss of the associated floral habitat. However, this habitat is largely degraded in nature and did not support a floral community representative of the reference vegetation type. As such, a significant loss of the associated degraded floral communities is not anticipated (impact restricted to local scale). Despite the extensive loss of floral species in the Degraded Hygrophilous Grassland, it is unlikely to impact floral communities at a larger local and regional (provincial) level. The proposed development activities will result in negative impacts on a sensitive habitat unit, namely the Degraded Coastal Forest Habitat (of moderately high floral sensitivity). This habitat unit provides unique habitat both within the study area and within the greater surrounding areas. It must be noted that the impacts on the degraded coastal forest habitat were addressed during the IDZ 2016 EIA and there are agreements in place for the destruction of the forest. The IDZ is currently undertaking the application for deforestation permits per the conditions of the 2016 EA.

  The proposed development activities within the Thicket Habitat (of moderately low floral sensitivity) will result in the extensive loss of the associated floral habitat. However, this habitat is largely encroached and degraded in nature and did not support a floral community representative of the reference vegetation type. As such, a significant loss of the associated degraded floral communities is not anticipated (impact restricted to local scale). Despite the extensive loss of floral species in the Thicket Habitat, it is unlikely to impact floral communities at a larger local and regional (provincial) level.

  Although no development is proposed within the depression wetland (of moderately high floral sensitivity) in the west of the study area, this wetland feature is still subject to edge effect impacts from the associated development activities. This wetland feature provides unique habitat within the study area and serves as dispersal and connective corridors within the surrounding areas. It is thus recommended that appropriate measures as contained in this report should be taken to minimise the potential edge effects that may occur.

  The proposed development within the Transformed Habitat Unit (of low sensitivity) is not deemed likely to impact on the floral habitat and diversity that is located within this habitat unit, nor is it likely to impact floral communities at a larger local and regional (provincial) level.

  Negative impacts likely to be associated with the floral ecology within study area includes, but are not limited to the following:

  - Destruction of floral habitat during construction activities;
  - AIP proliferation, bush encroachment, and erosion in disturbed areas as well as fragmentation of surrounding habitats; and
  - Increased human movement, leading to greater pressure on natural floral habitat and increasing the potential for harvesting of protected floral species.

- Impacts on Floral SCC: The study area provides habitat to support SCC. The loss of SCC within areas where vegetation clearance will occur is deemed definite. The habitats within the study area provide suitable habitat to sustain viable populations of floral SCC, namely protected orchid species (as per the KNNCMAA), *Disa woodii*, and protected species within the Amaryllidaceae Family (as per the KNNCMAA). A Floral walkdown of the study area was conducted in 2015 and permits granted for the relocation of *Boophone disticha* and *Crinum macowanii* within the study area. However, the orchid species (*Disa woodii*) identified on site during 2022 was not previously identified and as such no relocation of this species has occurred. If the proposed development is authorised, it will be necessary to conduct a thorough walkdown of all the footprint areas and all floral SCC marked for possible relocation to suitable habitat outside the direct footprint (as far as is feasible). Permits from the necessary authorities will be required for the possible relocation, removal, or destruction of this species before vegetation clearing activities commence.

  Activities which are likely to negatively affect the flora of conservation concern within and around the study area include, but are not limited to, the following:

  - Placement of infrastructure within sensitive floral habitat or habitat favoured by the recorded protected floral species;
  - Irreversible destruction of favourable floral habitat for SCC during construction activities;
  - Poorly managed habitat where SCC have been relocated; and
  - Poorly managed AIP proliferation with subsequent displacement of floral SCC outside of authorised footprints.

  Impacts on SCC from the proposed development activities can be reduced if vegetation clearing is kept only to areas where development activities and associated surface infrastructure will be erected and vegetation in between these structures be retained.

- Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas: The study area overlaps important conservation features including CBA Irreplaceable areas and a nationally threatened Ecosystem, namely the CR *Kwambonambi Hygrophilous* Grasslands Ecosystem. *The finding that the area is part of CBA Irreplaceable areas and Threatened Ecosystem habitat within the i) Degraded Hygrophilous Grassland, Thicket Habitat, and Transformed Habitat was not supported by the findings of the site specific biodiversity assessment undertaken; given the level of anthropogenic influences experienced both within and around these habitats and thus the subsequent habitat degradation and fragmentation (and the subsequent influence this has on ecosystem processes (e.g., dispersal corridors), the presence of intact habitat of important conservation features was absent*. However, such habitat was confirmed for the Freshwater Habitat (particularly the western Depression Wetland). Although the western Depression Wetland habitats have been impacted by anthropogenic influences (that have subsequently resulted in degradation within the habitat), this freshwater feature still provides suitable habitat to support an array of species as well as ecological processes (e.g., dispersal and connective corridors, nutrient cycling etc.). Despite the degradation and habitat fragmentation that the western Depression Wetland have experienced, it still provides important ecological features within the landscape, albeit modified. The presence of intact (albeit modified) CBA habitat was thus confirmed for this feature.

- Impact on Indigenous Forests: The Degraded Coastal Forest Habitat meets the NFA definition of “natural forests”. Although this habitat has experienced some degradation historically (e.g., firewood collection, AIP proliferation, etc.,), the habitat supports higher levels of biodiversity than the surrounding areas, contributing significantly towards woody species diversity. The Forest habitat also provide important ecological functions within the landscape (e.g., dispersal corridors). Thus, loss of the forest habitat may impact ecological connectivity within the greater landscape. The impacts on the forest were addressed during the IDZ 2016 EIA and there are agreements in place for the destruction of the forest. The IDZ is currently undertaking the application for deforestation permits per the conditions of the 2016 EA.

- Impact on Faunal Habitat and Diversity: The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected by the proposed development activities. The proposed development activities will result in the extensive clearance of vegetation, which will lead to a loss of faunal habitat and diversity within the study area.

  The proposed development activities within the Degraded Hygrophilous Grassland (of intermediate sensitivity) will result in the extensive loss of important supporting habitat. Although the habitat is degraded from a floral perspective this habitat remains the most extensive unit within the study area and likely plays an important role as a foraging area for fauna. Although not sensitive from a faunal diversity perspective, impacts are anticipated to increase competition for resources within the adjacent unit. As such, impacts associated with the faunal communities is not anticipated to be high provided that mitigation measures are undertaken.

  The proposed development activities will result in negative impacts on a sensitive habitat unit, namely the Degraded Coastal Forest Habitat and the Depression Wetland (of moderately high faunal sensitivity). These habitat units provide unique habitat both within the study area and within the greater surrounding areas. Furthermore, important ecosystem functions are maintained by the Depression Wetland. Development within the Degraded Coastal Forest and Depression Wetland Habitat will greatly impact on the species diversity and the associated ecosystem functions provided within these units and the broader area. It must be noted that the impacts on the degraded coastal forest habitat were addressed during the IDZ 2016 EIA and there are agreements in place for the destruction of the forest. The IDZ is currently undertaking the application for deforestation permits per the conditions of the 2016 EA. In addition, the Nyanza plant has been designed in such a way that no infrastructure will be located within the depression wetland and associated 30m buffer area as was agreed during the IDZ's 2016 EIA process.

  The proposed development activities within the Thicket Habitat (intermediate sensitivity) will result in the loss of forage and sheltering areas for several fauna. Although this unit is encroached and degraded in nature it does provide habitat of valuable structure for invertebrates, reptiles, and avifauna. The loss of this unit is however not anticipated to lead to high impacts on faunal diversity at a regional (provincial) level.

  The Transformed unit is already considered developed and thus impact is anticipated to be low.

  Negative impacts likely to be associated with the faunal ecology within study area includes, but are not limited to, the following:

  - Reduction in faunal movement corridors;
  - AIP proliferation, bush encroachment, and erosion in disturbed areas degrading the remaining faunal habitat; and

  - Increased human movement, leading to greater pressure on faunal communities and increasing the potential for human wildlife conflict.

  Freshwater habitats function as important migratory corridors and provide valuable freshwater resources which cannot be replaced in the surrounding landscape. Impeding movement corridors will inevitably lead to increased population fragmentation and reduce the ability of fauna to locate suitable forage resources and habitat, impacting on diversity.

  All edge effects are to be monitored to ensure that the surrounding natural habitat is not impacted upon, thereby ensuring no further impacts to faunal species diversity and habitat occurs. Impacts anticipated to occur to faunal habitat and diversity within the study area range from high to medium prior to mitigation implementation. With mitigation measures full implemented the impacts can be reduced to medium, very low and insignificant impacts all cases.

  If left unmanaged, these edge effects may potentially impact areas outside of the study area, and as a result may alter more suitable faunal habitat on an increased spatial scale, jeopardizing conservation potential of landscapes surrounding the study area. However, mitigation measures will notably aid in the reduction of the significance of impacts due to decreased spatial scale and duration. Through implementing mitigation measures not only will the overall impact significance decrease, the effort, time and financial input costs for rehabilitation and AIP control over the long term will be reduced.

- Impacts on Faunal SCC: Portions of the study area contain unique and sensitive faunal habitat and as such it is anticipated that several SCC may occur within the study area. The fragmented nature of the study area does reduce the potential for several of these species to occur, however, habitat remains suitable. Best construction and operation practices must be employed alongside the recommended mitigation measures to ensure no further habitat degradation occurs. This is important to assist in future rehabilitation activities, increasing the potential that SCC may in the future be able to recolonise suitable locations within the study area.

  Due to distribution overlap, food resources and habitat availability within or in the vicinity of the study area, there is a reasonable possibility that twenty-one SCC may utilise the study area. These SCC are: Sensitive species 7, Sensitive species 2, *Coracias garrulus* (European Roller, NT), *Circus ranivorus* (Marsh Harrier), *Falco biarmicus* (Lanner Falcon), *Circaetus fasciolatus* (Southern Banded Snake Eagle), *Stephanoaetus coronatus* (Crowned Eagle), *Geokichla guttata* (Spotted-ground-thrush), *Rostratula benghalensis* (Greater Painted-snipe), *Mycteria ibis* (Yellow-billed Stork), *Pyxicephalus edulis* (African Bullfrog), *Python natalensis* (Southern African Python), *Bitis gabonica* (Gaboon Adder), *Hemisus guttatus* (Spotted Shovel nosed Frog), *Homoroselaps dorsalis* (Striped Harlequin Snake), *Dendroaspis angusticeps* (Green Mamba), *Chamaesaura macrolepis* (Large-scaled Grass Lizard), *Lycophidion pygmaeum* (Pygmy Wolf Snake), *Hyperolius pickersgilli* (Pickersgill's Reed Frog), *Pomatonota dregii* (East Coast Katydid), *Arytropteris basalis* (Flat-necked Shieldback). Habitat for larger species has been degraded through fragmentation and current anthropogenic activities and impacts. Smaller species of herpetofauna and invertebrates may breed within the site and as such impacts to Degraded Coastal Forest and the Depression Wetland may lead to high impacts to these species. It is strongly advised that a search, rescue, and relocation plan be designed and implemented prior to the proposed development for the herpetofauna which likely occur within the study area. Even with mitigatory measures implemented, it is inevitable that development and increased human presence in the study area will reduce suitable breeding and foraging habitat for the abovementioned SCC, resulting in a potential decline of SCC in the study area. However, should mitigation measures be followed it is unlikely that impacts to most SCC that may occur in the study area will be significant in the region.

The results of the quantitative biodiversity impact assessment for the construction phase are provided in Table 12-16 to Table 12-19.

Table 12-16: Impact on floral habitat and diversity for the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on SCC on the project site: Vegetation clearing leads to the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	Without mitigation	Local	Medium	Long-term	Medium	Definite	MEDIUM	– ve	High
		1	2	3	6				
	Essential mitigation measures:								
	• Limit impact footprint to what is absolutely necessary; • Construction should take place in a phased manner, commencing only in areas where SCC have already been rescued and relocated (i.e., during the Pre-construction phase). All necessary permits and authorisations will need to be obtained from authorities before the commencement of relocation/ destruction activities occur; and • Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed disturbance footprint area.								
	With mitigation	Local	Medium	Long-term	Medium	Definite	MEDIUM	– ve	High
		1	2	3	6				

Table 12-17: Impact on (1) floral habitat and diversity, and (2) floral SCC associated with the Depression Wetland (i.e., undeveloped Freshwater Habitat) for the proposed development activities for the Construction Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on habitat diversity within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in: • *Edge effects e.g., dumping of cleared vegetation or construction rubble and/or the AIP spread which will result in the replacement of native flora, the reduction in floral habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions; and* • *Compaction and degradation of soils which have a higher probability of erosion.*	Without mitigation	Regional	Medium	Long-term	High	Definite	HIGH	– ve	High
		2	2	3	7				
	Essential mitigation measures:								

	• Removal of vegetation must remain within the approved development footprint (i.e., outside of the Depression wetland). As this wetland is not proposed to be developed, strict mitigation measures should be implemented to ensure no construction of any sort or associated activities (e.g., dumping of cleared vegetation or construction rubble) occurs within the habitat;
	• Appropriate edge effect management must be implemented. Care should be taken during the construction phase of the proposed development to limit edge effects to surrounding habitat, including the Depression Wetland. This can be achieved by:
	  o Ensuring continued demarcation of all footprint areas during construction activities;
	  o Construction rubble or cleared AIPs are to be disposed of in a sustainable and environmental responsible manner, e.g., taken to a registered waste disposal site;
	  o A rehabilitation plan must be prepared and implemented, and all rehabilitation actions must be adhered to to mitigate edge effects on the receiving environment;
	  o Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management;
	  o All soils compacted because of construction activities should be ripped and profiled and reseeded with indigenous seed mixes; and
	  o Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Specific mention in this regard is made of Category 1b species identified within the study area.
	• Access roads should be kept to existing roads so to reduce fragmentation. No new roads should be developed within the Depression Wetland or within its associated buffers (refer to the Freshwater assessment (SAS 22-1058 (2022)). Vehicles to be restricted to travelling only on designated roadways to limit								

	the ecological footprint of the construction activities; • If any spills/leaks/storage failures occur, they must be cleaned up immediately to avoid soil contamination which has the potential to hinder re-establishment of vegetation or ecological function down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practiced, preventing the ingress of hydrocarbons into the topsoil; and • No illicit fires must be allowed during the construction of the proposed development.								
	With mitigation	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on SCC within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in • *The loss of floral SCC and SCC habitat (e.g., in the case of vegetation cutting and/or rubble from construction activities that are dumped in the Wetland and/or associated buffer); and* • *The spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.*	*Without mitigation*	Regional	Medium	Long-term	High	Probable	HIGH	– ve	High
		2	2	3	7				
	Essential mitigation measures:								
	• Limit impact footprint to what is absolutely necessary; • Construction should take place in a phased manner, commencing only in areas where SCC have already been rescued and relocated (i.e., during the Pre-construction phase). All necessary permits and authorisations will need to be obtained from authorities before the commencement of relocation/ destruction activities; and • Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed disturbance footprint area.								
	With mitigation	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
		1	1	1	3				

Table 12-18: Impact on the (1) faunal habitat and diversity, and (2) faunal SCC for the proposed development activities for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion and sedimentation of Freshwater Habitat.	Without mitigation	Regional	Medium	Long-term	High	Definite	HIGH	– ve	High
		1	3	3	7				
	Essential mitigation measures:								
	• Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint – manage footprint creep into surrounding areas; • The construction footprint must be kept as small as possible to minimise impact on the Degraded Coastal Forest and Freshwater habitats that are not located within the proposed footprints (edge effect management). Care should be taken during the construction phase of the proposed development to limit edge effects outside of the authorised footprint; • Ensuring continued demarcation of all footprint areas during construction activities; • Construction rubble or cleared AIPs are to be disposed of in a sustainable and environmentally responsible manner, e.g., taken to a registered waste disposal site; • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder faunal rehabilitation later down the line. Spill kits should be kept on site within workshops. in the event of a breakdown, maintenance of vehicles must take place with care and spillage preventative measures implemented;								

	• No hunting/trapping or collecting of faunal species is allowed; • No informal fires by construction personnel are allowed; • Smaller species of invertebrates and reptiles are likely to be less mobile during the colder period, as such should any be observed in the study site during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own; • When rehabilitating a disturbed area, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonize the rehabilitated area; • Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management; and • All soils compacted because of construction activities outside of the final footprints should be ripped and profiled and reseeded with indigenous seed mixes to restore faunal habitat.								
	With mitigation	Local 1	Low 1	Medium-term 2	Very low 4	Definite	VERY LOW	– ve	High
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on SCC: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	*Without mitigation*	Regional 2	Medium 2	Medium-term 2	Medium 6	Probable	MEDIUM	– ve	High
	Essential mitigation measures:								
	• Limit impact footprint to what is absolutely necessary; • Stormwater runoff has potential to cause harm to the sensitive SCC which inhabit this unit, as such it is vital that this is managed, considering the hydrological and hydropedological regime of the study area; • No hunting/trapping or collecting of faunal SCC is allowed; • A walkdown of the footprint area is required before construction activities can commence, where all faunal SCC are searched for and relocated under the provision that the necessary permits have been obtained prior to this; and • Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC outside of the proposed disturbance footprint area.								
	With mitigation	Local 1	Low 1	Short-term 1	Very low 3	Possible	INSIGNIFICANT	– ve	High

Table 12-19: Impact on (1) faunal habitat and diversity, and (2) faunal SCC associated with the Depression Wetland (i.e., undeveloped Freshwater Habitat) for the proposed development activities for the Construction Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on habitat diversity within the freshwater habitat: Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat	*Without mitigation*	Regional 2	High 2	Long-term 3	High 7	Probable	HIGH	– ve	High
	Essential mitigation measures:								

<table>
<tr><td rowspan="3">fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion.</td><td colspan="9">• Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint – manage footprint creep to surrounding areas. Portions of this wetland will be developed according to the proposed development layout. This unit is extremely sensitive to fauna and potentially provides habitat to several SCC while maintaining important hydrological regimes, strict mitigation measures should be implemented to ensure no construction of any sort or associated activities (e.g., dumping) occurs within the habitat or its buffer zone;
• The construction footprint must be kept as small as possible to minimise impact on the surrounding environment (edge effect management). Care should be taken during the construction phase of the proposed development to limit edge effects to surrounding habitat outside of the authorised footprint;
• Ensuring continued demarcation of all footprint areas during construction activities;
• If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder faunal rehabilitation later down the line. Spill kits should be kept on site within workshops. in the event of a breakdown, maintenance of vehicles must take place with care and spillage preventative measures implemented;
• No hunting/trapping or collecting of faunal species is allowed;
• No informal fires by construction personnel are allowed;
• Smaller species of invertebrates and reptiles are likely to be less mobile during the colder period, as such should any be observed in the study site during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Operational personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own;
• When rehabilitating a footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonize the rehabilitated area;
• Construction rubble or cleared AIPs are to be disposed of in a sustainable and environmental responsible manner, e.g., taken to a registered waste disposal site;
• A rehabilitation plan must be prepared and implemented, and all rehabilitation actions must be adhered to in order to mitigate edge effects on the receiving environment;
• Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management; and
• All soils compacted because of construction activities should be ripped and profiled and reseeded with indigenous seed mixes.</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Regional</td><td>Medium</td><td>Medium-term</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>6</td></tr>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="5">Impact on SCC within the Freshwater Habitat: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.</td><td rowspan="2">Without mitigation</td><td>Regional</td><td>High</td><td>Long-term</td><td>High</td><td rowspan="2">Definite</td><td rowspan="2">HIGH</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>3</td><td>7</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">• Limit impact footprint to what is absolutely necessary;
• A walkdown of the footprint area is required before construction activities can commence, where all anticipated faunal SCC are identified. Several reptiles, avian and amphibian SCC likely utilise this unit for breeding or foraging purposes. Regular monitoring of these species should occur to ensure their continued persistence and establishment within the habitat;
• Stormwater runoff within the Freshwater Habitat has potential to cause harm to the sensitive SCC which inhabit this unit and it is vital that hydropedological regimes are not altered, if they are it is unlikely that any potential SCC will re-establish populations where stream flow is altered;
• No hunting/trapping or collecting of faunal SCC is allowed;
• Ensure no collection of faunal SCC occurs by personnel; and
• Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC outside of the proposed disturbance footprint area.</td></tr>
<tr><td></td><td>Regional</td><td>Medium</td><td>Medium-</td><td>Medium</td><td>Probable</td><td>MEDIUM</td><td>– ve</td><td>High</td></tr>
</table>

	With mitigation			term					
		2	2	3	6				

12.2.13 Waste Management

Poor waste management practices during the construction phase will result in:

- Contamination of surface runoff resulting in the deterioration of water quality of the watercourse.
- Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff.

The results of the waste management quantitative impact assessment for the construction phase are provided in Table 12-20.

Table 12-20: Waste Management Impact Assessment Results for the Construction Phase

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	**6**				
	Essential mitigation measures:								
	• Waste management will be undertaken in line with the NEM: WA Waste Management Hierarchy, ensuring re-use and recycling of waste as much as possible. Where re-use, recycling or disposal of waste is required, the following shall apply: *Separation of waste* • All waste shall be separated into general waste and hazardous waste. • Hazardous waste shall not be mixed with general waste • General waste can further be separated in waste that can be recycled and/or reused, if possible • No littering shall be allowed in and around the site, enough bins shall be provided for the disposal of waste. • Where necessary dedicate a storage area on site for collection of waste. *Storage of waste* • General waste will be collected in an adequate number of litter bins located throughout the site. • Bins must have lids in order to keep rainwater out. • Bins shall be emptied regularly to prevent the bins from overflowing. • All work areas shall always be kept clean and tidy. • All waste management facilities will be maintained in good working order. • Waste shall be stored in demarcated areas according to type of waste. • Flammable substances must be kept away from sources of ignition and from oxidizing agents. • No builder’s rubble shall be disposed of to the riparian area. • If builder’s rubble is not removed immediately, it shall be stockpiled outside the sensitive wetland areas. • Demolition waste and surplus concrete shall be re-used, recycled, or disposed (last resort) of responsibly. • Waste shall not be buried or burned on site. *Disposal of general waste* • No dumping shall take place in or near the project site. • All general waste shall be re-used, recycled, or disposed (last resort) of to a licensed landfill site. • Demolition waste and builder’s rubble shall be used as cover material at an appropriate licensed landfill site.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		**Extent**	**Intensity**	**Duration**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								

	• If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion; • Runoff from stockpiles shall be detained in order to support growth of vegetation; • Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are like pre disturbed levels; • Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; • A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; • If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; • Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; • Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.								
	With mitigation	Local 1	Low 1	Short-term 1	Very low 3	Possible	INSIGNIFICANT	– ve	High
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	Without mitigation	Regional 2	Medium 2	Medium-term 2	Medium 6	Probable	MEDIUM	– ve	High
	Essential mitigation measures:								
	• No dumping shall be allowed in or near the site. • Hazardous containers shall be re-used, recycled, or disposed (last resort) of at an appropriate licensed site. • Hazardous waste will be removed and managed by an approved service provider. • A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste. • The safe disposal certificates shall be stored and provided on request.								
	With mitigation	Local 1	Low 1	Short-term 1	Very low 3	Possible	INSIGNIFICANT	– ve	High

12.3 Operational Phase

Impacts during the operational phase will result largely due to improper or inadequate maintenance of the plant.

12.3.1 Socio-Economic

During the operational phase, the Nyanza project will result in the creation of 550 jobs and will contribute to the reduction in unemployment levels in the Richard's Bay area and the uMhlathuze Local Municipal area.

In addition to the direct job creation, the proposed project will lead to the upliftment of businesses around the project area, through provision of services that will be required at the plant. These services will include, but are not limited to:

- Transport for employees to and from the plant;
- Provision of catering services (canteens);
- Transportation of raw materials, product, and waste; and
- Increased demand for housing and rentals around the project area;

One of the proposed plants is for the air to water installation plant. Nyanza will partner with a local entrepreneur.

The TiO_2 pigment plant will also result in an improvement to the local and national GDP through sales that are earmarked for international markets, bringing foreign currency into the country.

The social impacts envisaged as a result of the Operational phase of the proposed project include:

- Negative impact as a result of the project as there will be additional trucks on the roads, impacting on local communities' health and safety;
- Negative impact on, local community health and safety due to influx of employees, the presence of job seekers, which may lead to prostitution and conflict with the local communities. Illegal informal settlement of job seekers in the area may exacerbate the situation;
- Positive impact as a result of operation and associated activities, providing a potential for local employment opportunities; increasing access to financial capital for workers; and
- As a result of underground mining activities, there is potential for the occurrence of subsidence, impacting on the safety surface land dwellers and users.

From a socio – economical perspective, there is no preferred alternative as the impact on the socio – economic environment remains relatively consistent in both layout alternatives.

12.3.2 Surface and Groundwater

The existing potential sources of contamination in the vicinity of the proposed plant, which have been identified in the area include the following:

- Possible groundwater contamination from hydrocarbons from vehicles during the construction and operation phase;
- Storage, transportation, and handling of feedstock (conventional slag, ilmenite, and waste slag);
- Storage, transportation, and handling of product;
- Storage, transportation, and handling of raw materials;

- Storage, transportation, and handling of waste (sludge);
- Storage, transportation, and handling of spent acid;
- Storage, transportation, and handling of precipitated filtrate as copperas; and
- Liquid bulk storage, transportation, and handling

The following potential pathways have been identified at the site:

- The groundwater is considered to be a viable transport pathway and is able to transport the potential contaminants, from surface sources, to beyond the site boundary;

The potential receptors identified during the desktop study and subsequent site visits are summarised in Table 12-21.

Table 12-21: Potential Receptors

Type	Distance and Direction	Description
Wetland	~300 m, Northwest	Wetland A
Surface water drainage	Downstream	Canal, streams
Shallow and Deeper Aquifers	No existing current users within 500m of the site	Potential source for water supply

In addition, the dewatering of the area has potential to result in minimal loss of flow to the conservation area wetland.

The potential impacts on surface water during the operational phase of the proposed project are as follows:

- Surface runoff contamination as a result of improper chemical storage/handling;
- Contamination of runoff by poor materials/waste handling practices; and
- Contaminated dirty water runoff from the plant to surrounding areas resulting in the impact on local surface water quality.

It is expected that without the implementation of mitigation measures, the impacts on the hydrology will be of medium-low (-) significance, which can be reduced to very low (-) significance with the implementation of mitigation measures.

Once the SWMP associated with the 80 000 tpa TiO_2 Rutile Pigment Plant has been constructed, it is expected that the potential impacts on surface water will be the same for both the alternatives and the preferred option.

Table 12-22: Socio Economic Impact Assessment for the Operational Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Possible boost in long term employment and local small business opportunities.	Without mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	+ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Nyanza Metals will appoint contractors who will be responsible for recruitment. Where possible, encourage the local employment • Revenue for local businesses which will be supplying the contractors with materials and increased use of the surrounding businesses. • The use of the local businesses is recommended especially in occasions where they can provide what is needed for the project. • Where possible, enforce a tender procedure requirement that bidders (contractors) commit to a recruitment process that includes a preference for local recruitment and promotion of local SMME's.								
	With mitigation	Regional	Medium	Medium-term	Medium	Definite	MEDIUM	+ve	High
		2	2	2	6				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential impact on safety and security because of theft, the occurrence of additional vehicles transporting raw material, waste and products on the roads and driving irresponsibly.	Without mitigation	Regional	Medium	Medium-term	Medium	Possible	MEDIUM	– ve	High
		2	2	2	6				
	Essential mitigation measures:								
	• Keep the speed limits to 40 km/h or less when driving. • No fires are allowed on the site, unless in areas demarked and managed for this purpose. • During induction, all site personnel will be made aware of fire risks • All workers must be provided with Personal Protective Equipment (PPE) and Nyanza Metals and contractors must ensure that their personnel make use of PPE								
	With mitigation	Local	Medium	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	2	1	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Health and safety risk because of the movement of vehicles increasing the risk of accidents	Without mitigation	Local	Medium	Short-term	Very low	Probable	INSIGNIFICANT	– ve	High
		1	2	1	4				
	Essential mitigation measures:								
	• Keep the speed limits to 40 km/h or less when driving. • Site personnel to use designated pedestrian routes • Induction on health and safety to be held for all site personnel (including visitors)								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Potential influx and unlawful occupation of the area by job seekers and influx of workers	Without mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
	Essential mitigation measures:								
	• Nyanza Metals will appoint contractors who will be responsible for recruitment. • Nyanza must develop and implement an influx management plan. • Nyanza must ensure that stakeholders are aware of and must implement the complaints register and its grievance redress mechanism. • Nyanza must implement the Local Hiring and Training Plan to ensure that Contractors are implementing the plan. • Where possible, encourage the local employment • Security personnel to be contracted to maintain a safe environment • No unlawful occupation of the site by job seekers should be allowed • All job seekers to apply as per Nyanza's and the RBIDZ's employment and recruitment procedure								
	With mitigation	Local	Low	Short-term	Very low	Improbable	INSIGNIFICANT	– ve	High
		1	1	1	3				

Table 12-23: Groundwater and Surface Water Impact Assessment for the Operational Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Groundwater and surface water impacts from improper storage and handling of feedstock	Without mitigation	Regional	Medium	Long-term	High	Probable	HIGH	– ve	Medium
		2	2	3	7				
	Mitigation measures:								
	• Stored in an enclosed warehouse with 6 storage bays separated by concrete walls								
	With mitigation	Local	Low	Medium-term	Low	Possible	Insignificant	– ve	Medium
		1	1	2	4				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Groundwater and surface water impacts from improper storage, transportation, and handling of products, raw materials, and waste (including sludge)	Without mitigation	Regional	Medium	long-term	High	Probable	High	– ve	Medium
		2	2	3	7				
	Mitigation measures:								
	• Install bunds under and around storage tanks • Using specialist service providers equipped for transportation via road, harbour, and railway • Adequate training for people on proper handling the product, raw materials, and waste responsibly • Ensure relevant standards including but not limited to the IFC Standards (EHS Guidelines) and good practice are adhered to for all installations								
	With mitigation	Regional	Low	Medium-term	Low	Possible	VERY LOW	– ve	Medium
		2	1	2	5				

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Groundwater and surface water impacts from improper storage, transportation, and handling of spent acid	Without mitigation	Regional	Medium	Medium-term	Medium	Possible	LOW	– ve	Medium
		2	2	2	6				
	Mitigation measures:								
	• Install bunds under and around storage tanks • Alternative uses such as the fertilizer industry • Neutralize with lime								
	With mitigation	Regional	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	Medium
		2	1	1	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential groundwater and surface water impacts from liquid bulk storage and transportation	Without mitigation	Regional	Medium	Medium-term	Medium	Probable	MEDIUM	– ve	Medium
		2	2	2	6				
	Mitigation measures:								
	• Install bunds under and around storage tanks • Use reputable service providers for transportation • Undertake regular monitoring and maintenance								
	With mitigation	Regional	Low	Medium-term	Low	Possible	VERY LOW	– ve	Medium
		2	1	2	5				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Potential groundwater levels impact from dewatering for safe plant construction and operation	Without mitigation	local	Medium	Medium-term	Low	Possible	VERY LOW	– ve	Medium
		1	2	2	5				
	Mitigation measures:								
	• Minimise loss of flow to wetland by pumping water from subsurface drain to wetland								
	With mitigation	Local	Low	Short-term	Very Low	Possible	INSIGNIFICANT	– ve	Medium
		1	1	1	3				

12.3.3 Air Quality, Odours and Climate Change

During the operational phase, PM, SO_2, SO_3, NO_2, CO and HCL emissions within the atmosphere have a potential to impact on the health of adjacent communities. Key findings from the assessment are as follows:

- Predicted P99 24-hour and annual PM_{10} concentrations fully comply against the Plant Design Criteria (PDC) at all discrete sensitive receptors. The PM_{10} emissions are low to negligible and are not a cause for concern. Nyanza's contributions to background PM_{10} concentrations are relatively low compared to the existing monitored baseline concentrations.
- All predicted P99 1-hour and annual average SO_2 concentrations at the discrete sensitive receptors are compliant against the relevant PDC. While the predicted P99 24-hour concentrations at Alton (33.03 µg/m^3) and Brackenham (36.91 µg/m^3) exceed the PDC standard of 20 µg/m^3, these concentrations comply against the 24-hour SA NAAQS of 125 µg/m^3. The cumulative P99 1-hour was above the PDC at Scorpio and the cumulative P99 24-hour concentrations are higher than the PDC at Brackenham, CBD, Arboretum, Scorpio, Harbour West and Felixton. These exceedances are attributed to the already elevated measured P99 24-hour concentrations, which already exceed the PDC.
- All predicted P99 1-hour, P99 24-hour and annual average SO_3 concentrations at the sensitive receptors are below the relevant standards. However, this cannot be used to measure compliance but rather indicates trends in SO_3 concentrations. All cumulative P99 1-hour, P99 24-hour and annual average SO_3 concentrations are below the relevant PDC.
- All predicted P99 24-hour and annual average NO_2 concentrations at the sensitive discrete receptors are compliant with the relevant PDC. Exceedances of the P99 1-hour cumulative concentrations are noted at Felixton and eSikhaleni, while exceedances of the annual average cumulative concentrations are noted at Felixton. However, it should be noted that the elevated baseline predicted concentrations exceed the PDC before Nyanza emissions are incorporated. This indicates that existing industries attribute to the high predicted concentrations in that area.
- All predicted P99 1-hour CO concentrations at the sensitive receptors are compliant with the relevant PDC. Predicted P99 8-hour CO concentration at the Brackenham (19,250 µg/m^3) monitoring station exceeds the relevant PDC of 10,000 µg/m^3. The predicted cumulative P99 8-hour average CO concentrations exceed the relevant PDC at Brackenham (10,251.71 µg/m^3).
- The HCL emissions are low to negligible and are not a cause for concern, with concentration decreasing with increasing distance from the project site. Predicted cumulative concentrations were below the relevant 24-hour PDC at all discrete sensitive receptors.

The significance of the impact is low in close proximity to the operational activities without the implementation of management measures. The findings from the modelling are presented in Figure 12-1 to Figure 12-8. The results of the significance assessment of the impact are provided in Table 12-31.

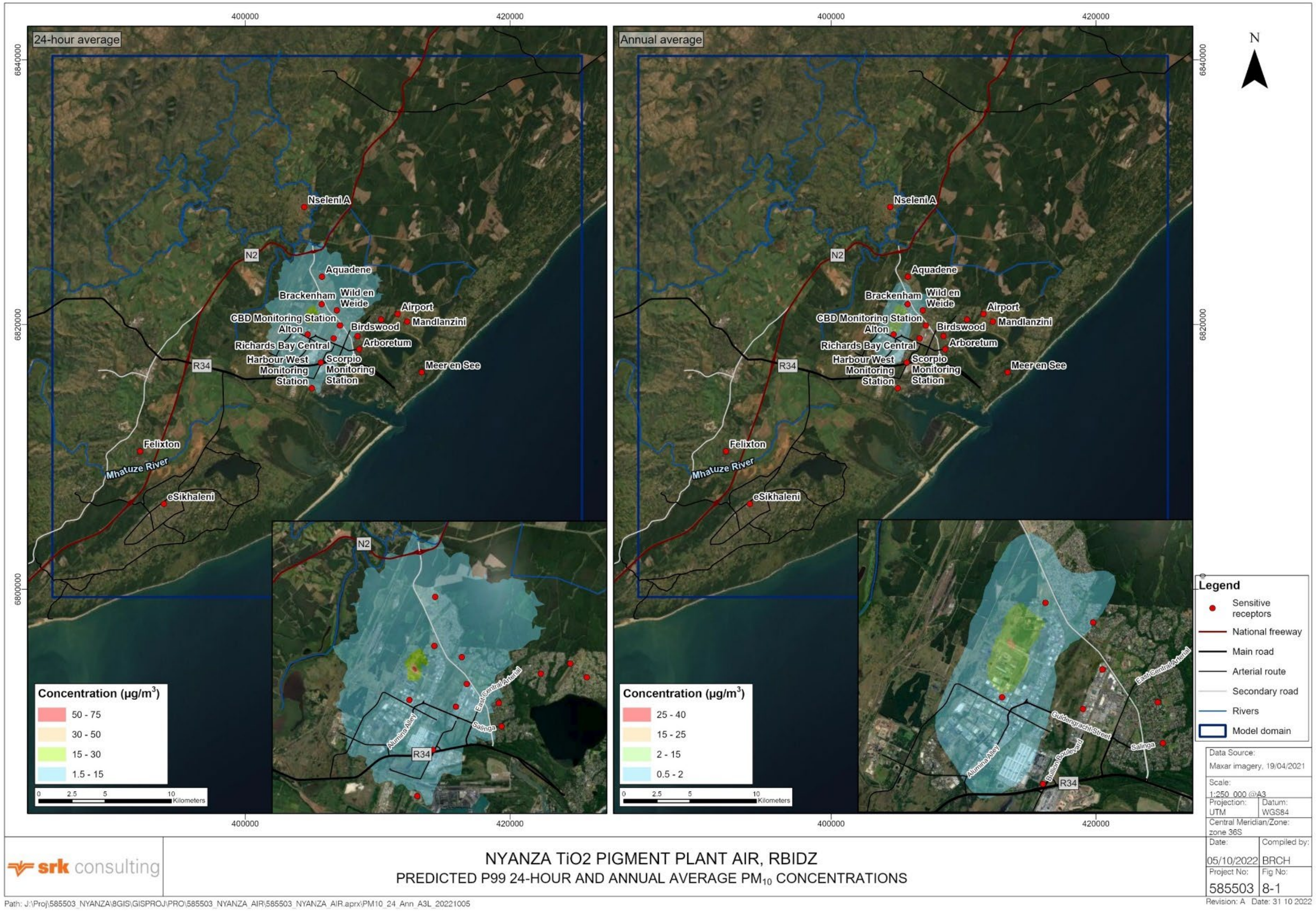
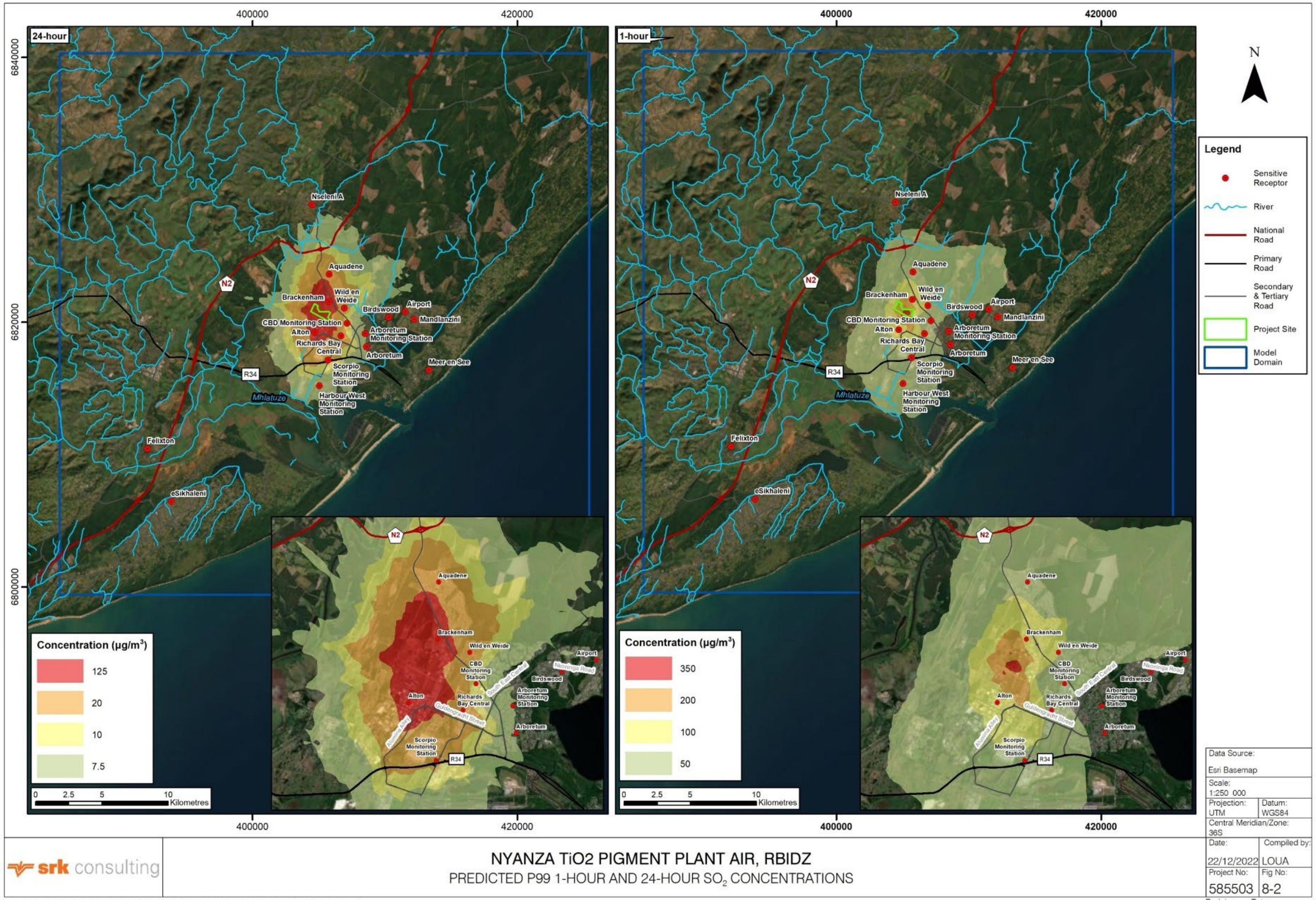


Figure 12-1: Predicted P99 24-hour and annual average PM_{10} concentrations



Path: J:\Proj\585503_NYANZA\8GIS\GISPROJ\MXD\585503_A3L_P99_24hr_1hr_SO2_20221222.mxd

Figure 12-2: Predicted P99 1-hour and 24-hour SO_2 concentrations

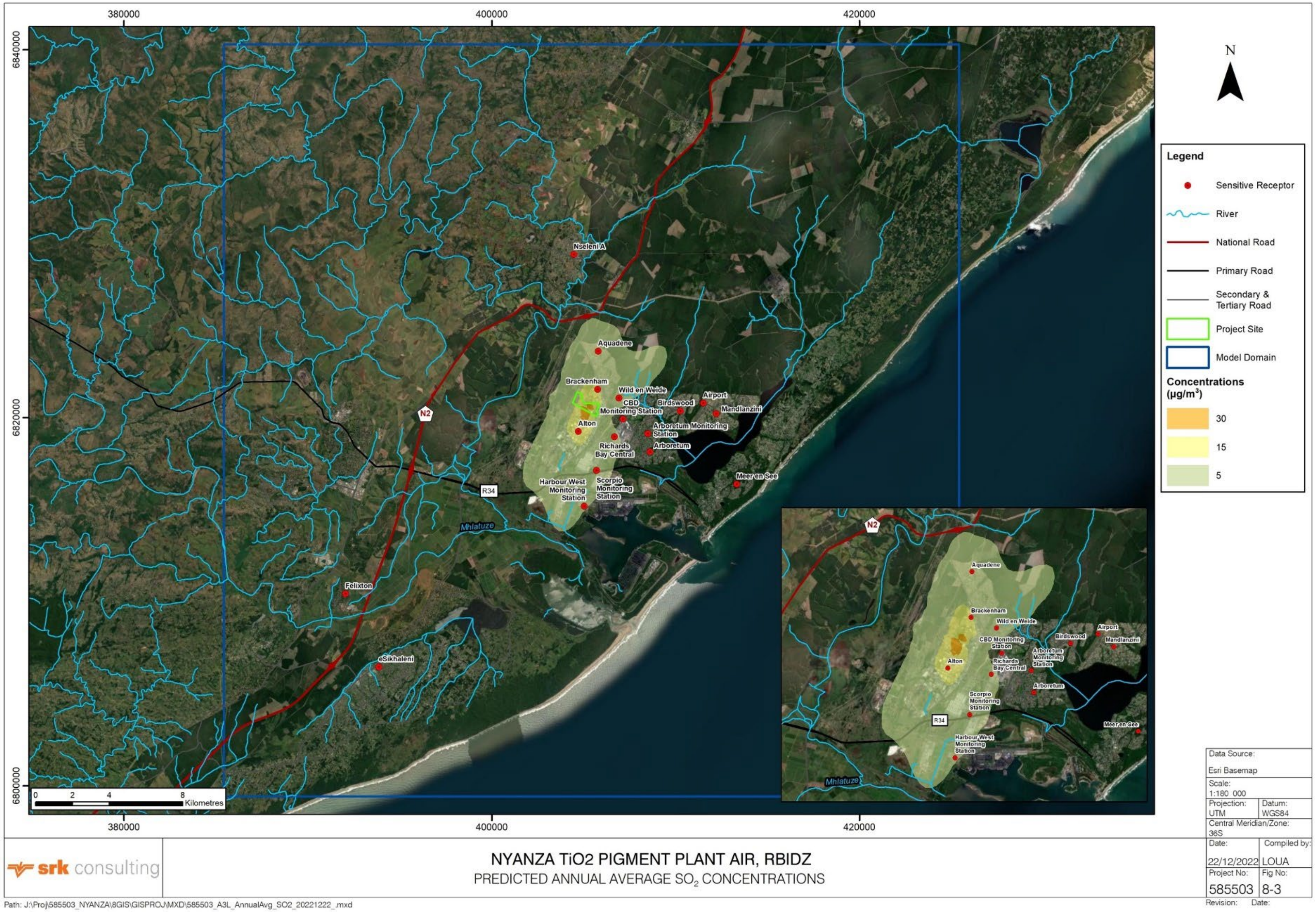


Figure 12-3: Predicted annual average SO_2 concentrations

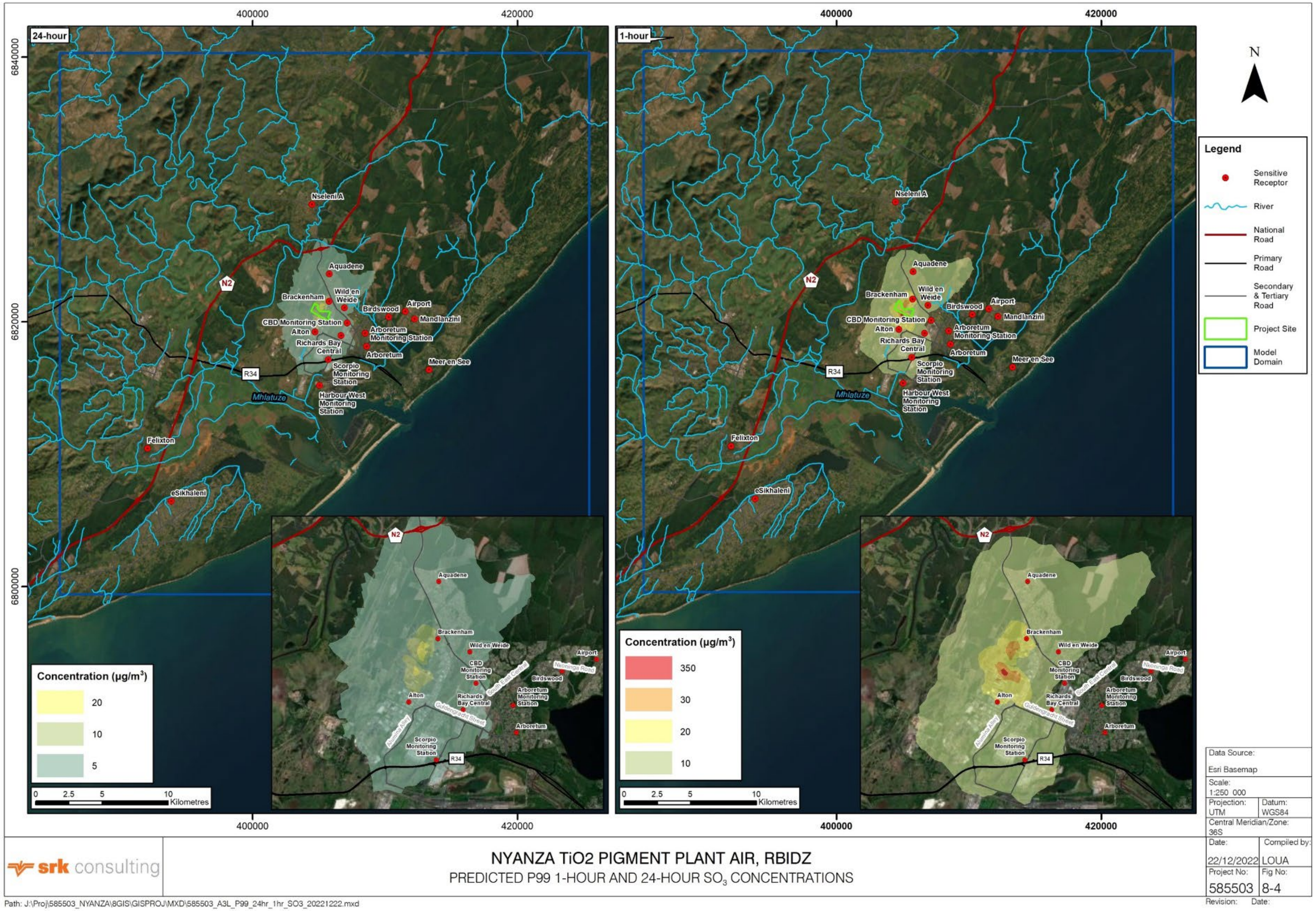


Figure 12-4: Predicted P99 1-hour and 24-hour SO_3 concentrations

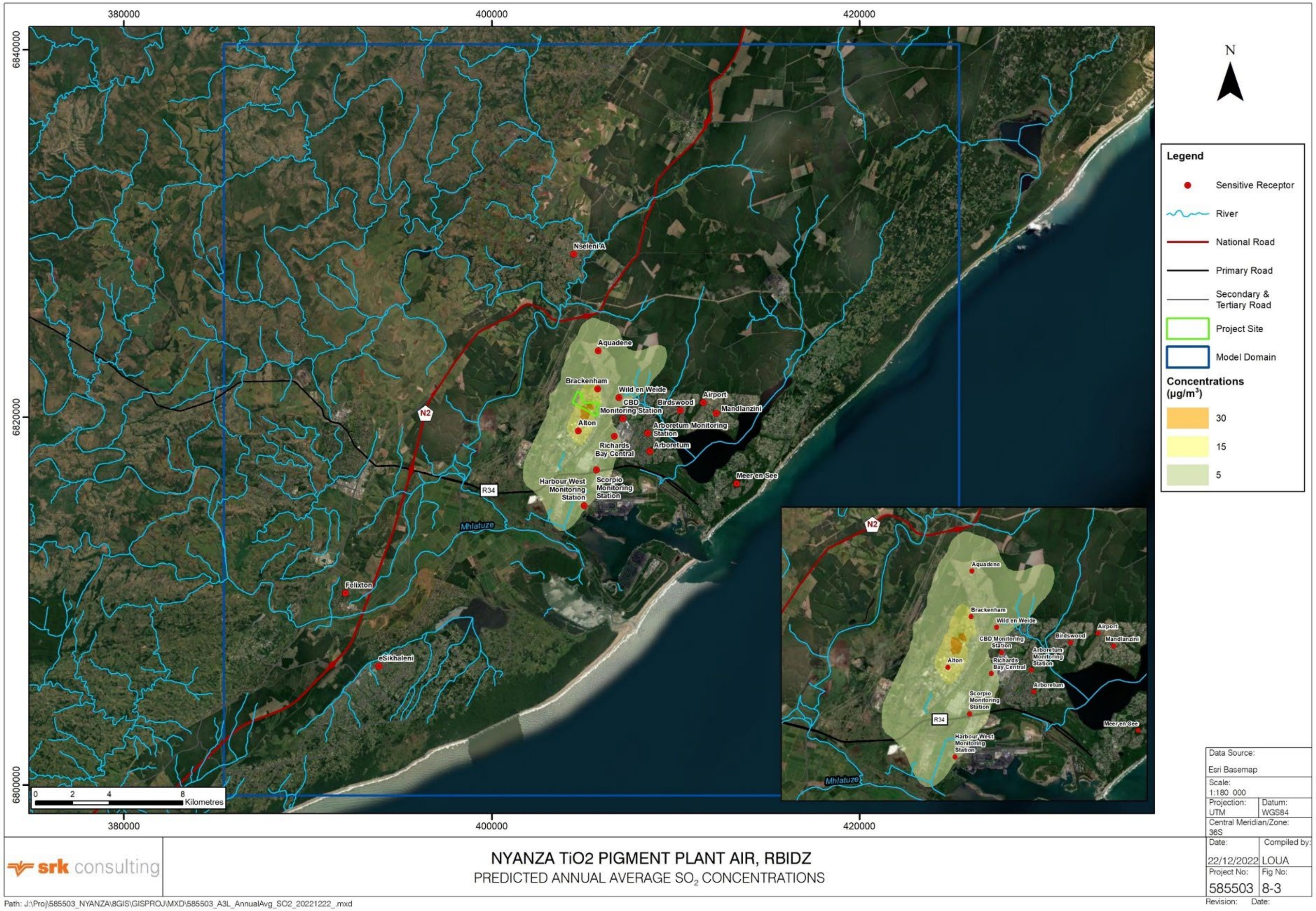


Figure 12-5: Predicted annual average SO_3 concentrations

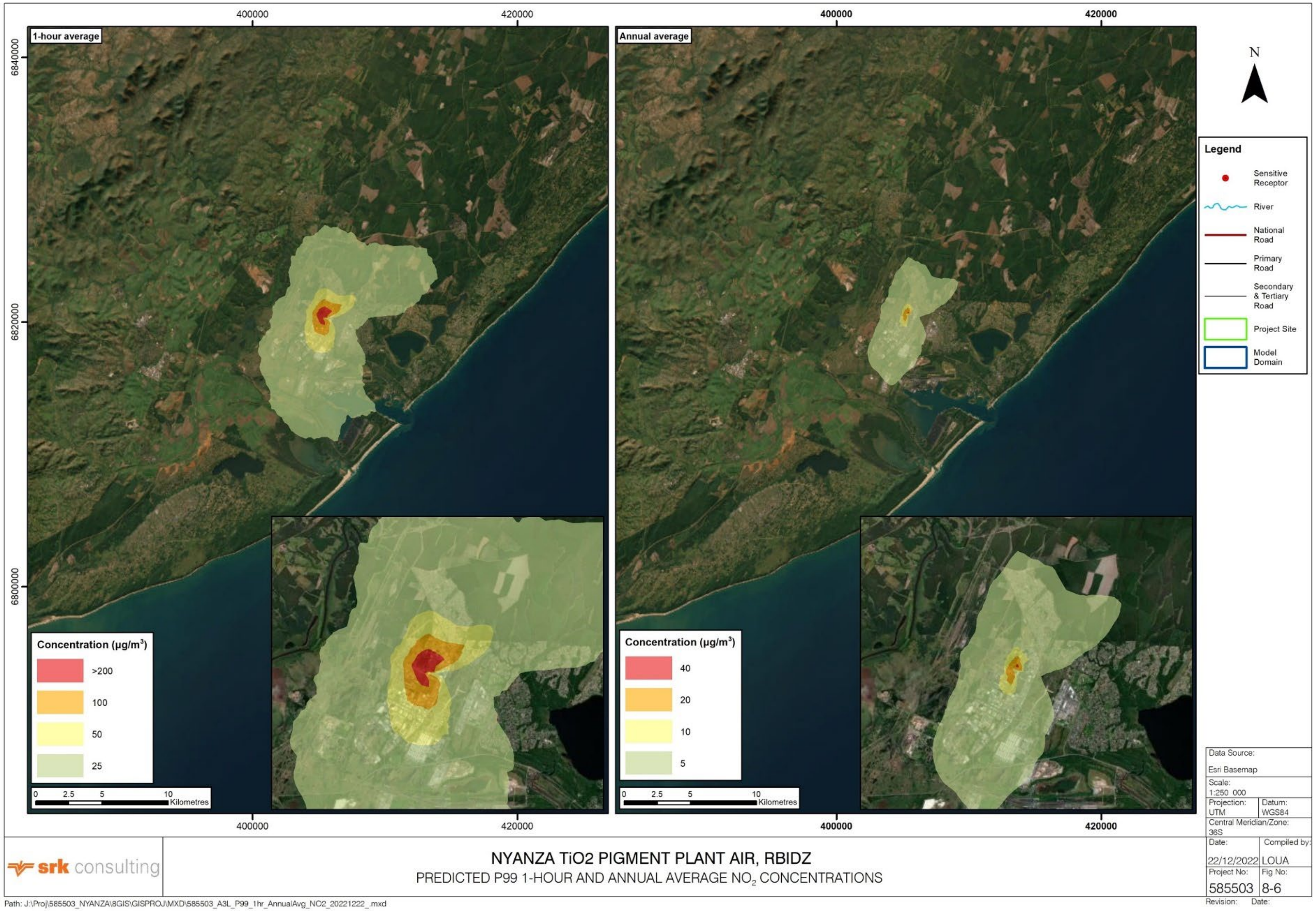


Figure 12-6: Predicted P99 24-hour and annual average NO_2 concentrations

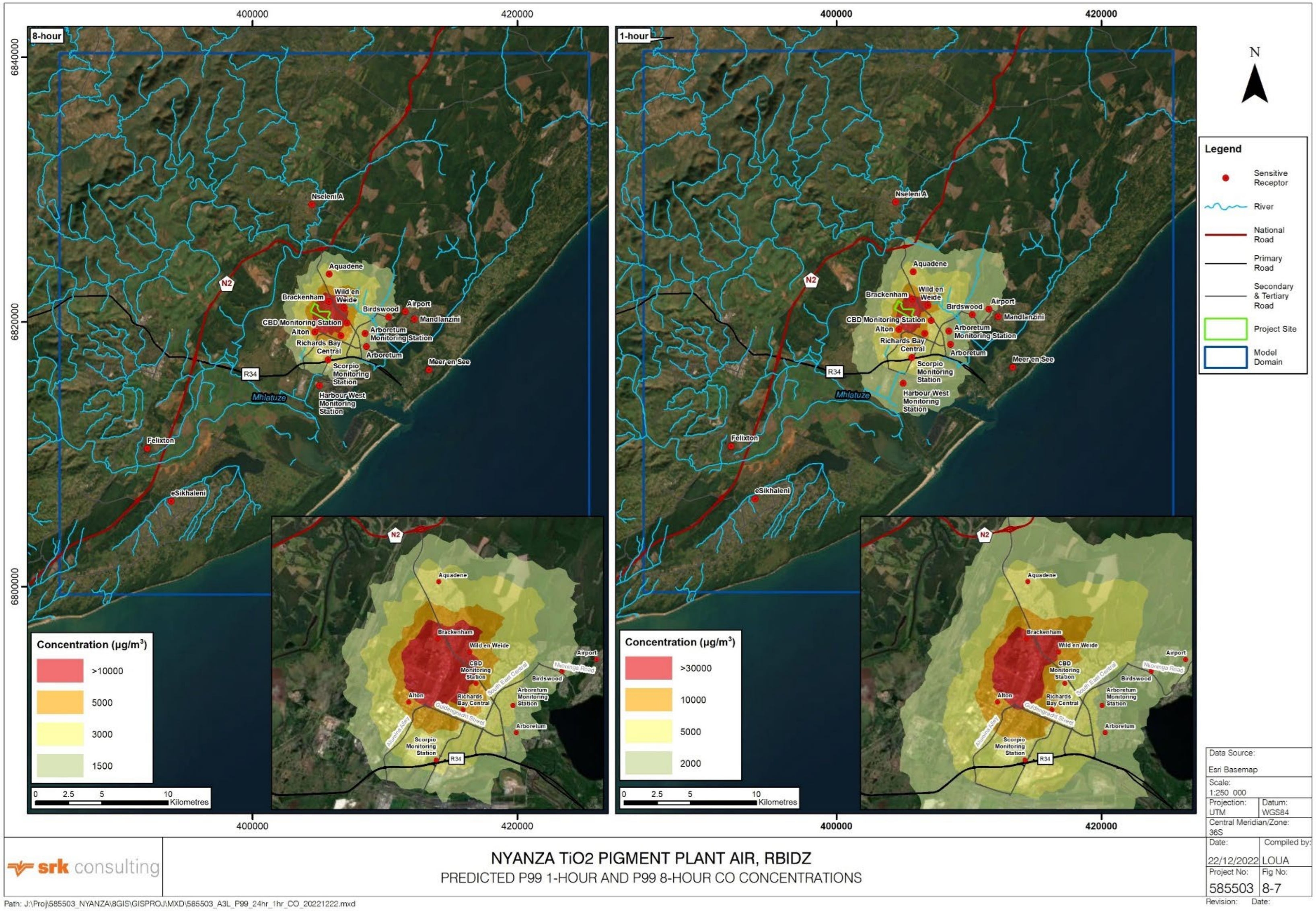


Figure 12-7: Predicted P99 1-hour and P99 8-hour CO concentrations

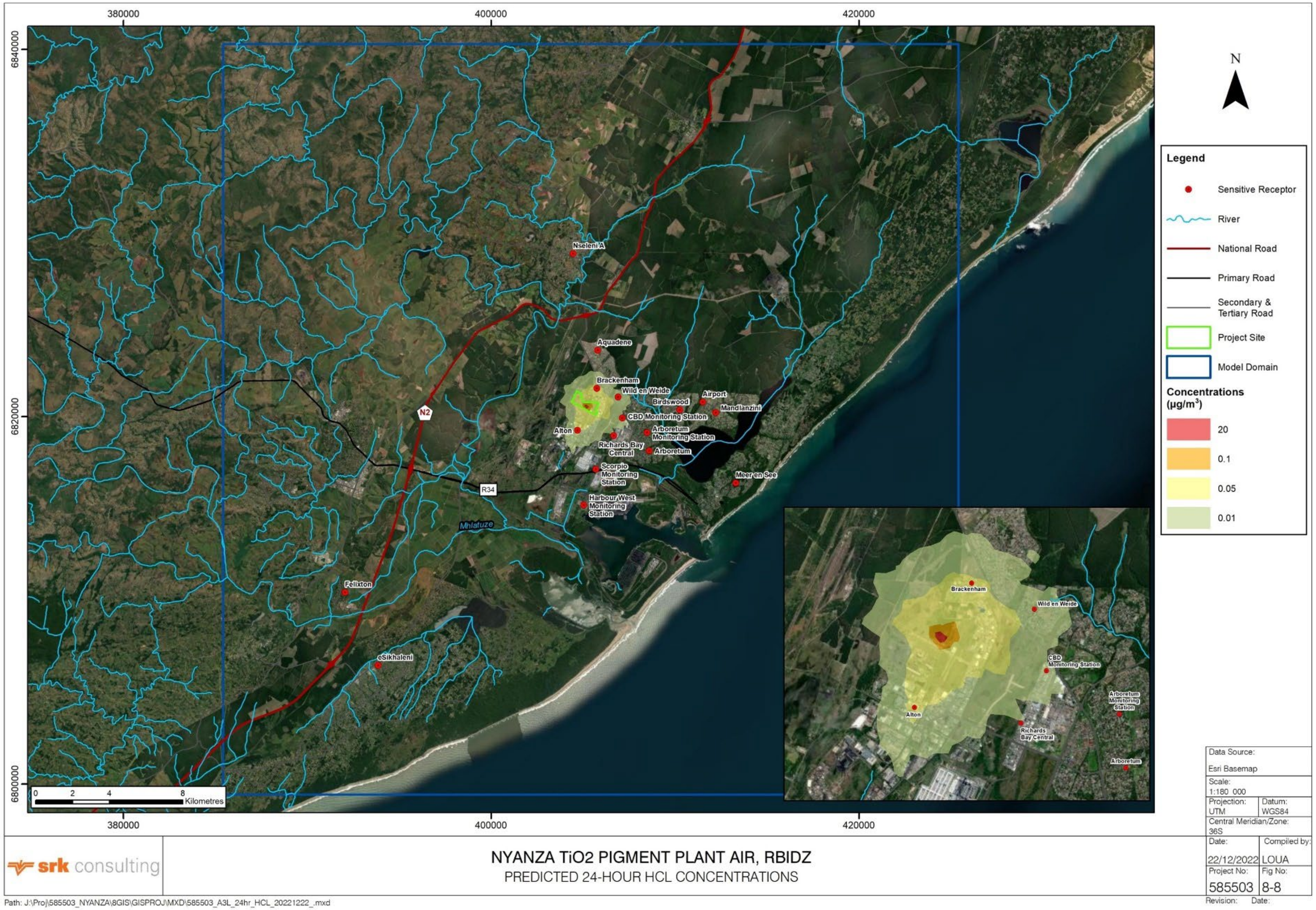


Figure 12-8: Predicted 24-hour HCL concentrations

Table 12-24: Air Quality Impact Assessment for the Operational Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
PM, SO_2, SO_3, NO_2, CO and HCL Emissions potentially resulting in nuisance and Health Effects on Nearby Receptors	Without mitigation	Regional	Medium	medium-term	Medium	Probable	MEDIUM	- ve	Medium -High
		2	2	2	6				
	Essential mitigation measures:								
	• Regular maintenance of the current stack abatement technology installed i.e., scrubbers will ensure equipment continues to meet supplier specifications and acceptable South African Emissions Standards and IFC Standards and Emission Guidelines. • A leak detection and repair program to be implemented to address potential fugitive emissions onsite. • Regular maintenance of vehicles to ensure equipment continues to meet supplier specifications and acceptable South African Emissions Standards. • Awareness training on air emissions should be carried out at all levels for the workforce (workers, foremen, managers), and can be included in induction courses. Training should focus on promoting understanding as to why mitigation measures are in place. • Nyanza has developed a Complaints Register included in Appendix A of the EMPr as a key component of its External Communications & Grievance Mechanism for external stakeholders. The Nyanza complaints register must be implemented, and the community must be made aware of the complaints procedure (if not already in place). The implementation of the ESMS must ensure that the management program is adjusted accordingly based on input and feedback from external communications and grievance mechanism. • The Grievance Redress Mechanism in Section 26 of this EIR is a starting point to address external stakeholder complaints. Nyanza must enhance this mechanism to comply with ESMS requirements. • Require employees to wear Personal Protective Equipment (PPE) in areas of exposure to gaseous emissions. • Isokinetic stack monitoring should take place on an annual basis Air Quality Specialist Report to determine compliance against the MES.								
	With mitigation	Regional	Low	medium-term	Low	Definite (>90%)	LOW	-ve	Medium -High
		2	1	2	5				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Possible production of odours due to improper handling, storage and management of waste of site	Without mitigation	Local	Medium	Short-term	Very Low	Probable	VERY LOW	-ve	Medium - High
		1	2	1	4				
	Essential mitigation measures:								
	• Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; and • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.								
	With mitigation	Local	Low	Short-term	Very Low	Probable	VERY LOW	-ve	Medium - High
		1	1	1	3				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Emissions of Green House Gases because of the use of vehicles and machinery used during the operational activities.	Without mitigation	Regional	Low	Short-term	Very low	Probable	VERY LOW	– ve	High
		2	1	1	4				
	Essential mitigation measures:								
	• All the vehicles shall undergo maintenance on a regular basis to ensure the combustion engine vehicle efficiency.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High

		1	1	1	3				

12.3.4 Noise

The probability of ambient noise being generated from Nyanza operations is definite and its impacts are considered unavoidable. This screening assessment predicted impacts to result in little community response in the area in which it is proposed to operate. It should be noted that Nyanza is proposed to be located in the RBIDZ which already has numerous industrial facilities operating and the nearest residential community is located approximately 2 km away from the proposed site.

Predicted day and night sound levels at the receptor points are presented in Table 12-25. The average predicted sound levels at the industrial points range from 37.1 dB(A) at M2 to 43.9 dB(A) at M1. Receptor M1 is located approximately 970 m southeast of the proposed site. Storage and handling activities as well as vehicle operations on the proposed site are expected to be key sources of noise in the vicinity, however, there were no exceedances of the industrial day or night SANS for environmental noise.

The average predicted sound levels at the urban (residential) points range from 18.6 dB(A) at M5 to 38.8 dB(A) at M6. All urban receptors are located in the north easterly direction from the proposed site, lower noise levels were expected at the residential communities due to the distance of these communities from the site. A road on the site, the wet mills and calciner fans located on the east of the projected site are expected to be key sources of noise in the vicinity, however, there were no exceedances of the urban day or night SANS for environmental noise.

Receptor M8 is located within Richards Bay Central, southeast of the proposed site, with a predicted sound level of 20.4 dB(A). This is below the SANS rating level for environmental noise for the CBD.

The noise modelling found that:

- Predicted sound levels in the immediate vicinity of the proposed site operations are, as expected, the highest. As the sound propagates further away from the site, it gradually diminishes.
- Predicted sound levels propagate outwards from 70 dB(A) to 40 dB(A) within an approximate radius of 800 m from the centre of site operations.
- Predicted sound levels propagate further outwards from 40 dB(A) to 30 dB(A) from approximately 800 m away from the proposed site to around 1 300 m away from the centre of site operations.
- Noise predictions on the northeast of the site (40 dB(A)) that extends to part of Brackenham can be attributed to a lack of noise barriers; in reality, buildings from other premises do exist in the space between the proposed site and Brackenham and therefore will act as noise barriers, effectively reducing the noise levels experienced at this location.
- The residential communities are predicted to have sound levels ranging between 6.7 dB(A) to 29.8 dB(A) due to Nyanza operations as illustrated in Figure 12-9; however, the cumulative assessment in the sections that follow further inform the expected sound levels.

In general, the predicted sound levels at the sensitive receptors lie between the 20 to 40 dB(A) range.

Table 12-25: Day and night sound level modelling results

Receptor	Description	SANS rating level (dBA) - Day	IFC Guideline (dBA)-Day	Predicted $LA_{eq,d}$ (dBA)-Day	SANS rating level (dBA) - Night	IFC Guideline (dBA)-Night	Predicted $LA_{eq,d}$ (dBA)-Night
Industrial Receptors							
M1	RBIDZ entrance	70	70	43.9	70	70	39.8
M2	Alton-Along Betastraal road	70	70	37.1	70	70	32.5
M3	Alton	70	70	37.4	70	70	32.1
M4	Along Ferro Gang Road	70	70	42.2	70	70	40.8
Residential Receptors							
M5	Aquadene	60	55	18.6	50	45	9.4
M6	Brackenham	60	55	38.8	50	45	33.5
M7	Wild en Weide	60	55	35.5	50	45	25.7
CBD Receptors							
M8	Richards Bay Central	65	70	20.4	55	70	20.5

The significance of the impact before and after management measures is provided in Table 12-26.

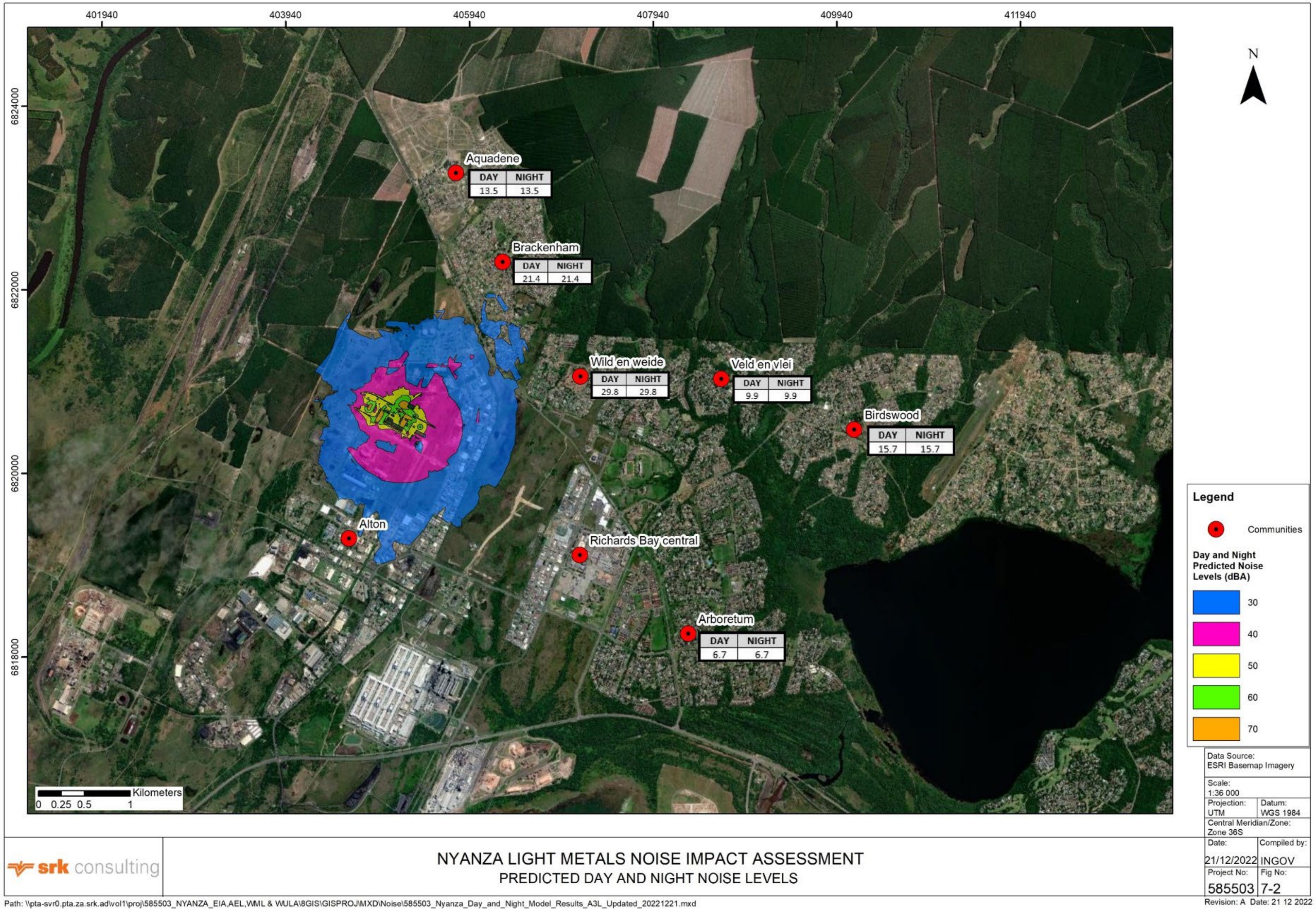


Figure 12-9: Day and night predicted sound levels

Table 12-26: Noise Impact Assessment for the Operational Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Ambient noise generated from Nyanza operations.	Without mitigation	Regional	Medium	medium-term	Medium	Probable)	MEDIUM	- ve	Medium -High
		2	2	2	6				
	Essential mitigation measures:								
	• Continuous maintenance on noise generating equipment as well as development of a maintenance schedule for equipment to ensure that no unnecessary noise is generated. • Investigation on the use of silent equipment. • The use of silencers for fans in the milling area. • Room enclosures for mill operators. • The use of noise barriers should these be required. • Limiting the number of simultaneous activities that occurs to reduce excessive noise. • Limiting certain operational activities (such as truck deliveries) to the daytime to reduce noise impacts at night. • Take advantage of the natural topography as a noise buffer • Personal hearing protection for employees where noise cannot be reduced, as described in the General Environmental, Health and safety (EHS) Guidelines. • Improve the acoustic performance of constructed buildings on site by applying sound insulation. • Installing suitable mufflers on engine exhausts and compressor components. • The implementation of a complaint register. • Through site induction programmes, all personal (including contractors) should be informed of their responsibilities and the importance of managing noise levels during the operational phase of the project.								
	With mitigation	Regional	Low	medium-term	Low	Definite (>90%)	LOW	-ve	Medium -High
		2	1	2	5				

12.3.5 Heritage

No additional impacts on heritage and palaeontology resources are expected during the operational phase of the project.

12.3.6 Visual

Due to current operations surrounding the project site, it is expected that the 80 000 tpa TiO_2 Rutile Pigment Plant will not result in any significant additional visual impacts. Visual impacts are expected to result from the plant buildings, use of night lighting, movement of vehicles transporting material and product to and from site. However, due to the location of the project, the impacts will be localised and will likely impact other tenants and visitors to the IDZ.

There is also potential for visual impacts from solar glint and glare from the sun's reflection from the solar panels, which may result in visual distraction for other tenants and visitors to the IDZ and is a potential safety risk for pilots. This has been found to be particularly problematic where the source of the glare and glint interfered with the approach angle to the runway. Although according to the DFFE screening tool, the project is located in an area classified to be of high civil aviation sensitivity, the IDZ is not located in close proximity to any airport, airfield, military airbase and is therefore not expected to pose a significant aviation safety risk.

The results from the quantitative visual impact assessment are provided in Table 12-27.

Table 12-27: Visual Impact Assessment for the Operational Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Visual intrusion because of the plant buildings and infrastructure.	Without mitigation	Local	Medium	Medium-term	Low	Probable	LOW	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• The height of the plant must be kept to a minimal as possible; and • Consider the use of neutral colours to minimise visual intrusion.								
	With mitigation	Local	Low	Medium-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	2	4				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Visual impacts from use of lighting at night.	Without mitigation	Local	Medium	Short-term	Very low	Probable	VERY LOW	– ve	High
		1	2	1	4				
	Essential mitigation measures:								
	• As far as possible, limit the use of bright floodlighting and to avoid the use of night-time lighting which may lead to skyglow; • Outdoor lighting must be strictly controlled; • The use of high light masts and high pole top security lighting should be avoided along the periphery of the operations. Any high lighting masts should be covered to reduce sky glow; • Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surrounding of the mining infrastructure, thereby minimising the light spill and trespass; and • Censored and motion lighting may be installed to prevent use of lights when not needed.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Visual impact from movement of vehicles transporting raw materials and products to and from site	Without mitigation	Local	Medium	Short-term	Very low	Probable	VERY LOW	– ve	High
		1	2	1	4				
	Essential mitigation measures:								
	• Dust control measures shall be implemented to make sure nuisance dust is kept at a minimum. • Where possible, movement of vehicles and construction machinery must be kept to a minimum.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Visual impact from the solar panels glint and glare	Without mitigation	Local	Medium	Short-term	Very low	Probable	VERY LOW	– ve	High
		1	2	1	4				

	Essential mitigation measures:								
	• Ensure that the panels used are coated with anti-reflective coating. • Where possible, make use of physical barriers such as vegetation to limit visual impacts from solar panels.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.3.7 Traffic

Most of the traffic will be associated with the delivery of chemicals to the site. The chemicals will be transported to the site via public roads and the railroad, but that will only require a few trucks a day.

- Road and Intersection Capacity: The proposed Nyanza Plant will generate an additional 193 trips/hr along Alumina Allee St during construction. Due to uncertain timeframes on the use of rail to transport raw materials to and from the plant, during the initial operational phase, the plant will generate an additional 186 trips/hr along Alumina Allee St during the operational phase, of which 29 % will be heavy vehicles. The additional heavy vehicle traffic during the construction and operational phases will strain the capacity of existing intersections to process the increased turning movement of heavy vehicles. The affected intersections will include:
    - Bauxite Bay St/ Alumina Allee St Intersection
    - Ferro Gang St/ Alumina Allee St Intersection
    - Heliumhoogte Rd/ Alumina Allee St Intersection
    - Heliumhoogte Rd/ R619 Intersection
    - John Ross Highway (R34)/ Alumina Allee St Intersection

  The R619/Heliumhoogte intersection cannot process the additional trips and requires improvements. A new traffic signal design is proposed to allow for optimised green split times at the intersection.

  Furthermore, the following roads will be affected by additional heavy vehicle movement during the temporary road-based transportation of raw materials:
    - Alumina Allee St
    - R619
    - R34
    - Harbour Arterial
    - Bauxite Bay St
- Road Safety: Specific causes of adverse effects foreseen in terms of road safety include abnormal loads delivering plant equipment and increased heavy vehicle traffic. In addition, the adverse effects will include reduced visibility, driver comfort and general road safety due to increased heavy vehicles that result in fading road markings, potholes and/or pavement damage and reduced sight distance. The extent of the road safety impact will be low due to relatively low volumes of heavy and abnormal loads stretched out over a long period during construction and operations. However, the significance of incidents may range from damage to fatality, and therefore some mitigation measures should be considered.

The results from the quantitative traffic impact assessment are provided in Table 12-28.

Table 12-28: Traffic Impacts During Operational Phase

Impact		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Road and Intersection Capacity	Without mitigation	Local	Medium	Medium- term	Low	Probable	LOW	– ve	High
		1	2	2	5				
	Essential mitigation measures								
	• Intersection capacity upgrades at the intersection of Heliumhoogte/R619 to facilitate processing additional heavy vehicle turning movement • Make public transport such as a bus service available for construction and plant staff from nearby residential • communities to reduce car and minibus taxi trips								
	With mitigation	Local	Medium	Medium- term	Low	Possible	VERY LOW	– ve	Medium
		1	1	2	4				
Impact		**Extent**	**Intensity**	**Duration**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Road Safety	Without mitigation	Local	Medium	Medium- term	Low	Possible	VERY LOW	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• Limiting heavy deliveries to daytime to avoid the risk of collision • Limiting abnormal loads to daytime and dry weather conditions, providing escort, and applying stop-go control where necessary • Regular maintenance of affected roads, including pavement structure, road markings and road signage								
	With mitigation	Local	Low	Medium- term	Very low	Possible	INSIGNIFICANT	– ve	Medium
		1	1	2	4				

12.3.8 Biodiversity

Potential biodiversity impacts associated with the operational phase include:

- Flora: During the operational phase, the potential failure to monitor the success of relocated floral SCC (if applicable) will result in loss of SCC. Increased introduction and proliferation of alien plant species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme can lead to ongoing displacement of natural vegetation outside of the footprint area, which will cause ongoing or permanent loss of faunal and floral habitat, diversity, and potential SCC. Increased human presence in the area once operational, potentially leads to the persecution of fauna in the adjacent natural habitat, or an increased risk of fire frequency impacting on floral and faunal communities outside of the development footprint. This will result in loss of faunal and floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area. Potential chemical spillages from the 80 000 tpa TiO_2 Rutile Pigment Plant can result in loss and degradation of faunal and flora habitat and faunal and floral species and the potential for contaminants to enter the groundwater and the resulting cascade of impacts.
- Fauna: The proposed development is anticipated to have a limited impact on faunal communities. The habitat integrity of majority of the study area has been degraded and completely altered from its natural state, and only a few commonly occurring faunal species were observed utilising the habitat. With mitigation measures implemented, the direct and indirect impacts on the floral ecology can be reduced to low and very-low levels. In addition, higher levels of traffic within the study area will increase the potential for collision of vehicles with fauna resulting in loss of fauna. The study area is surrounded by man-made barriers such as roads, railways, fences, and other developments, and it is thus also not anticipated any migratory routes for faunal species will be impacted by the proposed development. As part of the rehabilitation actions, disturbed areas not within the development footprint must be rehabilitated appropriately and AIP establishment controlled within such areas.

The quantitative biodiversity impact assessment results are provided in Table 12-29 to Table 12-32.

Table 12-29: Impact on the (1) floral habitat and diversity, and (2) SCC for all habitats (especially within the surrounding areas) except for the Depression Wetland associated with the proposed development activities for the Operational & Maintenance Phase

<table>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="6">Impact on Floral Habitat & Diversity across the habitats: loss of floral habitat and diversity because of:
• Ineffective or malfunctioning of storage facilities that store hazardous chemicals, resulting in chemical leaks and/or spills that contaminate the receiving environment;
• Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas;
• An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint; and
• Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.</td><td rowspan="2">Without mitigation</td><td>Local</td><td>Medium</td><td>Long-term</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>6</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">• No dumping of litter or refuse must be allowed on-site. Appropriate disposal of such material should be at a separate waste facility;
• Edge effects arising from the proposed development, such as erosion and AIP species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020);
• Ongoing AIP monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas;
• If any spills/leaks/storage failures occur, they must be cleaned up immediately to avoid soil contamination which has the potential to hinder re-establishment of vegetation or ecological function down the line. Spill kits should be kept on-site within workshops. In the event of infrastructure failure (i.e., chemical storage facilities) or a breakdown, maintenance of infrastructure and vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil;
• Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards; and
• If any fires break out, they should be extinguished immediately. Fire extinguishers and hoses should be easily accessible through the proposed infrastructure development to allow for quick use in the case of fire. This is of particular importance given that the study area (in which hazardous chemicals are stored, thus resulting in an increase fire risk) is surrounded by grassland and forest habitat (which may catch a light easily).</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Local</td><td>Low</td><td>Long-term</td><td>Low</td><td rowspan="2">Probable</td><td rowspan="2">LOW</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>1</td><td>1</td><td>3</td><td>5</td></tr>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="6">Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of:
• Failure to monitor the success of relocated floral SCC;
• The increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area;
• Loss of SCC may occur because of the increased human presence in the area once operational,</td><td rowspan="2">Without mitigation</td><td>Local</td><td>Medium</td><td>Long-term</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>6</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">• Monitoring of relocation success should continue for at least three years after the completion of the construction phase, or until it is evident that the species have established self-sustaining populations. No harvesting of SCCs by operational and maintenance teams must be allowed;
• Edge effects arising from the proposed development, such as erosion and AIP species proliferation, which may affect adjacent SCC habitat, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020); and
• Ongoing AIP plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Local</td><td>Low</td><td>Long-term</td><td>Low</td><td rowspan="2">Probable</td><td rowspan="2">LOW</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>1</td><td>1</td><td>3</td><td>4</td></tr>
</table>

potentially leading to Illegal harvesting/ collection of SCC; and • *An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint.*									

Table 12-30: Impact on the (1) floral habitat and diversity, and (2) SCC for the Depression Wetland (associated with the Freshwater Habitat) associated with the proposed development activities for the Operational & Maintenance Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on Floral Habitat & Diversity the Depression Wetland: loss of floral habitat and diversity because of: • *Ineffective or malfunctioning of storage facilities that store hazardous chemical, resulting in chemical leaks and/or spills that contaminate the receiving environment, including the Depression Wetland;* • *Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas;* • *An increased risk of fire frequency impacting on floral communities within the Depression Wetland and outside of the development footprint; and* • *Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas as well as the continued fragmentation and degradation of remaining forest patches in the surrounding areas.*	Without mitigation	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
	Essential mitigation measures:								
	• No dumping of litter or refuse must be allowed on-site. Appropriate disposal of such material should be at a separate waste facility; • Edge effects arising from the proposed development, such as erosion and AIP species proliferation, which may affect and further fragment remaining (surrounding) forest patches, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020); • Ongoing AIP monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; • If any spills/leaks/storage failures occur, they must be cleaned up immediately to avoid soil contamination which has the potential to hinder re-establishment of vegetation or ecological function down the line. Spill kits should be kept on-site within workshops. In the event of infrastructure failure (i.e., chemical storage facilities) or a breakdown, maintenance of infrastructure and vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards; and • If any fires break out, they should be extinguished immediately. Fire extinguishers and hoses should be easily accessible through the proposed infrastructure development to allow for quick use in the case of fire. This is of particular importance given that the study area (in which hazardous chemicals are stored, thus resulting in an increase fire risk) is surrounded by grassland and forest habitat (which may catch a light easily)								
	With mitigation	Local	Low	Long-term	Low	Probable	LOW	– ve	High
		1	1	3	5				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on Floral SCC for the Depression Wetland: Ineffective edge effect management leading to:	*Without mitigation*	Local	Medium	Long-term	Medium	Probable	MEDIUM	– ve	High
		1	2	3	6				
	Essential mitigation measures:								

• *Failure to monitor the success of relocated floral SCC (where applicable);* • *AIP control and erosion that can lead to the loss of SCC habitat and availability.*	• Monitoring of relocation success should continue for at least three years after the completion of the construction phase, or until it is evident that the species have established self-sustaining populations. No harvesting of SCCs by operational and maintenance teams must be allowed; • Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020); and • Ongoing AIP plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas. No chemical control of AIPs to occur without a certified professional and no chemical control to be permitted in Freshwater habitat.								
	With mitigation	Local	Low	Long-term	Low	Probable	LOW	– ve	High
		1	1	3	5				

Table 12-31: Impact on the (1) faunal habitat and diversity, and (2) SCC (across all habitat units, excluding the Depression Wetland) associated with the proposed development activities for the Operational & Maintenance Phase

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on Faunal Habitat & Diversity across the habitats: Loss of faunal habitat and diversity because of • *ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas, and / or* • *ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.*	Without mitigation	Regional	Medium	Long-term	High	Probable	HIGH	– ve	High
		2	2	3	7				
	Essential mitigation measures:								
	• No dumping of waste must be allowed on-site. All waste from the site must be collected and disposed of at a separate waste facility; • Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020); • Maintain quality of existing Degraded Coastal Forest habitat; • No collection of firewood is allowed by personnel; and • Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.								
	With mitigation	Local	Low	Medium-term	Very low	Probable	VERY LOW	– ve	High
		1	1	2	4				
Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of failure to monitor the success of relocated faunal SCC as well as the increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management program, leading to ongoing displacement of natural vegetation outside of the footprint area. Further loss of SCC may occur	*Without mitigation*	Local	Medium	Medium-term	Low	Probable	LOW	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• Monitoring of relocation success should continue for at least three years after the completion of the construction phase, or until it is evident that the species have established self-sustaining populations; • No collection of faunal SCC is allowed by personnel; • Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020); and • Ongoing AIP plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.								
	With mitigation	Local	Low	Medium-term 2	Very low	Probable	VERY LOW	– ve	High

because of the increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection, the persecution of fauna in the adjacent natural habitat, or an increased risk of fire frequency impacting on fauna and faunal communities outside of the development footprint.		1	1	2	4				

Table 12-32: Impact on the (1) faunal habitat and diversity, and (2) SCC for the Depression Wetland (associated with the Freshwater Habitat) associated with the proposed development activities for the Operational & Maintenance Phase

Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on Faunal Habitat & Diversity the Depression Wetland: Loss of faunal habitat and diversity because of i) ineffective rehabilitation of exposed and impacted areas in the surrounding areas, increasing erosion and sedimentation risk and AIP proliferation within the surrounding areas, and / or ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	Without mitigation	Regional	Medium	Long-term	High	Definite	HIGH	– ve	High
		2	2	3	7				
	Essential mitigation measures:								
	• No dumping of waste must be allowed on-site. All waste from the site must be collected and disposed of at a separate waste facility; • No impacts to the Depression Wetland or its buffer should be undertaken; • Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.								
	With mitigation	Local	Low	Medium-term	Very low	Definite	VERY LOW	– ve	High
		1	1	2	4				
Impact:		***Extent***	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact on Faunal SCC for the Depression Wetland: Ineffective edge effect management (e.g., AIP control and erosion plans) that can lead to the loss of SCC habitat and availability.	*Without mitigation*	Regional 2	Medium 2	Long-term 3	High 7	Probable	HIGH	– ve	High
		1	2	3	6				
	Essential mitigation measures:								
	• Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020); • No collection of faunal SCC is allowed by personnel; and • Ongoing AIP plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas. No chemical control of AIPs to occur without a certified professional and no chemical control to be permitted in Freshwater habitat.								
		Local	Low	Medium-term	Very low	Probable	VERY LOW	– ve	High

	With mitigation	1	1	2	2				

12.3.9 Wetlands

There are four key ecological impacts on the wetlands that are anticipated:

- Changes to the wetlands leading to the loss of habitat;
- Modification of hydrological function and water quality of the wetlands;
- Changes to the wetlands geomorphological processes and sedimentation; and
- Impacts on the wetlands leading to the loss of biota.

According to the wetland specialist study, various activities and development aspects may lead to these impacts, however, these impacts can be adequately minimized or avoided provided the mitigation measures provided the mitigation are implemented and adhered to.

The results from the quantitative wetland impact assessment are provided in Table 12-33, Table 12-34 and Table 12-35.

Table 12-33: Wetlands Impacts from the Operation of the plant and associated service buildings and associated stormwater infrastructure

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Potential impacts associated with the operation of the plant and associated service buildings include: • *Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc;* • *Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure;* • *Potential effects of TiO_2 nanoparticles on the aquatic ecosystems; and* • *Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.*	Without mitigation	Local	Medium	Long-term	Medium	Definite	MEDIUM	– ve	High
		1	2	3	6				
	Essential mitigation measures:								
	• It must be ensured that regular inspections of all stormwater infrastructure are conducted. During the inspection data must be recorded and kept for the purposes of tracking and reporting; • Any spills to be immediately cleaned up and treated accordingly. An emergency spill kit must be available at the at the plant and must take cognisance that there are wetlands in the vicinity of the plant. Mitigation measures must be indicated accordingly; • Should a sump area be included as part of the development, it must be regularly inspected to ensure no dirty water is leaking/being released into the surrounding wetland; • All stormwater management and attenuation facilities should be constructed through excavation of the in-situ material, sloped to a ratio not steeper than 3:1 and lined with rocks and cobbles to assist with energy dissipation and prevent sedimentation and erosion as well as improve the aesthetic appeal of the water management features; • The TiO_2 nanoparticles have the potential to impact on the aquatic ecosystem and result in some osmotic stress as well smothering of aquatic habitat, should they reach the receiving freshwater environment. The degree of the impact will likely depend on the volume of water that reaches the receiving environment, as well as dilution rates with water already present within the receiving environment; • As part of the wetland monitoring programme, the monitoring of water quality, specifically benthic diatom composition and screening toxicity testing to quantify potential effects of TiO_2 nanoparticles on the aquatic ecosystems has been included. During the operation of the plant, should any significant changes on the toxicity testing be quantified, suitable measures to manage impacts on the aquatic ecosystem must be implemented.								
	With mitigation	Local	Medium	Medium-term	Low	Definite	LOW	– ve	Medium
		1	2	2	5				

Table 12-34: Wetlands Impacts from the Operation and maintenance of the ground solar panels

Impact:		Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Potential impacts associated with the operation and maintenance of the ground solar panels: • *Potential indiscriminate movement of maintenance vehicles along wetland situated in close proximity to the Solar panels; and* • *Potential maintenance activities such as cutting of grass and cleaning of surface area underneath the solar panels.*	Without mitigation	Local	Medium	Long-term	Medium	Definite	MEDIUM	– ve	High
		1	2	3	6				
	Essential mitigation measures:								
	• Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the wetland and associated buffer zones; • During periodic maintenance activities of the surface infrastructure, monitoring for erosion should be undertaken with specific mention of investigating the support structures and areas accessed to facilitate maintenance activities; • Should erosion be noted at the base of the support structures that may potentially impact on a wetland situated adjacent, the areas must be rehabilitated by infilling and erosion gullies, resurfacing disturbed areas, and revegetating these areas with suitable indigenous vegetation; and • Monitoring for the establishment for AIP's along wetland must be undertaken along disturbed areas and access roads used to facilitate maintenance activities. Should AIP's be identified, they must be removed and disposed of as per an AIP control plan and the area must be revegetated with suitable indigenous vegetation.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

Table 12-35: Wetlands Impacts from the Rehabilitation of impacted areas and management of the wetland

Impact:		*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Potential impacts associated with the operation of the plant and associated service buildings include: • *Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc;* • *Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure; and* • *Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.*	Without mitigation	Local	Medium	Medium-term	Low	Probably	Low	– ve	High
		1	2	2	5				
	Essential mitigation measures:								
	• Following construction, a suitable alien invasive management plan must be implemented to ensure that alien invasive plant species do not become established within the areas disturbed by construction activities and especially along wetland habitats. • Small scale rehabilitation of the wetland and associated 30m buffer should be undertaken, including clearing of all alien and invasive plants and reinstatement of indigenous riparian vegetation; and • Incorporate as much indigenous terrestrial and wetland vegetation into landscape plan for all open space areas, SUDs, attenuation facilities.								
	With mitigation	Local	Low	Short-term	Very low	Possible	INSIGNIFICANT	– ve	High
		1	1	1	3				

12.3.10 Waste Management

One of the feedstocks to be used for the project is the HSS, which was classified as a hazardous waste. HSS will be stored on site and used in the process. Nyanza will store up to 18 days' worth of HSS on the site to ensure continuity of the process. The HSS will be stored in floored and roofed areas designated for the storage of the HSS. In addition, Nyanza will also produce other types of waste which will be temporarily stored at the site for collection and disposal by registered waste management companies.

Improper storage of the HSS will result in contamination of water resources including wetlands and groundwater.

In addition, poor waste management practices will result in:

- Contamination of surface runoff resulting in the deterioration of water quality of surface water resources, including wetlands; and
- Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface water resources resulting in the deterioration of water quality of the water resources.

The potential impacts from improper management of waste are expected to have a medium-low impact, and these can be mitigated to low (-) significance should it occur.

The results of the quantitative impact assessment for the operational phase are provided in Table 12-36.

Table 12-36: Waste Management related impacts during the operation phase

<table>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="6">Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.</td><td rowspan="2">Without mitigation</td><td>Regional</td><td>Medium</td><td>Medium-term</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>6</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">
Waste management will be undertaken in line with the NEM: WA Waste Management Hierarchy, ensuring re-use and recycling of waste as much as possible.
Where re-use, recycling or disposal of waste is required, the following shall apply:
Separation of waste

All waste shall be separated into general waste and hazardous waste.
Hazardous waste shall not be mixed with general waste
General waste can further be separated in waste that can be recycled and/or reused, if possible
No littering shall be allowed in and around the site, enough bins shall be provided for the disposal of waste.
Where necessary dedicate a storage area on site for collection of waste.

Storage of waste

General waste will be collected in an adequate number of litter bins located throughout the site.
Bins must have lids in order to keep rainwater out.
Bins shall be emptied regularly to prevent the bins from overflowing.
All work areas shall always be kept clean and tidy.
All waste management facilities will be maintained in good working order.
Waste shall be stored in demarcated areas according to type of waste.
Flammable substances must be kept away from sources of ignition and from oxidizing agents.
No builder's rubble shall be disposed of to the riparian area.
If builder's rubble is not removed immediately, it shall be stockpiled outside the sensitive wetland areas.
Demolition waste and surplus concrete shall be re-used, recycled, or disposed (last resort) of responsibly.
Waste shall not be buried or burned on site.

Disposal of general waste

No dumping shall take place in or near the project site.
All general waste shall be re-used, recycled, or disposed (last resort) of to a licensed landfill site.
Demolition waste and builder's rubble shall be used as cover material at an appropriate licensed landfill site.

</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Local</td><td>Low</td><td>Short-term</td><td>Very low</td><td rowspan="2">Possible</td><td rowspan="2">INSIGNIFICANT</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>3</td></tr>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="2">Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.</td><td rowspan="2">Without mitigation</td><td>Regional</td><td>Medium</td><td>Medium-term</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">– ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>6</td></tr>
</table>

<table>
<tr><td rowspan="3"></td><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">

If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion;
Runoff from stockpiles shall be detained in order to support growth of vegetation;
Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are like pre disturbed levels;
Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff;
A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity;
If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation;
Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes;
Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.

</td></tr>
<tr><td>With mitigation</td><td>Local
1</td><td>Low
1</td><td>Short-term
1</td><td>Very low
3</td><td>Possible</td><td>INSIGNIFICANT</td><td>– ve</td><td>High</td></tr>
<tr><th>Impact:</th><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="4">Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.</td><td>Without mitigation</td><td>Regional
2</td><td>Medium
2</td><td>Medium-term
2</td><td>Medium
6</td><td>Probable</td><td>MEDIUM</td><td>– ve</td><td>High</td></tr>
<tr><td colspan="9">Essential mitigation measures:</td></tr>
<tr><td colspan="9">

No dumping shall be allowed in or near the site.
Hazardous containers shall be re-used, recycled, or disposed (last resort) of at an appropriate licensed site.
Hazardous waste will be removed and managed by an approved service provider.
A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste.
The safe disposal certificates shall be stored and provided on request.

</td></tr>
<tr><td>With mitigation</td><td>Local
1</td><td>Low
1</td><td>Short-term
1</td><td>Very low
3</td><td>Possible</td><td>INSIGNIFICANT</td><td>– ve</td><td>High</td></tr>
</table>

12.4 Closure and Decommissioning Phase

It is not expected that the 80 000 tpa TiO_2 Rutile Pigment Plant will be decommissioned in the foreseeable future, the current expected life of plant is 60 years. The impacts from the decommissioning and closure are expected to be the same as for construction and have not been assessed in detail. Nyanza will apply for an EA for the decommissioning and closure of the plant when the time comes, as per the requirements of Environmental Legislation at that time.

12.5 Cumulative Impacts

Incomparable activities can result in several complex effects on the natural biophysical and social environment. These impacts are mainly identified as direct and immediate effects on the environment by a single entity affecting a variable of the environment. These direct impacts have the potential to combine and interact with other activities, depending on the surrounding environmental state and land use. These impacts may aggregate or interact with other impacts to cause additional effects, not easily quantified when assessing an individual entity.

The NEMA, 2014, specifically requires that cumulative impacts be assessed. This section provides a description and analysis of the potential cumulative effects of the proposed 80 000 tpa TiO2 Rutile Pigment Plant , and past and present projects hereby considering the effects of any changes on the:

- Biophysical; and
- Socio – Economic conditions.

For the analysis of cumulative effects to be utilised as a useful tool for decision makers and stakeholders, it must be limited to the effects that can be meaningfully evaluated, rather that expanding on resources or receptors that are no longer affected by the development or are not of interest to the stakeholders. Two important aspects require consideration prior to the evaluation of cumulative effects:

- The determination of an appropriate spatial and temporal boundaries for evaluation of cumulative effects of the project; and
- The evaluation of relevant projects for consideration in the cumulative effects' analysis.

Spatial and temporal boundaries for analysis of cumulative effects are dependent on several factors, including:

- The size and nature of the project and its potential effects;
- The size, nature, and location of past and (known) future projects and activities in the area,
- The aspect of the environment impacted by the cumulative effect; and
- The period of occurrence of effects.

The spatial extent of the cumulative impact analysis is generally aligned with the zone of influence of the project and other projects in the vicinity. Most impacts will be localised; however, others may be experienced on a regional scale. This is taken into consideration during the assessment of cumulative impacts. It is reasonably straightforward to identify significant past and present projects and activities that may interact with the 80 000 tpa TiO_2 Rutile Pigment Plant project to produce cumulative impacts, and in many respects, these are considered in the descriptions of the biophysical and socio- economic baseline.

12.5.1 Wetlands

Cumulative impacts are activities and their associated impacts on the past, present and foreseeable future, both spatially and temporally, considered together with the impacts identified in Section 6 above. Freshwater ecosystems within the region are under continued pressure from activities such as development of residential developments, agricultural activities and mining related activities for different resources (such as sand and coal) which further impact on their ecological integrity and ecological functioning. These various developments have also resulted in loss of freshwater habitat and infilling of the wetlands within the study area will also result in cumulative impacts in the area. The expansion of the RBIDZ and increase demand of industrial space in the area has resulted in further cumulative losses of regional wetland habitat and especially on the inter-dunal wetlands and swamp forest habitats which occur in the as a result of groundwater occurring at or near the surface.

The cumulative impacts associated with the loss of freshwater habitat and vegetation removal in developing areas has severe impacts especially during periods of high rainfall as it increases the vulnerability of flooding of infrastructure. As such, it is considered important that mitigation measures are implemented to avoid and/or minimise potential edge effects on the conservation wetland.

12.5.2 Groundwater and Surface Water

The potential groundwater and surface water quality impacts associated with the construction and operation of the 80 000 tpa TiO_2 Rutile Pigment Plant relate to the potential contamination as a result of leakages from vehicles and machinery. Mitigation measures have been proposed for the impacts on ground water and surface water contamination. It is expected that with the implementation of the mitigation measures, including the SWMP, these impacts will be reduced to an acceptable level. The hydrological and surface water cumulative impacts resulting from the construction and operation of the 80 000 tpa TiO2 Rutile Pigment Plant will be negligible.

12.5.3 Air Quality

The cumulative assessment (Nyanza proposed operations including the existing air quality) found that:

- All predicted P99 24-hour and annual average NO_2 concentrations at the sensitive discrete receptors are compliant with the relevant PDC. Exceedances of the P99 1-hour cumulative concentrations are noted at Felixton and eSikhaleni, while exceedances of the annual average cumulative concentrations are noted at Felixton. However, it should be noted that the elevated baseline predicted concentrations exceed the PDC before Nyanza emissions are incorporated. This indicates that existing industries attribute to the high predicted concentrations in that area.
- Predicted SO_2 and PM_{10} concentrations from Nyanza operations in relation to the existing baseline measured concentrations from the RBCAA monitoring stations show the following:
  - Cumulative P99 24-hour and annual PM_{10} concentrations were above the WHO guidelines at Brackenham, CBD, and eNseleni.
  - The cumulative P99 1-hour SO_2 concentrations were above the NAAQS at Scorpio and the cumulative P99 24-hour concentrations were above the NAAQS and WHO guidelines at Brackenham, CBD, Arboretum, Scorpio, Harbour West and Felixton.
- A revised cumulative dispersion model of the Richards Bay Airshed was developed using information from the most recent authorised AELs as provided by the Richards Bay Clean Air Association (RBCAA). Emission rates were modelled at their Maximum Emissions Standards (MES) to account for the worst-case scenario. Simulated P99 1-hour, P99 24-hour and period average air pollutant concentrations relevant to this assessment were added to the Nyanza

predicted concentrations to determine the cumulative predicted concentrations. Results are as follows:

- Predicted cumulative PM_{10} 24-hour concentrations exceed the NAAQS at Felixton. Brackenham, Alton, Arboretum, Scorpio, Harbour West and Felixton concentrations exceed the WHO guidelines.
- Predicted cumulative SO_2 concentrations note multiple exceedances of the NAAQS and WHO guidelines, attributed to the elevated baseline concentrations.
- Predicted cumulative NO_2 concentrations exceed the NAAQS and WHO guidelines at Felixton and eSikhaleni, likely attributed to the elevated baseline concentrations.
- SO_3, and HCL cumulative predicted concentrations were low and below the relevant standards at all receptors.
- Predicted cumulative CO concentrations exceedances of the NAAQS and WHO guidelines were noted at Brackenham.

Results from the cumulative assessment are provided in Table 12-37 to Table 12-42

Table 12-37: Cumulative predicted PM10 concentrations

Receptors	Predicted P99 24-hour Concentrations (µg/m³)			Predicted Annual Average Concentrations (µg/m³)		
	Baseline	Nyanza	Cumulative	Baseline	Nyanza	Cumulative
Arboretum	23.55	1.17	24.72	2.41	0.11	2.52
Alton	41.40	7.45	48.85	4.50	2.07	6.57
Richards Bay Central	28.07	3.56	31.63	3.37	0.32	3.69
Wild en Weide	31.96	4.94	36.9	3.98	0.60	4.58
Aquadene	28.39	3.29	31.68	3.49	0.42	3.91
Birdswood	16.73	1.23	17.96	1.75	0.10	1.85
Meer en See	13.55	0.56	14.11	1.31	0.05	1.36
Brackenham	37.35	8.10	45.45	5.14	1.29	6.43
CBD	26.79	3.65	30.44	3.37	0.27	3.64
Arboretum	22.22	1.59	23.81	2.30	0.13	2.43
Scorpio	44.84	2.61	47.45	4.81	0.38	5.19
Harbour West	53.70	1.47	55.17	7.00	0.27	7.27
Nseleni A	19.25	0.90	20.15	2.06	0.09	2.15
Airport	15.46	1.07	16.53	1.52	0.10	1.62
Mandlanzini	13.73	0.79	14.52	1.27	0.07	1.34
Felixton	206.15	0.24	206.39	25.48	0.03	25.51
eSikhaleni	38.57	0.22	38.79	4.30	0.04	4.34
SA NAAQS	**75**			**40**		
WHO guideline	**45**			**15**		
Red- Exceeds NAAQS; Orange- Exceeds WHO Guideline						

Table 12-38: Cumulative predicted SO2 concentrations

Receptors	Predicted P99 1-hour Concentrations			Predicted P99 24-hour Concentrations			Predicted Annual Average Concentrations		
	Baseline (µg/m³)	Nyanza (µg/m³)	Cumulative (µg/m³)	Baseline(µg/m³)	Nyanza (µg/m³)	Cumulative (µg/m³)	Baseline (µg/m³)	Nyanza (µg/m³)	Cumulative (µg/m³)
Arboretum	221.97	8.82	230.79	106.33	5.02	111.35	8.18	0.36	8.54
Alton	591.01	73.51	664.52	202.18	33.03	235.21	21.51	7.88	29.39
Richards Bay Central	389.40	37.06	426.46	168.61	16.08	184.69	16.66	1.26	17.92
Wild en Weide	483.65	51.84	535.49	187.48	13.67	201.15	20.26	1.98	22.24
Aquadene	608.13	38.29	646.42	205.15	16.19	221.34	25.43	1.88	27.31
Birdswood	238.34	10.89	249.23	92.85	3.98	96.83	8.91	0.33	9.24
Meer en See	104.71	4.95	109.66	61.04	2.68	63.72	4.33	0.18	4.51
Brackenham	641.24	84.72	725.96	232.22	36.91	269.13	27.58	5.06	32.64
CBD	407.27	20.29	427.56	155.47	9.98	165.45	16.32	0.74	17.06
Arboretum	275.75	10.65	286.4	121.13	4.37	125.5	10.11	0.38	10.49
Scorpio	232.48	42.88	275.36	154.06	10.98	165.04	10.70	1.59	12.29
Harbour West	500.35	20.85	521.2	185.04	5.89	190.93	26.08	1.05	27.13
Nseleni A	408.17	9.77	417.94	157.32	4.01	161.33	18.29	0.40	18.69
Airport	221.30	11.83	233.13	93.39	4.08	97.47	8.32	0.35	8.67
Mandlanzini	180.40	8.27	188.67	82.59	2.94	85.53	6.61	0.23	6.84
Felixton	287.01	3.09	290.1	85.74	1.15	86.89	10.02	0.13	10.15
eSikhaleni	334.32	3.78	338.1	85.40	1.13	86.53	16.79	0.19	16.98
NAAQS	**350**			**125**			**50**		
WHO Guideline	**-**			**40**			**-**		
Red- Exceeds NAAQS; Orange- Exceeds WHO Guideline									

Table 12-39: Cumulative results for SO_3

Receptors	Predicted P99 1-hour Concentrations (µg/m³)			Predicted P99 24-hour Concentrations (µg/m³)			Predicted Annual Average Concentrations (µg/m³)		
	Baseline	Nyanza	Cumulative	Baseline	Nyanza	Cumulative	Baseline	Nyanza	Cumulative
Arboretum	2.97	1.15	4.12	0.91	0.63	1.54	0.09	0.05	0.14
Alton	4.05	10.18	14.23	1.46	4.11	5.57	0.13	0.94	1.07
Richards Bay Central	4.90	4.13	9.03	1.72	1.78	3.5	0.21	0.14	0.35
Wild en Weide	3.56	5.24	8.8	1.36	1.46	2.82	0.15	0.16	0.31
Aquadene	2.71	4.75	7.46	1.07	2.05	3.12	0.11	0.24	0.35
Birdswood	2.44	1.09	3.53	0.66	0.43	1.09	0.08	0.04	0.12
Meer en See	0.53	0.64	1.17	0.25	0.34	0.59	0.02	0.02	0.04
Brackenham	3.85	10.70	14.55	1.62	3.59	5.21	0.16	0.52	0.68
CBD	3.82	2.57	6.39	1.33	1.30	2.63	0.16	0.10	0.26
Arboretum	3.49	1.34	4.83	1.00	0.60	1.6	0.11	0.05	0.16
Scorpio	1.47	4.78	6.25	1.29	1.26	2.55	0.06	0.17	0.23
Harbour West	5.71	2.51	8.22	1.52	0.74	2.26	0.31	0.13	0.44
Nseleni A	1.19	1.37	2.56	0.49	0.61	1.1	0.05	0.06	0.11
Airport	2.22	1.19	3.41	0.60	0.50	1.1	0.07	0.04	0.11
Mandlanzini	1.80	0.86	2.66	0.50	0.35	0.85	0.06	0.03	0.09
Felixton	0.61	0.44	1.05	0.22	0.15	0.37	0.02	0.02	0.04
eSikhaleni	0.71	0.53	1.24	0.18	0.15	0.33	0.03	0.03	0.06
NAAQS	**350**			**125**			**50**		
WHO Guideline	**-**			**40**			**-**		
Red- Exceeds NAAQS; Orange- Exceeds WHO Guideline									

Table 12-40: Cumulative predicted NO2 concentrations

Receptors	Predicted P99 1-hour Concentrations (µg/m^3)			Predicted Annual Average Concentrations (µg/m^3)		
	Baseline	Nyanza	Cumulative	Baseline	Nyanza	Cumulative
Arboretum	52.92	1.73	54.65	4.51	0.14	4.65
Alton	118.99	13.66	132.65	13.79	3.12	16.91
Richards Bay Central	66.35	6.12	72.47	6.91	0.53	7.44
Wild en Weide	82.41	9.34	91.75	10.48	1.21	11.69
Aquadene	68.77	6.05	74.82	9.12	0.71	9.83
Birdswood	48.48	1.82	50.3	4.88	0.16	5.04
Meer en See	33.92	0.92	34.84	2.76	0.07	2.83
Brackenham	104.27	19.52	123.79	14.63	2.59	17.22
CBD	69.79	3.77	73.56	8.28	0.29	8.57
Arboretum	54.72	1.94	56.66	5.18	0.15	5.33
Scorpio	67.45	4.89	72.34	5.68	0.67	6.35
Harbour West	64.18	2.43	66.61	5.13	0.42	5.55
Nseleni A	53.08	1.48	54.56	6.17	0.14	6.31
Airport	48.20	1.83	50.03	4.50	0.16	4.66
Mandlanzini	42.92	1.33	44.25	3.74	0.11	3.85
Felixton	1,254.42	0.39	1,254.81	155.80	0.05	155.85
eSikhaleni	208.65	0.37	209.02	21.52	0.07	21.59
NAAQS	**200**			**40**		
WHO Guideline	**200**			**10**		
Red- Exceeds NAAQS; Orange- Exceeds WHO Guideline						

Table 12-41: Cumulative predicted HCL concentrations

Receptors	Predicted P99 24-hour Concentrations (µg/m^3)		
	Baseline	Nyanza	Cumulative
Arboretum	1.66	0.0018	1.66
Alton	8.34	0.0112	8.35
Richards Bay Central	3.47	0.0047	3.47
Wild en Weide	5.16	0.0074	5.17
Aquadene	4.39	0.0026	4.39
Birdswood	2.60	0.0014	2.60
Meer en See	1.15	0.0007	1.15
Brackenham Monitoring Station	7.31	0.0111	7.32
CBD Monitoring Station	4.25	0.0059	4.26
Arboretum Monitoring Station	2.50	0.0026	2.50
Scorpio Monitoring Station	2.23	0.0027	2.23
Harbour West Monitoring Station	2.52	0.0013	2.52
Nseleni A	3.51	0.0005	3.51
Airport	2.50	0.0011	2.50

Receptors	Predicted P99 24-hour Concentrations (µg/m³)		
	Baseline	Nyanza	Cumulative
Mandlanzini	1.98	0.0008	1.98
Felixton	1.99	0.0002	1.99
eSikhaleni	1.88	0.0001	1.88
AAQS	**20**		
Orange- Exceeds AAQS			

Table 12-42: Cumulative predicted CO concentrations

Receptors	Predicted P99 1-hour Concentrations (µg/m³)			Predicted P99 8-hour Concentrations (µg/m³)		
	Baseline	Nyanza	Cumulative	Baseline	Nyanza	Cumulative
Arboretum	2.23	1,655.30	1,657.53	1.32	1,177.30	1,178.62
Alton	3.55	8,193.50	8,197.05	2.13	3,706.60	3,708.73
Richards Bay Central	3.07	6,489.90	6,492.97	1.87	4,162.50	4,164.37
Wild en Weide	2.77	9,158.20	9,160.97	1.70	5,057.50	5,059.2
Aquadene	2.14	2,656.30	2,658.44	1.33	1,836.70	1,838.03
Birdswood	2.10	1,437.90	1,440	1.29	1,092.10	1,093.39
Meer en See	1.66	444.26	445.92	1.10	382.45	383.55
Brackenham	2.71	16,019.00	16,021.71	1.71	10,250.00	10,251.71
CBD	2.91	4,104.30	4,107.21	1.83	4,736.80	4,738.63
Arboretum	2.35	1,848.50	1,850.85	1.50	1,491.60	1,493.1
Scorpio	3.09	3,723.70	3,726.79	1.87	1,872.20	1,874.07
Harbour West	2.79	1,526.70	1,529.49	1.70	773.69	775.39
Nseleni A	1.20	461.29	462.49	0.80	328.98	329.78
Airport	1.87	1,184.00	1,185.87	1.17	788.92	790.09
Mandlanzini	1.75	862.46	864.21	1.05	673.06	674.11
Felixton	43.63	141.95	185.58	24.74	85.60	110.34
eSikhaleni	5.01	176.92	181.93	3.38	83.15	86.53
NAAQS	**30,000**			**10,000**		
WHO Guideline	**35,000**			**10,000**		
Red- Exceeds NAAQS; Orange- Exceeds WHO Guideline						

12.5.4 Biodiversity

Within the surrounding areas, the current greatest threat to the floral ecology that is likely to contribute to cumulative impacts include i) the continued expansion of the surrounding infrastructure that could impact on the remaining extent of the vegetation type and further fragment landscapes, and ii) the continued proliferation of AIP species and/or bush encroachment, resulting in the overall loss of native floral communities within the local area.

The study area has avoided extensive transforming impacts and as such has retained natural characters, however, fragmentation through extensive fencing and edge effects have occurred within and surrounding the study area due to its close proximity to human settlements and industry. These activities have degraded the habitat for mammals; however, the remaining classes are all anticipated to occur within the study area in intermediate abundances. The development will lead to common faunal species being displaced from the proposed footprint areas into adjacent habitats. This will lead to increased competition for space and food resources within the study are and adjacent units. Edge effects and AIP proliferation are more concerning over the long-term. AIP proliferation will ultimately lead to loss of viable habitat, on a potentially increased scale, in the surrounding areas, displacing faunal species further as indigenous floral species (faunal habitat and food resources) are displaced and lost. An additional cumulative impact that could increase substantially over the life of the development, if not mitigated, is littering and dumping of other waste material in sensitive areas or outside designated areas, which may negatively impact faunal habitat on an increased scale over time.

12.5.5 Heritage Resources

The establishment of the proposed 80 000 tpa TiO_2 Rutile Pigment Plant adds to the existing infrastructure within the study area and, in so doing, decreases the area of open land on which heritage resources could potentially exist. The HIA however found no heritage resources that may be affected by the proposed project. It is therefore expected that the proposed project will not contribute to cumulative impacts.

12.5.6 Noise Impacts

The potential noise nuisance associated with the construction and operation of the 80 000 tpa TiO_2 Rutile Pigment Plant relates to the movement of vehicles and operation of machinery on site. The noise modelling undertaken found that:

- Daytime Cumulative Sound Levels: The cumulative daytime sound levels at the industrial receptors ranged from 48.5 dB(A) at M4 to 62.9 dB(A) at M2. The maximum excess sound level at the industrial receptors was 1.15 dB(A), occurring at M4. None of the industrial receptors exceeded the daytime SANS rating level of 70 dB(A).

  The cumulative daytime sound levels at the urban receptors ranged from 55.2 dB(A) at M7 to 67.6 dB(A) at M6. The maximum excess sound level at the urban receptors was 0.05 dB(A), occurring at M7. Receptors M5 and M6 exceeded the night-time SANS level rating of 60 dB(A). This was expected as these are the closest communities to the RBIDZ. These exceedances, however, were mainly due to existing noise sources such as heavy vehicle traffic along the R619, the lack of attenuation areas between these receptors and the industrial area and, noise from existing industries.

  The cumulative sound level at receptor M8 (CBD) is expected to be 62.0 dB(A) with an excess sound level of 0.00030 dB(A). This does not exceed the daytime CBD SANS level rating of 65 dB(A).

  Cumulative noise levels at monitoring points M5, M6, and M7 had exceeded their IFC daytime residential guideline of 55 dB(A); however, these results can only be used for comparison and not for compliance due to baseline noise levels were monitored over 20-minute sampling periods.

  It should be noted that the resulting cumulative sound levels are largely due to the baseline ambient sound levels being already elevated. Regardless, the cumulative sound levels at all receptors except M5 and M6, were below their respective daytime SANS level ratings. The excess sound levels at all receptors were minimal and any changes in the noise climate caused by daytime Nyanza operations can be considered negligible.

- Night-time Cumulative Noise: The cumulative (including the baseline) night-time sound levels, ambient monitoring results and excess sound levels for receptors M1-M8 are presented in Table 12-44 for comparative purposes.

  The cumulative night-time sound levels at the industrial receptors ranged from 42.2 dB(A) at M2 to 51.4 dB(A) at M4. The maximum excess sound level at the industrial receptors was 1.29 dB(A), occurring at M2. None of the industrial receptors exceeded the night-time SANS rating level of 70 dB(A).

  The cumulative night-time sound levels at the urban receptors ranged from 49.7 dB(A) at M7 to 66.9 dB(A) at M5. The maximum excess sound level at the urban receptors was 0.17 dB(A), occurring at M7 Receptors M5 and M6 exceeded the night-time SANS level rating of 50 dB(A). This was once again expected as these are the closest communities to the RBIDZ. These exceedances were also mainly due to existing noise sources such as heavy vehicle traffic along the R619 (especially the many heavy motor vehicles such as trucks that travel this road at night), the lack of attenuation areas between these receptors and the industrial area and, slight noise from existing industries.

  The cumulative sound level at receptor M8 is expected to be 45.2 dB(A) with an excess sound level of 0.01 dB(A). This does not exceed the night-time CBD SANS level rating of 55 dB(A).

  Cumulative noise levels at monitoring points M5, M6, and M7 had exceeded their IFC nighttime residential guideline of 45 dB(A); however, these results can only be used for comparison and not for compliance due to baseline noise levels were monitored over 20-minute sampling periods.

  The baseline noise climate influences the cumulative sound levels greatly, regardless, cumulative sound levels at all receptors except M5 and M6 were below their respective night-time SANS level ratings. Similar to the daytime, the excess night-time sound levels at all receptors were minimal and any changes in the noise climate caused by night-time Nyanza operations can be considered negligible.

Table 12-43: Daytime ambient monitoring results, cumulative and excess sound levels

Receptor	Description	Baseline sound level (dB(A))	Predicted sound level (dB(A))	Cumulative sound level (dB(A))	Excess sound level (dB(A))[1]	Daytime SANS rating level (dBA)	IFC Daytime Guideline (dBA)	IFC Exceedance	SANS Compliant
Industrial Receptors									
M1	RBIDZ entrance	62	43.9	62.1	0.07	70	70	No	Yes
M2	Alton-Along Betastraal road	62.9	37.1	62.9	0.01	70	70	No	Yes
M3	Alton	52	37.4	52.1	0.15	70	70	No	Yes
M4	Along Ferro Gang Road	47.4	42.2	48.5	1.15	70	70	No	Yes
Residential Receptors									
M5	Aquadene	66.3	18.6	66.3	0.00	60	55	Yes	No
M6	Brackenham	67.6	38.8	67.6	0.01	60	55	Yes	No
M7	Wild en Weide	55.2	35.5	55.2	0.05	60	55	Yes	Yes
CBD Receptors									
M8	Richards Bay Central	62	20.4	62.0	0.00	65	70	No	Yes

[1]The excess sound level was computed as the difference between the predicted and baseline sound levels.
Red- exceeds the respective SANS rating level. and IFC Guidelines
Blue- exceeds IFC guidelines only

Table 12-44: Night-time ambient monitoring results, cumulative and excess sound levels

Receptor	Description	Baseline sound level (dB(A))	Predicted sound level (dB(A))	Cumulative sound level (dB(A))	Excess sound level (dB(A))[2]	SANS rating level (dBA) - Day	IFC Night-time Guideline (dBA)	IFC Exceedance	Compliant
Industrial Receptors									
M1	RBIDZ entrance	50.6	43.9	51.4	0.84	70	70	No	Yes
M2	Alton-Along Betastraal road	41.7	37.1	43.0	1.29	70	70	No	Yes
M3	Alton	45.9	37.4	46.5	0.57	70	70	No	Yes
M4	Along Ferro Gang Road	50.9	42.2	51.4	0.55	70	70	No	Yes
Residential Receptors									
M5	Aquadene	66.9	18.6	66.9	0.00	50	45	Yes	No
M6	Brackenham	55.4	38.8	55.5	0.09	50	45	Yes	No
M7	Wild en Weide	49.5	35.5	49.7	0.17	50	45	Yes	Yes
CBD Receptors									
M8	Richards Bay Central	45.2	20.4	45.2	0.01	55	70	No	Yes

[2]The excess sound level was computed as the difference between the predicted and baseline sound levels.

Red- exceeds the respective SANS rating level. and IFC Guidelines

Blue- exceeds IFC guidelines only

12.5.7 Traffic

According to the traffic assessment, the cumulative impact on traffic during the construction phase will be negligible. There will be additional traffic during the operational phase of the project due to transportation of raw materials, by products, co products and waste. This will contribute to the cumulative traffic impacts which are expected to be of low significance. The implementation of mitigation measures contained in this report and accompanying EMPr will reduce the significance of the cumulative impacts even further.

12.6 Residual Impacts

The expected residual impacts will include:

- Permanent loss of and altered floral diversity of sensitive habitat (i.e., Degraded Coastal Forest Habitat);
- Permanent loss of and altered floral species diversity;
- Loss of connective freshwater habitat and thus the fragmentation of dispersal and connective corridors within the greater surrounding areas;
- Permanent loss of protected floral species and suitable habitat for such species;
- Disturbed areas are not rehabilitated to an ecologically functioning state with resulting significant loss of floral habitat, species diversity and SCC/protected floral species likely to be permanent;
- Altered faunal species diversity;
- Potential changes in the local hydrology of the area through wetland infilling and encroachment;
- Potential continued loss of faunal SCC;
- Potential loss of faunal abundance in the local area; and
- Disturbed areas are highly unlikely to be rehabilitated to baseline levels of ecological functioning and loss of faunal habitat and species diversity will most likely be long term.

13 Assumptions, Uncertainties, and Gaps in Knowledge

13.1 General

Technical data and information provided by specialists to SRK during the EIA were checked and reviewed for quality assurance by EAP team. All the data and information are assumed to be accurate and still applicable. It is assumed that the applicant will comply with all legislation pertaining to the activities of this proposed project and that all permits and license that may be required will be identified and applied for prior to commencement of construction activities. Furthermore, it is assumed that the applicant will comply with the IFC Performance standards and the IFC EHS Guidelines

The public participation process was sufficiently effective in identifying the critical issues needing to be addressed in the EIR by the EAP. The public participation process sought to involve key stakeholders, including the Competent Authorities (KZN EDTEA and DFFE). Wherever possible the information requested, and comments raised by I&AP's during the scoping phase was sufficiently addressed and incorporated into the EIR. These requests and any further comments were tracked throughout the process and recorded in the CRR contained in Appendix G 8.

SRK assumes that Nyanza will implement the measures contained in the EMPr and will adhere to any monitoring procedures developed for the project. A monitoring and evaluation system, including auditing, will be established, and operationalised to track the implementation of the EMPr, ensuring that management measures are effective to avoid, minimise and mitigate impacts and that corrective action is being undertaken to address shortcomings and/or non-conformances.

13.2 Specialist Studies

13.2.1 Biodiversity Impact Assessment

The following assumptions and limitations apply to the ecological assessment:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the surrounding areas or adjacent properties, although ecologically important or sensitive areas according to the desktop databases of the surrounding areas have been included on the relevant maps;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the assessed area's actual site characteristics at the scale required to inform more intricate planning, e.g., at the scale needed for an EA. Nevertheless, this information is useful as background information to the study and is important in legislative contextualisation of risk and impact and was used as a guideline to inform the biodiversity assessment, and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified, ground-truthed information must carry more weight in the decision-making process;
- The National Web-Based Environmental Screening Tool, hereafter referred to as the "Screening Tool", identified the potential presence of sensitive species within the study area. As per the best practise guidelines as stipulated by the SANBI's protocol, the name of sensitive

species may not appear in the public domain to protect the identity and potential location of such species; and

- The field assessment was undertaken during autumn (6 – 7 April 2022). The field assessment aimed to determine the ecological status of the habitat associated with the study area, and to "ground-truth" the results of the desktop assessment. Information from previous filed assessments associated with the study area (e.g., namely Nemai Consulting (2016) and Exigent Group (2019)) were also used as additional source material.

13.2.2 Heritage Resources Impact Assessment

The aerial imagery indicated that there would be several areas that are relatively open and that there was an access road to the outer perimeter. The imagery also indicated that some areas had been disturbed. These would be ideal to view areas for artefacts, especially those that occur 1m+ below the surface. Previous servitude excavations would also cut into lag deposits and expose any artefacts.

The limitation to the project is that the survey was undertaken in January and after two months of good rain. Ground vegetation was thus dense in many places. Ground visibility was thus poor in certain areas that were noted as being sensitive. Ground visibility was good in the open and disturbed areas.

The limitations did not impact the survey; however they were integrated into the management plan.

13.2.3 Wetlands and Aquatic Ecosystems Impact Assessment

The following assumptions and limitations are applicable to the wetlands delineation and assessment:

- All freshwater ecosystems associated with the proposed infrastructure were ground- truthed, however freshwater ecosystems within 500 m of the proposed infrastructure were delineated in fulfilment of GN509 of the National Water Act, 1998 (Act No. 36 of 1998) using various desktop methods including use of topographic maps, historical and current digital satellite imagery, and aerial photographs. Desktop delineations were ground-truthed where feasible;
- The presence of canals within the study area (identified during the field work and indicated in the topographical map) has impacted on the natural timing, flow, and patterns of water within the study area. This has overtime likely altered the natural saturation patterns within the study area;
- Due to presence of various activities and disturbances in the area, such as vegetation clearing, for development of surface infrastructure such as includes service buildings and roads, vegetation was not always a reliable indicator of the presence of freshwater ecosystems throughout the areas assessed. As such, in highly disturbed areas, the vegetation indicator may have affected the accuracy of the delineation. Under such circumstances satellite imagery was used to improve accuracy of the delineations, which is considered good practice and acceptable;
- With regards to data sources used to provide background information on the sensitivity of the assessed areas, it is important to note that although all data sources provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely

accurate indication of the study area's actual site characteristics at the scale required to inform the environmental authorisation process;

- Wetland, riparian, and terrestrial ecosystem zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundary may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results;
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. A more reliable assessment of the biota would require seasonal sampling, with sampling being undertaken under both low flow and high flow.

13.2.4 Air Quality Impact Assessment

The following assumptions and limitations apply to the dispersion modelling undertaken for this study:

- Unless otherwise stated, emission data was provided by TCSG, Hatch, GLTA and the process engineers. Any errors, limitations, or assumptions inherent in these datasets extend to this study.
- Ambient air quality impacts from this assessment are predicted at areas beyond the Nyanza fenceline.
- No upset/abnormal conditions have been modelled; the impact assessment is based on the operational phase of the plant. Impacts related to the construction and decommissioning phase are expected to be less significant than operational phase impacts. Mitigation and management measures recommended for the operational phase are however also applicable to the construction and decommissioning phases.
- At the time of the study, fuel storage tank data was unavailable and hence not included in the model. However, any emissions from these tanks are expected to be negligible.
- Nyanza advised that the on-site materials in stockpiles are located within enclosed workshops/sheds. As such, all fugitive dust emissions are expected to occur within enclosed areas.
- Nyanza advised that all conveyor belts and transfer houses are completely enclosed therefore, any fugitive emissions from their operations are considered negligible and were excluded from this study.
- Nyanza advised that a baghouse is installed at the ammonium sulphate storage bunker and ammonium sulphate/liquor mixing tanks to filter possible dusting during operations, resulting in no CO or NH_3 or particulate emissions from this bunker. Likewise, there are no CO or NH_3 or particulate emissions from the Ammonium sulphate/liquor mixing tank vent.
- The model-predicted ambient pollutant concentrations are reflective of contributions from the site and exclude contributions from other background emission sources in the surrounding area.
- Modelled meteorological data was purchased from Lakes Environmental. This data is designed to simulate or predict meso-scale atmospheric circulation over the study area using the WRF model.

- It was conservatively assumed that all TSP is PM_{10}. In the absence of particle size distribution data, $PM_{2.5}$ was not modelled in this assessment. However, it is conservatively assumed that if PM_{10} is compliant $PM_{2.5}$ will also be compliant
- It was conservatively assumed that all NO_x is rapidly converted to NO_2.
- .The highest temporal resolution provided by CALPUFF is 1-hour, therefore, the 10-minute SO_2 concentrations could not be modelled. However, to ensure compliance, the P99 maximum predicted.

13.2.5 Noise Impact Assessment

The Noise impact study has made the following assumptions that may impact the results obtained:

- The assessment of the construction phase of the proposed Nyanza project has been undertaken with a qualitative approach as the construction phase is temporary and noise level increases for this period are seen to be negligible.
- Baseline measurements taken over a single day/ night period was assumed to be representative of the sound levels experienced at each receptor location.
- The information provided for the operational activities is assumed to be representative of what will occur in reality.
- The operational conditions were assessed with no upset conditions. The plant is operational 365 days for 24 hours a day, annually.
- The sound emission level of the wet mill was assumed to be the same as a dry ball mill as data was not available for this source.
- Standby generators were considered as operational 24 hours a day, annually.
- Operational phase noise sources are based on estimated sound level data based on data provided by the client and relative literature sources.
- Buildings themselves within the project area were defined as acoustic barriers.
- The effects of acoustic barriers (i.e., warehouse brick wall enclosures, noise supressing sheet metal powerhouse structure, hood lining, etc.) have not been accounted for in the calculations.
- Noise impacts from the office block (storeroom, boardroom, admin office, toilets etc.) and the maintenance workshop (tool areas, spares storeroom etc.) have not been included in this assessment as these are expected to be negligible.
- Noise results from the baseline assessment cannot be assessed for compliance against the IFC noise guidelines as baseline noise readings were undertaken over 20-minute monitoring periods, IFC guidelines can only be used for comparison.

13.2.6 Traffic Impact Assessment

According to the Traffic Impact assessment study undertaken by Merchelles Collective (Pty) Ltd "Merchelles", the proposed Nyanza Plant will generate an estimated total of 193 trips during the construction phase, and the following assumptions were made for distributing the new trips to the road network:

- Staff/construction labour will arrive from nearby residential areas of Brackenham, Meer en See, Dube, Nseleni and Empangeni via the R34, P106 and R619 roads.

- The delivery of construction materials is assumed to arrive from within Richards Bay via Alumina Allee St and some from Durban via the N2.

14 Environmental Management Programme

The RBIDZ Phase 1F has an EMPr that was approved in 2016. The EMPr provides guidance on the management of the whole area (Phase 1F). A site specific EMPr has been compiled in accordance with Appendix 4 of GNR 326 of the NEMA. The site specific EMPr also considers the requirements and management protocols that were included in the RBIDZ EMPr.

The Nyanza EMPr provides effective management and mitigation measure pertaining to the proposed development relating to the identified environmental impacts. These management and mitigation measures will strive to minimise the negative impacts of the proposed development and enhance the positive impacts.

The site specific EMPr has been included in Appendix H.

16 Statement Motivating the Preferred Site

The proposed project is in line with the IDZ Phase 1F which is zoned as general industrial and is in line with the mandate of the RBIDZ to be a purpose-built and secure industrial estate developed specifically to manufacture goods and to produce services to enhance beneficiation, investments, economic growth, job creation, and developing skills.

In addition, the project site is close to a port for bulk export of the final titanium product. The plant is also located in close proximity to one of the main required raw materials, sulfuric acid, which will be sourced from nearby facilities like Foskor which is also located in Richards Bay. For the above reasons, the Richards Bay site was the most suitable site alternative, and thus this is where Phase 1, the Product Testing and Development Centre was developed. Due to the fact that Phase 1 is now already developed, there are no further site alternatives for the main plant that were assessed.

The specialist studies and impact assessment undertaken for the proposed project found that the proposed project will result in impacts ranging from high (-) significance to very low (-) significance. The majority of the impacts can however be mitigated to be within acceptable limits. The main impacts identified which cannot be mitigated include the loss of the wetlands on the property that will be infilled, and the loss of the forest located on the property. It must be noted that the impacts on the forest were assessed during the impact assessment process for the whole IDZ Phase 1F and the IDZ is currently in the process of applying for the required deforestation permits. The RBIDZ is currently undertaking the application for a deforestation permit for the destruction of the forest thicket. In addition, the RBIDZ EA grant permission for the infilling of the wetlands on the project site, with the exception of the conservation wetland and associated 30m buffer area. The Nyanza plant has been designed in such a way that no infrastructure will be located within the conservation wetland and 30m buffer area. There are offset arrangements that were made as part of the RBIDZ EIA process.

Furthermore, the proposed plant will be located within the City of uMhlathuze Local Municipality, where according to the Municipality IDP, there are high levels of unemployment in the area, making the proposed project important for the region. The project will result in the generation of a total of approximately1 750 jobs, two thirds of which will be for unskilled labourers. People from the Richards Bay area will be preferably employed as this will be the most economically viable option.

17 Summary of Specialist Reports

Findings from specialist studies have been incorporated into the base characterisation, impact assessment and EMPr. The full specialist reports are included in Appendix F of this report.

18 Period for which the Environmental Authorisation should be issued

The proposed 80 000 tpa TiO_2 Rutile Pigment Plant will be permanent and, it is requested that the Environmental Authorisation be issued for a period of 60 years.

19 Opinion and Conditions on Authorisation

The construction of the 80 000 tpa TiO_2 Rutile Pigment Plant must be conducted under duty of care and must be in accordance with the mitigation measures that were included in the EMPr to ensure that impacts are prevented and if they do occur, they are kept to the minimum.

The studies and impact assessment have been based on the plant layout, location, and other available information from the applicant. The management of the impacts identified for the construction, operation and closure phase is through a comprehensive range of programmes and plans contained in the EMPr. Implementation of these plans and programmes together with mitigation measures stipulated in the EMPr will be institutionalized through regular monitoring and auditing.

In order to achieve relative environmental management standards and ensure that the findings of the environmental assessment are implemented through practical measures, the recommendations and management measures from this EIA study are included within a site specific EMPr. The EMPr must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for the life cycle phases of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

The EAP recommends that the 80 000 tpa TiO_2 Rutile Pigment Plant be authorised for a period of 60 years.

In addition, the following key conditions should be included as part of the authorisation:

- No removal and/or relocation of protected species as specified in the biodiversity assessment report and EMPr may be undertaken without relevant permits from Ezemvelo;
- Nyanza shall be on the lookout for possible graves on site A2 as stipulated in the HIA. No graves and/or cultural and palaeontological resources may be relocated and/or destroyed without relevant permits from SAHRA;
- Nyanza is not exempted from complying with any other statutory requirements that is applicable to the undertaking of the activity.
- The Stormwater Management Plan incorporated into the plant design must be adhered to;
- The EMPr must be enforced throughout the life of the project;
- Nyanza must appoint a suitably experienced (independent) ECO for the construction phase of the development that will have the responsibility to ensure that the mitigation and rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPr; and
- Environmental audits reports must be submitted to the KZN EDTEA and DFFE on a monthly basis once construction has begun and on an annual basis during the operational phase. This is to ensure that mitigation measures are being implemented and to prevent environmental degradation (e.g. erosion) during the construction and operational phases.

Detailed conditions to be included in the EA and WML have been included in Section 22 of this report.

20 Environmental Impact Statement

An EIA has been conducted in accordance with the EIA regulations which included the required PPP aimed at the key Organs of State and the identified I&APs. Where potential biophysical or social impacts have been identified mitigation and management measures have been proposed to control and monitor the magnitude of impacts associated with the various aspects of the proposed project.

The proposed project is justified through the manageable environmental impacts and positive benefits resulting from the operation of the proposed project. This section of the report presents the outline of the key findings of the Impact Assessment.

20.1 Preferred Option

The potential impacts evident from the detailed impact assessment of the proposed project are both positive and negative in nature. The identified and assessed negative impacts can be managed to acceptable levels.

The most significant impacts associated with the project include the loss of the forest that is located on the site. This impact has however been dealt with in the IDZ's approved 2016 EIA and EMPr and the IDZ is currently applying for a deforestation permit. The habitats within the study area provide suitable habitat to sustain viable populations of floral SCC. A Floral walkdown of the study area was conducted in 2015 and permits granted for the relocation of *Boophone disticha* and *Crinum macowanii* species within the study area. These species were recently relocated; however, additional species were identified on site during 2022 that were not previously identified and as such no relocation of this species has occurred. Furthermore, habitat to support other SCC is available within the habitats. If the proposed development is authorised, it will be necessary to conduct a thorough walkdown of all the footprint areas and all floral SCC marked for possible relocation to suitable habitat outside the direct footprint (as far as is feasible). Permits from Ezemvelo will be required for the possible relocation, removal, or destruction of this species before vegetation clearing activities commence. the proposed project will also have a positive impact, albeit (of low significance) on biodiversity as it will result in removal of Alien Invasive Plant Species currently on the property.

There are a number of wetlands located on the site that will be lost through infilling for the establishment of the plant. It must be noted that authorization has previously been granted for infilling of the wetlands within the study area, except for the depression wetland which has been designated as a conservation area within the RBIDZ area. The layout plan of the plant is in such a way that the depression wetland and associated 30m buffer are not directly affected by the plant, however this wetland feature is still subject to edge effect impacts from the associated development activities. The wetlands impact assessment was therefore undertaken, and mitigation measures identified to ensure that potential edge effects are managed in-line with the mitigation hierarchy.

Most of the negative impacts identified i.e. impacts of particulate mobilisation, increased nuisance noise, visibility due to dust plumes, potential soil, and groundwater pollution due to chemicals, oil and diesel will take place during all phases of the project. The main receptors that may be impacted by contaminated groundwater are the wetlands located close to the site. However, the impacts are expected to be of low and medium ;low significance and the periods of the majority of the impacts will be of short duration.

Particulate mobilisation is easily and effectively controlled by dust suppression and the potential for soil and groundwater pollution will be mitigated by taking due care to prevent spillages of chemicals, oil, and diesel and to clean up any spillages that might occur. In addition, the design of the facility includes oil sumps which will lined to avoid and/limit contamination of water resources during the operation of the facility. A SWMP that has been incorporated into the plant design will also be implemented to ensure that clean and dirty water is separated and that water resources are protected.

To keep working areas safe during construction and infrastructure safe during plant operation, it may be necessary to dewater and lower the water table locally. The extent and necessity of dewatering required will be dependent on final construction and operational requirements. At this junction, it is anticipated 19 m^3/hr will be pumped out from sub-surface drains to maintain the water table at 2 mbgl. The abstracted water could be directed to the plant for use or to the wetland. The abstraction of groundwater as potential to result in groundwater drawdown that may impact the conservation wetland The significance of the impact has been classified as low and can be mitigated to be insignificant.

The noise impact assessment found that the proposed project will not result in any of the respective SANS limits. Potential sources of air pollution were identified and assessed. The identified pollutants of concern include PM_{10}, SO_2, SO_3, NO_2, CO and HCL emissions from the processing plant as well as vehicles travelling along paved roads were considered. Nyanza has employed multiple abatement technologies to reduce air pollution emissions. Technologies such as sophisticated scrubber systems and baghouses at storage bunkers were considered in the emissions inventory calculations. The impact assessment found that the plant will not result in exceedances of the NAAQS and EHS Guidelines.

All the identified cumulative impacts are expected to be of low significance and implementation of mitigation measures will render the potential cumulative impacts negligible.

The main positive impacts of the proposed project will be that it will allow Nyanza to make use of the HSS, which will result in the reduction in waste at Highveld Steel. The project will result in the creation of employment, approximately 1750 jobs will be created during the construction and operational phases of the project. In addition to the direct job creation, the proposed project will lead to the upliftment of businesses around the project area, through provision of services that will be required at the plant. One of the proposed plants is for the air to water installation plant. Nyanza will partner with a local entrepreneur.

The TiO_2 pigment plant will also result in an improvement to the local and national GDP through sales that are earmarked for international markets, bringing foreign currency into the country.

The mitigation measures in the EMPr (Appendix H) are deemed adequate to avoid and/or minimise further degradation of the environment. In the long term, effective implementation of mitigation measures (as recommended in the EMPr) may also result in positive impacts in terms of control of alien vegetation.

Table 20-1 provides a summary of the impact assessment results pre and post mitigation.

Table 20-1: Summary of Findings from the Impact Assessment Pre and Post Mitigation

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
Pre-Application	Impact on Floral Habitat & Diversity across the habitats: Degradation and modification of the receiving environment, loss of floral habitat and species diversity resulting from: • Inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an Alien Invasive Plant (AIP) control and management plan, and/or erosion or stormwater control plan or poor infrastructure design leading to increased risk of hazardous chemical leakage into surrounding areas.	HIGH	MEDIUM
	Impact on SCC across the habitats: loss of floral SCC and/or habitat because of: • Failure to conduct an additional site walkdown for additional SCC observed during the 2022 field assessment; and • Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate floral SCC to suitable habitat outside of the surface infrastructure footprint.	HIGH	MEDIUM
	Impact on Faunal Habitat & Diversity across the habitats: loss of faunal habitat and diversity because of inconsiderate planning, infrastructure design and placement leading to unnecessary edge effects impacts, e.g., failure to compile an AIP control and management plan, and/or erosion control plan	VERY HIGH	MEDIUM
	Impact on SCC across the habitats: Failure to obtain the necessary permits for nationally and provincially protected species and failure to relocate faunal SCC to suitable habitat outside of the surface infrastructure footprint.	VERY HIGH	MEDIUM
	Potential impacts associated with site clearing prior to commencement of construction activities related to the proposed infrastructure: • Vehicular transport and access to the site, site clearing; • Removal of vegetation and associated disturbances to soils; • Miscellaneous activities by construction personnel.	LOW	INSIGNIFICANT
Construction	Possible boost in short term employment and local small business opportunities.	MEDIUM	MEDIUM
	Potential impact on safety and security because of theft, the occurrence of additional trucks on the roads, uncontrolled lighting of fires on site, littering and driving irresponsibly.	INSIGNIFICANT	INSIGNIFICANT
	Health and safety risk because of the movement of vehicles increasing the risk of accidents	INSIGNIFICANT	INSIGNIFICANT
	Potential influx and unlawful occupation of the area by job seekers and workers	INSIGNIFICANT	INSIGNIFICANT
	Possible groundwater contamination from hydrocarbons from vehicles during the construction and operation phase	MEDIUM	VERY LOW
	Potential deterioration in water quality due to accidental spillages of hazardous substances such as hydrocarbons from vehicles and machinery used during construction.	MEDIUM	INSIGNIFICANT
	Possible contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality	MEDIUM	INSIGNIFICANT
	Poor stormwater management leading to runoff from stockpiled material removed causing pollution of the water resources.	MEDIUM	INSIGNIFICANT
	Possible increase in dust generation, PM10 and PM2.5, because of earthworks, operation of heavy machinery, and vehicle movement.	VERY LOW	VERY LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Emissions of Green House Gases (GHGs) because of the use of vehicles and machinery used during the construction activities.	VERY LOW	INSIGNIFICANT
	Possible production of odours due to improper handling, storage, and management of waste of sit	VERY LOW	VERY LOW
	The use of the steel fabrication plant, construction vehicles and machinery during the construction phase may generate nuisance noise in the immediate vicinity	VERY LOW	INSIGNIFICANT
	Possible production of odours due to improper handling, storage, and management of waste of site	VERY LOW	INSIGNIFICANT
	The use of the steel fabrication plant, construction vehicles and machinery during the construction phase may generate nuisance noise in the immediate vicinity	VERY LOW	INSIGNIFICANT
	Visual intrusion because of the movement of machinery and the establishment of the required infrastructure.	LOW	INSIGNIFICANT
	Indirect visual impact due to dust generation because of the movement of vehicles and materials, to and from the site area.	VERY LOW	INSIGNIFICANT
	Localised chemical pollution of soils as a result of vehicle hydrocarbon spillages and compaction.	LOW	INSIGNIFICANT
	Localised clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	LOW	INSIGNIFICANT
	Removal of local geology as a result of construction activities.	LOW	INSIGNIFICANT
	Potential impacts on Stone Tools	LOW	LOW
	Potential impacts on human graves.	MEDIUM	MEDIUM
	Potential impacts on the depression wetland associated with vegetation clearing of vegetation within the footprint of the proposed infrastructure including: • Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and • Potential continued proliferation of alien and invasive vegetation species due to disturbance.	MEDIUM	INSIGNIFICANT
	Potential wetlands impacts associated with excavation and concrete works associated with the proposed infrastructure (processing plant, ground-mounted solar panels, and non-process water buildings such as offices and workshops and storerooms including: • Removal of vegetation and associated disturbance to soil within the construction footprint; • Increased likelihood of dust generation; • The movement of construction machinery, personnel, and equipment directly; • Mixing and casting of concrete to facilitate construction; and • Proliferation of alien and invasive vegetation species within the footprint areas associated with the proposed infrastructure.	HIGH	MEDIUM
	Potential wetland impacts from clearing of vegetation and soil specifically within the footprint of the proposed infrastructure including:	HIGH	LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	• Compaction of soil and disturbance of vegetation due to personnel within the proposed footprint associated with the infrastructure; and • Potential continued proliferation of alien and invasive vegetation species due to disturbance.		
	Increase in traffic volumes due to transportation of materials may lead to an increase in traffic congestion on roads around the project area increasing the chances of road accidents.	MEDIUM	VERY LOW
	The increase in vehicles results in an increased potential for road degradation of the road network in the vicinity of the project.	MEDIUM	INSIGNIFICANT
	Impact on SCC on the project site: • Vegetation clearing leads to the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	MEDIUM	MEDIUM
	Impact on habitat diversity within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in: • Edge effects e.g., dumping of cleared vegetation or construction rubble and/or the AIP spread which will result in the replacement of native flora, the reduction in floral habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions; and • Compaction and degradation of soils which have a higher probability of erosion.	HIGH	MEDIUM
	Impact on Habitat Diversity within the freshwater habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in: • Edge effects e.g., dumping of cleared vegetation or construction rubble and/or the AIP spread which will result in the replacement of native flora, the reduction in floral habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well as loss of significant and specialised habitat conditions; and • Compaction and degradation of soils which have a higher probability of erosion.	HIGH	MEDIUM
	Impact on SCC within the Freshwater Habitat: Secondary impacts because of construction-related activities, e.g., vegetation clearing activities in neighbouring habitats will result in • The loss of floral SCC and SCC habitat (e.g., in the case of vegetation cutting and/or rubble from construction activities that are dumped in the Wetland and/or associated buffer); and • The spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	HIGH	MEDIUM
	Impact on the (1) faunal habitat and diversity, and (2) faunal SCC for the proposed development activities: Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion and sedimentation of Freshwater Habitat.	HIGH	VERY LOW
	Impact on SCC: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	MEDIUM	INSIGNIFICANT
	Impact on habitat diversity within the freshwater habitat: Vegetation clearing activities will result in a decrease in faunal habitat and diversity, reduced habitat integrity, and habitat fragmentation of the habitat with surrounding areas, as well	HIGH	MEDIUM

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	as loss of significant and specialised habitat conditions. AIP spread which will result in the replacement of native flora; Construction activities will lead to the compaction and degradation of soils which have a higher probability of erosion.		
	Impact on SCC within the Freshwater Habitat: Vegetation clearing leads to the loss of faunal SCC and SCC habitat. Furthermore, the spread of AIPs within the disturbed areas can lead to the additional loss of SCC diversity from surrounding natural habitat.	HIGH	MEDIUM
	Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
	Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.	MEDIUM	INSIGNIFICANT
	Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
Operational	Possible boost in long term employment and local small business opportunities.	MEDIUM	MEDIUM
	Potential impact on safety and security because of theft, the occurrence of additional vehicles transporting raw material, waste and products on the roads and driving irresponsibly.	MEDIUM	INSIGNIFICANT
	Health and safety risk because of the movement of vehicles increasing the risk of accidents	INSIGNIFICANT	INSIGNIFICANT
	Potential influx and unlawful occupation of the area by job seekers and influx of workers	INSIGNIFICANT	INSIGNIFICANT
	Groundwater and surface water impacts from improper storage and handling of feedstock	HIGH	INSIGNIFICANT
	Groundwater and surface water impacts from improper storage, transportation, and handling of products, raw materials, and waste (including sludge)	HIGH	VERY LOW
	Groundwater and surface water impacts from improper storage, transportation, and handling of spent acid	LOW	INSIGNIFICANT
	Potential groundwater and surface water impacts from liquid bulk storage and transportation	MEDIUM	VERY LOW
	Potential groundwater levels impact from dewatering for safe plant construction and operation	VERY LOW	INSIGNIFICANT
	PM, SO_2, SO_3, NO_2, CO and HCL Emissions potentially resulting in nuisance and Health Effects on Nearby Receptors	MEDIUM	LOW
	Possible production of odours due to improper handling, storage and management of waste of site	VERY LOW	VERY LOW
	Emissions of Green House Gases because of the use of vehicles and machinery used during the operational activities.	VERY LOW	VERY LOW
	Ambient noise generated from Nyanza operations.	MEDIUM	LOW
	Visual intrusion because of the plant buildings and infrastructure.	LOW	INSIGNIFICANT
	Visual impacts from use of lighting at night.	VERY LOW	INSIGNIFICANT
	Visual impact from movement of vehicles transporting raw materials and products to and from site	VERY LOW	INSIGNIFICANT

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Visual impact from the solar panels glint and glare	VERY LOW	INSIGNIFICANT
	Road and Intersection Capacity	LOW	VERY LOW
	Road Safety	VERY LOW	INSIGNIFICANT
	Impact on Floral Habitat & Diversity across the habitats: loss of floral habitat and diversity because of: • Ineffective or malfunctioning of storage facilities that store hazardous chemicals, resulting in chemical leaks and/or spills that contaminate the receiving environment; • Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas; • An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint; and • Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	MEDIUM	LOW
	Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of: • Failure to monitor the success of relocated floral SCC; • The increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area; • Loss of SCC may occur because of the increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection of SCC; and An increased risk of fire frequency impacting on floral communities and SCC outside of the development footprint.	MEDIUM	LOW
	Impact on Floral Habitat & Diversity the Depression Wetland: loss of floral habitat and diversity because of: • Ineffective or malfunctioning of storage facilities that store hazardous chemical, resulting in chemical leaks and/or spills that contaminate the receiving environment, including the Depression Wetland; • Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas; • An increased risk of fire frequency impacting on floral communities within the Depression Wetland and outside of the development footprint; and • Ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas as well as the continued fragmentation and degradation of remaining forest patches in the surrounding areas.	MEDIUM	LOW
	Impact on Floral SCC for the Depression Wetland: Ineffective edge effect management leading to: • Failure to monitor the success of relocated floral SCC (where applicable); • AIP control and erosion that can lead to the loss of SCC habitat and availability.	MEDIUM	LOW
	Impact on Faunal Habitat & Diversity across the habitats: Loss of faunal habitat and diversity because of • ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas, and / or ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	HIGH	VERY LOW

PROJECT PHASE	IMPACT:	SIGNIFICANCE PRE-MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION MEASURES
	Impact on SCC across the habitats: Loss of SCC individuals and suitable habitat because of failure to monitor the success of relocated faunal SCC as well as the increased introduction and proliferation of AIP species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management program, leading to ongoing displacement of natural vegetation outside of the footprint area. Further loss of SCC may occur because of the increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection, the persecution of fauna in the adjacent natural habitat, or an increased risk of fire frequency impacting on fauna and faunal communities outside of the development footprint.	LOW	VERY LOW
	Impact on faunal habitat & diversity the depression wetland: Loss of faunal habitat and diversity because of i) ineffective rehabilitation of exposed and impacted areas in the surrounding areas, increasing erosion and sedimentation risk and AIP proliferation within the surrounding areas, and / or ii) ineffective edge effect management (e.g., AIP control) which leads to the continued spread of AIP species within the surrounding natural areas.	HIGH	VERY LOW
	Impact on faunal SCC for the depression wetland: Ineffective edge effect management (e.g., AIP control and erosion plans) that can lead to the loss of SCC habitat and availability.	HIGH	VERY LOW
	Potential impacts associated with the operation of the plant and associated service buildings include: • Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc; • Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure; • Potential effects of TiO_2 nanoparticles on the aquatic ecosystems; and • Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.	MEDIUM	LOW
	Potential impacts associated with the operation and maintenance of the ground solar panels: • Potential indiscriminate movement of maintenance vehicles along wetland situated in close proximity to the Solar panels; and • Potential maintenance activities such as cutting of grass and cleaning of surface area underneath the solar panels.	MEDIUM	INSIGNIFICANT
	Potential impacts associated with the operation of the plant and associated service buildings include: • Increased impermeable surfaces due to the presence of buildings, associated roofs, parking areas, access roads, etc; • Potential risk of contaminated runoff from surfaces such as roads and parking areas associated with the proposed infrastructure; and • Potential indiscriminate movement of vehicles within the wetland for perimeter inspections/ maintenance.	LOW	INSIGNIFICANT
	Poor waste management during construction could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT
	Stockpiling material from the construction activities may result in secondary pollution and surface water contamination.	MEDIUM	INSIGNIFICANT
	Disposal of hazardous waste including hydrocarbon contaminated soils, rags etc. could result in the contamination of surface runoff resulting in the deterioration of water quality of the watercourse.	MEDIUM	INSIGNIFICANT

20.2 No-go alternative

The no-go alternative would entail not implementing the proposed 80 000 tpa TiO_2 Pigment Plant. The proposed plant will be located with the RBIDZ, and the no-go option would mean that development of the section of the RBIDZ 1F affected by the proposed project will not continue. The negative environmental impacts associated with the proposed project including loss of wetland systems, loss of biodiversity etc may not occur and the area will remain in its existing condition for a limited timeframe, barring the impacts that have occurred due to the existing Nyanza TiO_2 PTDC.

However, it must be noted that since the RBIDZ was developed for the sole purpose of attracting development, it is expected that the site will eventually be used by another industry, which will still impact on some, if not all of the environmental aspects affected by the Nyanza project.

It must also be noted that not implementing the project will also mean that all the benefits associated with the proposed project will also not be realised.

The no-go option is therefore not recommended.

21 Proposed Impact Management Objectives and Impact Management Outcomes for Inclusion in the EMPr

The EMPr seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment and surrounding communities will be mitigated, controlled and monitored.

The EMPr compiled for the proposed project addresses the environmental impacts and possible unplanned events during each phase of the project (construction and operational and rehabilitation). Due regard was given to environmental protection during the entire project and a number of environmental recommendations were made to achieve environmental protection.

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts, assess their significance and implement appropriate mitigation and management measures to avoid, minimise and/or remediate the associated impacts where they cannot completely be avoided.
- Implement an adequate monitoring programme to:
  - Ensure that mitigation and management measure are effective.
  - Allow quick detection of potential impacts, which in turn will allow for quick responses to issues/impacts.
  - Reduce duration of any potential negative impacts.

The objectives of the EMPr will be to:

- Provide sufficient information to strategically plan the project activities as to avoid unnecessary social and environmental impacts;
- Provide sufficient information and guidance to plan the project activities in a manner that will reduce impacts (social, physical, and biological) as far as is practically possible;
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance; and
- Provide a management plan that is effective and practical for implementation.

Through the implementation of the identified proposed mitigation measures, it is anticipated that the identified impacts can be managed and mitigated effectively. Table 21-1 provides a summary of impact management objective and outcomes for the project.

Table 21-1: Impact Management Objectives and Management Outcomes

Objectives	Outcomes
Soil	
Ensure suitable removal, storage, transportation of topsoil for reuse during rehabilitation. To manage soil erosion.	No visual evidence of erosion. No visual evidence of erosion from topsoil stockpiles and from areas where topsoil has been reinstated.
Flora	
Minimise unnecessary clearance of indigenous vegetation. Preserve protected flora species. Control alien plants and noxious weeds.	Clearance of vegetation to be limited to Nyanza Plant area. No disturbance to SCC without permits. No net-loss of biodiversity. Ongoing eradication of alien invasive plants and noxious weeds.
Fauna	
Ensure the protection of animals.	No direct / indirect harm to animals from construction activities.
Wetlands	
Minimise impact to wetland areas. Minimise environmental impacts associated with stormwater. Minimise stormwater runoff from the site.	Reduced impact to wetland areas. Rehabilitation of wetland areas. No net loss of wetland biodiversity Protection of wetland at the conservation area No visual evidence of erosion caused by wastewater or stormwater practices. No environmental contamination associated with effluent management or stormwater practices.
Noise	
Minimise noise nuisance.	No complaints regarding noise pollution. Comply with SANS 10103:2008 and OHS requirements. Comply with EHS Guidelines for Noise (EHS Guidelines on Noise Management)
Air Quality	
Minimise dust generation Minimise air pollution	No complaints regarding nuisance dust No exceedances of nuisance dust emissions at identified receptors No exceedances of MES, IFC EHS Guidelines on air quality standards and limits (EHS Guidelines on Air Emissions and Ambient Air Quality)
Groundwater and Surface Water Resources	
Minimise ground and surface water quality impacts Minimise groundwater drawdown Minimise reduction in groundwater flowing to the conservation wetland	No pollution of groundwater resources No/minimal lowering of groundwater levels due to over abstraction of groundwater No exceedances of the IFC EHS Guidelines on Wastewater and Ambient Water Quality
Visual	
Minimise impacts to the aesthetics / visual quality. Ensure that the visual appearance of the site is not an eyesore the adjacent areas.	No complaints regarding impacts to visual quality.
Safety and Security	

Objectives	Outcomes
Provide a safe and healthy working environment to construction workers and the public.	No complaints regarding impacts to safety and security. No reportable health and safety incidents. Compliance with the OHS Act, Construction Regulations (2014) and other relevant regulations.
Traffic	
Ensure the safety of all road users by implementing proper signage and traffic control measures. Minimise traffic disruptions.	No reports of construction vehicles using other unauthorised routes. No transporting of unsafe loads. Permits are to be obtained for abnormal loads. No speeding. No accidents.
Heritage	
To avoid damage to or destruction of previously unknown or excavated heritage resources and archaeological artefacts during construction. The preservation and appropriate management of new findings should these be discovered during construction.	No archaeological and cultural resources or graves to be damaged during construction.
Waste	
Minimise environmental impacts associated with waste.	Provision of adequate and bunded storage area for HSS. No littering on site. Maintain a clean and tidy site. 100% record of all waste generated and disposed at waste disposal facilities. Valid disposal certificates for all waste disposed. Provision of adequate waste containers that are easily accessible and maintained.

22 Aspects for Inclusion as Conditions of Authorisation

The construction of the plant must be conducted under duty of care and must be in accordance with the mitigation measures that were included in the EMPr to ensure that impacts are prevented and if they do occur, they are kept to the minimum.

The following key conditions should be included as part of the authorisation: and the following recommendations should be adhered to:

- Bulk storage of hydrocarbons and chemicals must be undertaken in a dedicated area and must include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the substances;
- No dumping of waste shall be permitted. If any spills occur, they should be immediately cleaned up;
- All vehicles shall be inspected for leaks on a regular basis. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil;
- Informal fires by construction personnel within the study area shall be prohibited;
- The SWMP incorporated into the design of the project must be implemented and infrastructure maintained in order to prevent pollution of water resources;
- No construction activities may be undertaken within the conservation wetland area and associated 30m buffer area;
- No infilling of wetlands can be undertaken without a licence from the DWS;
- All flora and fauna Species of Conservation Concern must be relocated by a qualified specialist as part of a relocation and monitoring plan prior to construction activities. Where it is not possible to relocate SCC, required permits must be obtained from Ezemvelo;
- No faunal SCC may be poached during the construction or operational phase of the project;
- Records of Stakeholder engagements must always be kept through the use of Nyanza's Complaints Register and the Grievance Redress Mechanism in Section 26.
- The applicant must appoint an ECO who will oversee the implementation of the EMPr and submit monthly compliance reports to the KZN EDTEA and DFFE;
- Annual external audits will be undertaken by an independent external auditor, who will submit annual reports to the KZN EDTEA and DFFE;
- The proposed development footprint shall be kept to a minimal;
- All hazardous storage containers, storage areas, and bunding areas for hazardous substances must comply with the relevant SANS standards to prevent leakage;
- The time in which soils are exposed during construction activities should remain as short as possible;
- It must be ensured that soil disturbance does not occur outside of the development footprint, as to ensure that further alien proliferation does not occur within the vicinity of the development footprint, which would further reduce the present ecological state of the surrounding area;
- Exotic or invasive plants shall be controlled as they emerge, as such, an alien vegetation control program must be developed and implemented within all disturbed areas;
- All areas of disturbed and compacted soils need to be ripped and reprofiled;

- No trapping or hunting of faunal species is to take place during all phases of the proposed project.
- Upon completion of construction activities, it must be ensured that indigenous vegetation is reintroduced and used for landscaping where possible.
- Regular inspection and maintenance of the 80 000 tpa TiO_2 Rutile Pigment Plant and associated infrastructure shall be undertaken during the operation phase to ensure the integrity of the plant is not compromised.
- The construction of HSS storage area as a category C will be in accordance with the conditions stipulated in the Norms and Standards for the storage of waste. Nyanza will ensure that only waste indicated in the Environmental Impact Assessment (HSS) for the Nyanza plant may be stored on site.
- The construction and further development of the plant where the HSS will be stored must be carried out under the supervision of a registered professional engineer.
- The design drawings for the plant must be approved in writing by the Department before construction and storage of HSS may commence.
- Environmental auditing and reporting
    - Nyanza must undertake monthly environmental audits to audit compliance with conditions related to this environmental authorisation and the approved EMPr and submit the report to KZN EDTEA and DFFE.
    - Nyanza must keep an incident report and complaints register, which must be made available to the external auditor, representatives of relevant departments (KZN EDTEA, DFFE, DWS) for the purpose of audit.
- Nyanza will ensure that the KZN EDTEA and DFFE must be notified as soon as the following incidents occur:
    - Any malfunction, breakdown or failure of equipment or techniques, accident or fugitive emission which has caused , is causing or may cause significant pollution; and
    - Any significant adverse environmental and health effects.
- General operation and impact management of waste management activities
- No waste may be disposed on the site. All waste produce must be collected by a registered waste management contractor and waste manifests must be kept at the site and made available on request.
- Nyanza must prevent spillages, and where the spillages occur, they will be effectively and safely cleaned.
- Nyanza must prevent the occurrence of nuisance conditions or health hazards.
- Nyanza will ensure that all personnel who work with hazardous waste are trained to deal with the potential hazardous situations so as to minimise the risks involved. Records of training and verification of competence must be kept by the Authorisation Holder.

23 Reasoned Opinion as to Whether the Proposed Activity should or should not be authorised

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements.

Following the overarching EA issued to the RBIDZ where permission was given that “some” wetlands may be infilled in turn for the preservation of a wetland which was identified for conservation purposes, the proposed project will result in the infilling of wetlands located on the property (with the exception of the conservation wetland and associated 30m buffer area). The Nyanza plant has been designed in such a way that there will be no infrastructure located within the conservation wetland and the associated 30m buffer area. Furthermore, the RBIDZ EA allows for the destruction of the forest thicket located on the property once the required permit shave been acquired. The RBIDZ is currently undertaking the application for a deforestation permit for the destruction of the forest thicket. There are offset arrangements that were made as part of the RBIDZ EIA process.

There were SCC that were identified during the 2016 EIA which have been relocated to the conservation area. There are however additional species that were identified which will require relocation. Nyanza and / or the IDZ will apply for the required permits and relocate the remaining species to the conservation area.

The findings of the impact assessment have shown that the proposed project will have negative impacts on the receiving environment, including:

- The loss of wetland habitat and ecoservices through infilling of the wetlands on the site;
- Loss and fragmentation of habitat of faunal SCC and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;
- Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the site;
- Groundwater drawdown due to the abstraction of groundwater for the creation of safe working conditions; and
- Localised nuisance noise, dust, and visual impacts;

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium-high to low significance, including:

- Stormwater management plan was incorporated into the plant design and will be implemented;
- The plant design includes multiple abatement technologies such as sophisticated scrubber systems and baghouses at storage bunkers to reduce air pollution emissions;
- Re-vegetation of the rehabilitated areas with indigenous species;
- Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project; and
- Monitoring plans, which should be implemented throughout the life of the plant, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

Furthermore, the indirect impacts from the proposed development could cause negative impacts on the surrounding natural sensitive environment, unless this is also managed and monitored in order to address adverse impacts immediately. Rehabilitation must be implemented based on best practice principles and the KZN EDTEA, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed project.

With the correct and effective mitigation and management measures, including the protection of conservation wetland located outside the plant footprint, the project could be feasible.

24 Period for which the Environmental Authorisation and Waste management Licence is required

The EA and WML are required for a period of 60 years.

25 Deviations from the Approved Scoping Report and Plan of Study

There are no deviations from the approves scoping report and plan of study.

26 Grievance Mechanism

26.1 Richard's Bay Industrial Development Zone

Stakeholders are expected to lodge grievances associated with Nyanza through the RBIDZ which has a process in place on how to handle stakeholder grievances.

26.2 Nyanza Project

This section summarises the Grievance Redress Mechanism (GRM). The GRM provides a clear description of the formal process whereby stakeholders submit a grievance or report an incident regarding the Nyanza project, through a defined process, and within a predictable timeframe, receive a response and a resolution (where possible) to the grievance. This process should be adhered to by Nyanza employees and contractors working on the project upon receipt of a stakeholder complaint.

This mechanism aims to:

- Ensure that unwanted events with negative impacts on external stakeholders are dealt with swiftly and appropriately;
- Ensure that incidents, complaints and grievances are logged and managed consistently to build trust in the legitimacy and efficiency of the procedure and system;
- Ensure that vulnerable people can log grievances in a non-threatening and accessible way;
- Allow Nyanza to identify and correct problems before they recur or escalate into more serious problems;
- Allow Nyanza to monitor and track stakeholder concerns, issues and complaints providing insight into how Nyanza is perceived by its external stakeholders;
- Provide an efficient and low-cost means of resolving disputes and providing control measures where appropriate; and
- Elevate the credibility and reputation of Nyanza by efficiently demonstrating that the concerns of external stakeholders are taken seriously.

The mechanism applies to Nyanza in addressing complaints, grievances and issues voiced by stakeholders due to perceived Nyanza impacts and/or incidents including, but not limited to, social-economic, environmental, health or safety aspects. It may be used by all stakeholders.

Nyanza has policies in place that will be used for employees and labour-related issues.

26.2.1 Monitoring Grievances

The grievance mechanism and its effectiveness must be reviewed by Nyanza's SHE and General Manager on a quarterly basis. Depending on the outcome of the review, the mechanism will be amended and disclosed to the stakeholders.

26.2.2 Awareness Training

In some cases, employees, or especially contractors, working in proximity to communities may receive grievances or complaints. Employees should therefore be familiar with the mechanism and the contact details of the SHE officer. It is necessary to train those who are likely to be involved in these situations on how to respond to aggrieved stakeholders with respect and to ensure they are given the correct information

All employees and contractors must be well-informed of the grievance procedure so that they can advise stakeholders accordingly if the need arises. Awareness-raising must be done through various means, such as the inclusion of the external grievance procedure in employee and contractor induction processes, the inclusion of the procedure in contractor tender documentation, strategically placed posters (in appropriate languages) and newsflashes for those employees and contractors who have access to e-mail. A text message broadcast (SMS) could be sent to those employees and contractors without access to e-mail. Consideration must be given to vulnerable people in raising awareness to ensure that they are aware of their rights and have access to dedicated channels in the case of women and youth.

26.2.3 Roles and Responsibilities

The Safety, Health and Environment (SHE) Officer will be responsible for the coordination and functioning of the grievance mechanism and for communicating responses and resolutions to stakeholders. Nyanza’s General Manager will be responsible for the investigation and resolution of assigned incidents or delegating investigations to an appropriate team member. Nyanza’s General Manager will be responsible for assessing the effectiveness of complaint responses, signing off on agreed resolutions, and communicating these to stakeholders in association with the community development.

Nyanza’s General Manager will be responsible for investigating stakeholder appeals. All employees and contractors will be responsible for understanding the Grievance Mechanism and upon notification of a complaint advising stakeholders of the available channels for grievance submission.

27 Undertaking of Oath by the EAP

Section 16 (1) (b) (iv), and Appendix 3 Section 2 (j) of the EIA Regulations, 2014 and amended in 2021 (promulgated in terms of the NEMA), require an undertaking under oath or affirmation by the EAP in relation to:

- The correctness of the information provided in the report;
- The inclusion of comments and inputs from stakeholders and I&APs;
- Any information provided by the EAP to I&AP's and any responses by the EAP to comments or inputs made by I&APs; and
- The level of agreement between the EAP and I&APs on the Plan of Study for undertaking the EIA.

SRK and the EAPs managing this project hereby affirm that:

- To the best of our knowledge the information provided in the report is correct, and no attempt has been made to manipulate information to achieve a particular outcome. Some information, especially pertaining to the project description, was provided by the applicant and/or their sub-contractors. In this respect, SRK's standard disclaimer pertaining to information provided by third parties applies.
- To the best of our knowledge all comments and inputs from stakeholders and I&AP's have been captured in the report and no attempt has been made to manipulate such comment or input to achieve a particular outcome. Written submissions are appended to the report while other comments are recorded within the report. For the sake of brevity, not all comments are recorded verbatim, and in instances where many stakeholders have made similar comments, they are grouped together, with a clear listing of who submitted which comment(s).
- Information and responses provided by the EAP to I&APs are clearly presented in the report. Where responses are provided by the applicant (not the EAP), these are clearly indicated.
- With respect to EIA Reports, SRK will take account of I&APs' comments and, insofar as comments are relevant and practicable, accommodate these during the EIR process.

28 Conclusion and Recommendations

SRK has undertaken the EIA for the proposed 80 000 tpa TiO_2 Rutile Pigment Plant in accordance with the requirements of the NEMA and NEM: WA. This has included a comprehensive stakeholder engagement process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in the project process and guide technical investigations that have taken place as part of the impact assessment phase of this study.

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements.

Following the overarching EA issued to the RBIDZ where permission was given that “some” wetlands may be infilled in turn for the preservation of a wetland which was identified for conservation purposes, the proposed project will result in the infilling of wetlands located on the property (with the exception of the conservation wetland and associated 30m buffer area). The Nyanza plant has been designed in such a way that there will be no infrastructure located within the conservation wetland and the associated 30m buffer area. Furthermore, the RBIDZ EA allows for the destruction of the forest thicket located on the property once the required permit shave been acquired. The RBIDZ is currently undertaking the application for a deforestation permit for the destruction of the forest thicket. There are offset arrangements that were made as part of the RBIDZ EIA process.

There were SCC that were identified during the 2016 EIA which have been relocated to the conservation area. There are however additional species that were identified which will require relocation. Nyanza and / or the IDZ will apply for the required permits and relocate the remaining species to the conservation area.

The findings of the impact assessment have shown that the proposed project will have negative impacts on the receiving environment, including:

- The loss of wetland habitat and ecoservices through infilling of the wetlands on the site;
- Loss and fragmentation of habitat of faunal SCC and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;
- Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the site;
- Groundwater drawdown due to the abstraction of groundwater for the creation of safe working conditions; and
- Air quality impacts, nuisance noise, dust, and visual impacts;

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium-high to low significance, including:

- Stormwater management plan was incorporated into the plant design and will be implemented;
- The plant design includes multiple abatement technologies such as sophisticated scrubber systems and baghouses at storage bunkers to reduce air pollution emissions;
- Re-vegetation of the rehabilitated areas with indigenous species;
- Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project;
- Develop and implement a biodiversity management plan; and

- Monitoring plans, which should be implemented throughout the life of the plant, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

Furthermore, the indirect impacts from the proposed development could cause negative impacts on the surrounding natural sensitive environment, unless this is also managed and monitored in order to address adverse impacts immediately. Rehabilitation must be implemented based on best practice principles and the KZN EDTEA, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed project.

With the correct and effective mitigation and management measures, including the protection of conservation wetland located outside the plant footprint, the project could be feasible.

An EMPr has also been developed as part of this EIA to ensure the mitigation of these impacts as far as practicable. It is anticipated that it will be possible to successfully mitigate the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented. The EMPr is considered adequate to assist the project in striving towards the principles of the NEMA.

The project team believes that the EIA undertaken for the proposed 80 000 tpa TiO_2 Rutile Pigment Plant fulfils the process requirements of the NEMA and NEM:WA. The impact assessment was tested against IFC standards and for the stage of the process was found to be in compliance with the requirements of the IFC. Where required, the process identified areas of improvement in terms of the IFC requirements. It is recommended that the proposed project be allowed to proceed under duty of care and must be in accordance with the recommendations that were included in this EIR and the accompanying EMPr.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.