APPENDIX E10 – Community Health Impact Assessment

Community Health Impact Assessment for the Proposed 750MW Combined Cycle Gas Turbine Power Plant in Richards Bay, City of uMhlathuze Local Municipality, King Cetshwayo District Municipality: Final

Prepared for

Nemai Consulting (Pty) Ltd

On Behalf of:

Mabasa Energy Fuels (Pty) Ltd

Document Detail

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EAP:	Nemai Consulting (Pty) Ltd		
Specialist:	Niara Environmental Consultants (Pty) Ltd		

Document History

Role	EAP/Author	Organisation	Date	Signature
Specialist	Vumile Ribeiro	Niara Environmental Consultants (Pty) Ltd	15 September 2026	V. Ribeiro
Client review	Donavan Henning	Nemai Consulting (Pty) Ltd		

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I Vumile Ribeiro, as duly authorised representative of Niara Environmental Consultants (Pty) Ltd., hereby confirm my independence and declare that I:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Signature of the Specialist:	V. Ribeiro
Name of Company:	Niara Environmental Consultants (Pty) Ltd
Date:	15 September 2026

Specialist Declaration of Independence

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

Specialist Information

Title of Specialist Study:	Community Health Impact Assessment for the Proposed Development of a 10784 - 750MW Combined Cycle Gas Turbine Power Plant in Richards Bay
Specialist Company Name:	Niara Environmental Consultants (Pty) Ltd
Specialist Name:	Vumile Ribeiro
Specialist Identity Number:	8605090831080
Specialist Qualifications:	BSocSc. (Geography and Environmental Management) University of KwaZulu Natal (2007); and BSocSc. Hons. (Environmental Analysis and Management) University of Pretoria (2011)
Professional Affiliation/Registration:	• Environmental Assessment Practitioners Association of South Africa (EAPASA) • EAPASA Reg. 2019/1183 • International Association of Impact Assessment South Africa (IAIASA) • Public Health Association of South Africa (PHASA) • Society of South African Geographers (SSAG) • National Association for Clean Air (NACA)
Physical Address:	Office 1 Palm Place Office Park, 22 Bram Fischer Drive, Linden, Johannesburg, 2195
Postal Address:	28 Shamrock Street, Ferndale, Randburg, 2194
Cell phone Number:	+27 82 767 2786
E-mail:	vumile@niara.co.za

Undertaking under Oath/Affirmation

I Vumile Ribeiro, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist:	V. Ribeiro
Name of Company:	Niara Environmental Consultants (Pty) Ltd
Date:	15 September 2026

Specialist Checklist

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 all specialist studies must comply with Appendix 6 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014). The table below show the requirements as indicated in this Report.

EIA REGULATIONS 2017 GNR 327, 325 and 324 Appendix 6 **CONTENT OF THE SPECIALIST REPORTS**	**In accordance with the EIA Regulations**	**Cross reference in this Report**
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	✓	Section 5 & Appendix A
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	✓	Page iii
(c) an indication of the scope of, and the purpose for which, the report was prepared	✓	Section 3
(cA) an indication of the quality and age of Base Data used for the specialist report	✓	Sections 4 & 8.8
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and the levels of acceptable change	✓	Sections 16 & 18
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	✓	Section 8.8
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	✓	Section 8
(f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	✓	Sections 14 & 8.6
(g) an identification of any areas to be avoided, including buffers;	✓	Section 8.6 & 6
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	✓	Figures 2-2, 2-3 & 15-2
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	✓	Section 4 & 9.3
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities	✓	Sections 16 & 17
(k) any mitigation measures for inclusion in the EMPr	✓	Section 16 & Section 19.8
(l) any conditions for inclusion in the environmental authorisation;	✓	Section 21.3
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	✓	Section 19
(n) a reasoned opinion—i. whether the proposed activity should be authorised;(iA) regarding the acceptability;ii. mitigation measures to be included	✓	Section 21 & Section 20
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto;	✓	Appendix B
(p) any other information requested by the competent authority	✓	None as yet

Executive Summary

Introduction

This Community Health Impact Assessment (cHIA) has been undertaken in support of the Environmental Impact Assessment (EIA) for the proposed 750 MW Combined Cycle Gas Turbine (CCGT) Power Plant to be developed by Mabasa Energy and Fuels (Pty) Ltd within Phase 1F of the Richards Bay Industrial Development Zone (RBIDZ), located in the City of uMhlathuze Local Municipality, KwaZulu-Natal. The project forms part of South Africa's energy diversification strategy under the Integrated Resource Plan (IRP 2019), which identifies natural gas as a transitional energy source capable of providing flexible, dispatchable power while reducing dependence on coal-based generation.

The proposed facility will operate as a high-efficiency combined cycle plant, incorporating gas turbines, heat recovery steam generators (HRSGs), a steam turbine, cooling systems, electrical infrastructure and associated fuel, water and waste management systems. These operational components define the actual exposure pathways assessed in this report. The project is not evaluated in abstraction, but in terms of how these systems interact with the surrounding environment and communities over time.

The use of a Community Health Impact Assessment, rather than a generic Health Impact Assessment, is necessitated by the nature of the receiving environment, the scale of the development and the presence of established community exposure pathways. The project is located within a densely industrialised and cumulatively burdened environment, where multiple emission sources, transport systems, industrial operations and residential receptors are already in interaction.

In such a context, health risks are not driven by a single project or a single exposure pathway. They are shaped by cumulative environmental loading, population vulnerability and system-level constraints, including air quality conditions, transport safety, social dynamics and healthcare capacity. IFC Performance Standard 4 requires that projects assess and manage risks to communities arising from environmental emissions, infrastructure and workforce interaction (IFC, 2012). A conventional HIA framework does not adequately address these dynamics. A cHIA is therefore required to evaluate:

- population-level exposure beyond the project boundary;
- incremental contributions to existing environmental burdens;
- interaction between environmental and social determinants of health; and
- the interface between workforce activity and surrounding communities.

Receiving Environment and Baseline Conditions

The Richards Bay area is characterised by a complex industrial-port system, including the Port of Richards Bay, heavy haul rail and road transport, bulk material handling, smelting operations, fertiliser and chemical industries, and expanding industrial activities within the RBIDZ. The surrounding environment includes both industrial land use and nearby residential communities, creating a setting where industrial and community systems are spatially and functionally integrated.

Baseline conditions confirm that the receiving environment is already under measurable environmental pressure, particularly in relation to air quality. Ambient monitoring data and modelling indicate elevated concentrations of key pollutants, including SO_2 and

particulate matter. These conditions are of direct health relevance, as ambient air pollution is strongly associated with respiratory disease, cardiovascular morbidity and premature mortality (WHO, 2021). The baseline is therefore not neutral; it represents a cumulatively stressed system, within which additional development must be assessed in terms of incremental impact.

In addition to environmental conditions, the baseline reflects socio-economic vulnerability and variability, including inequality, pressure on services and the presence of sensitive receptors such as children, the elderly and individuals with pre-existing health conditions. These factors influence how environmental exposures translate into actual health outcomes.

Primary Health Risk Pathways

The assessment identifies several key health pathways associated with the proposed Project, each of which is directly linked to specific plant operations and interactions with the receiving environment.

The most significant pathway is air quality and associated respiratory and cardiovascular health outcomes. Emissions from combustion turbines, including nitrogen oxides (NOx), sulphur dioxide (SO_2) and particulate matter, contribute to ambient air quality conditions. While the project's standalone contribution is relatively low, cumulative modelling demonstrates that exceedances of air quality standards may occur when existing and future sources are considered together. This establishes air quality as a cumulative risk pathway, where health outcomes are driven by total exposure rather than individual contributions. The WHO has confirmed that there is no safe threshold for particulate matter exposure and that even incremental increases in pollution levels are associated with adverse health effects (WHO, 2021; Burnett et al., 2018).

A second key pathway relates to traffic and injury risk. The project will increase heavy vehicle movement during both construction and operation, interacting with an existing industrial transport network. While infrastructure is designed to accommodate such activity, the introduction of additional traffic increases both the likelihood and severity of accidents, particularly where heavy vehicles interact with public road users. This represents an intensification of an existing risk, rather than the creation of a new one.

Water-related health risks are identified as conditional and event-driven, arising primarily from potential failures in stormwater, wastewater or chemical containment systems. Under normal operating conditions, exposure is expected to be minimal. However, incidents such as spills, leaks or flood-related mobilisation of contaminants may create short-term exposure pathways with health implications. This reflects the broader principle that water-related risks in industrial settings are often associated with system failure rather than continuous exposure (WHO, 2017).

Exposure to hazardous materials, noise and malodours is also assessed. Baseline conditions indicate low to moderate levels of exposure; however, the industrial context means that risk is embedded within the system, particularly in relation to chemical handling, fuel storage, electrical infrastructure and mechanical operations. Occupational exposure is the most significant component of this pathway, while community-level impacts are more likely to manifest as nuisance, annoyance or psychosocial stress.

Finally, the assessment identifies social determinants of health as a critical pathway. The project is expected to generate employment and economic benefits, but may also introduce labour influx, increased demand for services and potential social tension. These factors influence health outcomes through mechanisms such as access to healthcare, behavioural risk and psychosocial wellbeing.

The WHO recognises social determinants as fundamental drivers of health outcomes, reinforcing the need to assess these pathways alongside environmental exposure (WHO, 2008).

Cumulative Impact Assessment

The cumulative impact assessment confirms that Richards Bay operates as a multi-source exposure environment, where health outcomes are influenced by the interaction of multiple industrial activities, transport systems and socio-economic factors. These include emissions from existing industrial facilities, port operations, shipping activity, heavy haul transport and planned future developments within the RBIDZ.

Within this system, the proposed Project is not a dominant source of pollution or risk. However, it is a measurable incremental contributor, particularly in relation to air quality and traffic. The significance of impacts is therefore driven by cumulative conditions. Without mitigation, impacts are assessed as moderate to high, reflecting the sensitivity of the receiving environment. With mitigation, impacts are reduced to moderate, with residual effects remaining due to the cumulative nature of the system.

The key issue is therefore not whether the project complies in isolation, but whether it contributes to a cumulative burden that may affect health outcomes. The assessment concludes that, while the project adds to existing pressures, it does not do so at a scale that fundamentally alters the overall risk profile of the system.

Key Findings and Recommendations

This cHIA evaluates the potential health impacts associated with the proposed 750 MW CCGT Power Plant in Richards Bay, KwaZulu-Natal. The assessment is structured around the twelve Environmental Health Areas (EHAs) as defined by the International Finance Corporation (IFC), ensuring a comprehensive, pathway-based evaluation of how project activities may influence human health across environmental, social and occupational domains.

The assessment is grounded in a detailed review of specialist studies, including air quality, noise, traffic, hydrology, socio-economic and visual assessments. Each specialist input has been interrogated to determine not only what the environmental findings are, but critically, what those findings mean for human health within a cumulatively stressed industrial environment. The analysis therefore moves beyond descriptive reporting and establishes clear causal linkages between project activities, exposure pathways and health outcomes.

Integrated Specialist Findings and Health Implications

The Air Quality Impact Assessment (AQIA) identifies emissions associated with gas turbine operation, including nitrogen oxides (NOx), sulphur dioxide (SO_2), particulate matter (PM_{10}) and carbon monoxide (CO). While the modelling indicates that the project's standalone contribution to ambient concentrations is relatively low, cumulative modelling demonstrates that exceedances of ambient air quality standards are likely when existing and future industrial sources are considered together. This finding is critical, as it confirms that the Richards Bay airshed is already under pressure and that the proposed Project contributes to a cumulative exposure environment.

While cumulative modelling indicates exceedances of ambient air quality standards within the Richards Bay airshed, these exceedances are not driven by the proposed Project in isolation. The Project is designed to comply with all applicable Atmospheric Emission Licence limits and represents a relatively small incremental contribution to the overall pollutant load. As such, the Project remains compliant from a regulatory perspective, with cumulative exceedances reflecting broader regional air quality constraints rather than project-specific non-compliance.

Notwithstanding the cumulative exceedances observed within the Richards Bay airshed, the proposed Project is designed to comply with all applicable Atmospheric Emission Licence limits and does not in itself result in non-compliance with regulatory standards.

The primary exposure pathway is through the inhalation of ambient air pollutants, with dispersion occurring beyond the project boundary and affecting surrounding communities. From a health perspective, this translates into increased risk of respiratory illness, including asthma and bronchitis, as well as cardiovascular disease, particularly under conditions of repeated or prolonged exposure. Acute exposure during peak pollution events may also result in irritation and short-term respiratory symptoms. Vulnerable groups include children, elderly individuals and persons with pre-existing respiratory or cardiovascular conditions, particularly within nearby communities such as Wild en Weide and Brackenham. The significance of this impact is assessed as moderate to high prior to mitigation, driven primarily by cumulative conditions rather than project-alone emissions.

The Noise Impact Assessment indicates that predicted noise levels associated with the project remain within acceptable standards, with limited incremental impact on the surrounding acoustic environment. Baseline conditions already reflect an industrial noise profile, and the project is not expected to significantly alter this at community level. The primary exposure pathway is environmental and occupational noise exposure, with community impacts limited to potential annoyance or minor sleep disturbance under certain conditions. However, occupational exposure remains more significant, particularly in relation to prolonged exposure to elevated noise levels within the plant. As such, community-level impacts are assessed as low, while occupational impacts are considered moderate in the absence of appropriate controls.

The Traffic Impact Assessment (TIA) identifies increased traffic volumes associated with construction and operational phases, including heavy vehicle movement and increased pressure on existing road infrastructure. Exposure occurs through direct interaction with road traffic, affecting both vehicle occupants and pedestrians. The health implications include an increased risk of accidents and injuries, particularly where heavy vehicles interact with public road users. Secondary impacts include localised air pollution and stress associated with congestion and safety concerns. The most affected receptors include road users, pedestrians, nearby communities and the construction workforce. The significance of this impact is assessed as moderate, reflecting the fact that it represents an intensification of an existing risk within an industrial transport network.

The Hydrological Assessment confirms that the site drains toward a canal with wetland-like characteristics and that baseline water quality is generally acceptable. However, the assessment identifies risks associated with stormwater contamination, flooding and sediment mobilisation, particularly under failure conditions. Exposure pathways include direct contact with contaminated water, indirect ecological pathways and flood-related exposure. Health implications include the potential for waterborne disease, contamination exposure, vector breeding (particularly mosquitoes) and flood-related injuries. These risks are not continuous but are

event-driven, dependent on system performance and environmental conditions. The significance is therefore assessed as moderate if unmanaged, reducing to low with effective mitigation and control.

The Socio-Economic Impact Assessment (SEIA) identifies both positive and negative health-related outcomes associated with the project. Positive impacts include employment creation, increased income and improved access to services, which are known to enhance health outcomes. However, the assessment also identifies risks associated with labour influx, increased pressure on healthcare and housing, inequality and potential social tension. Exposure occurs through social and economic pathways, rather than direct environmental contact. Health implications include increased risk of communicable diseases (including HIV/STIs), psychosocial stress, substance abuse and pressure on public services. Vulnerable groups include low-income households, migrant workers, women, children and local service systems. The overall significance is assessed as high, reflecting the dual nature of impacts and the importance of effective social management.

The Noise Site Sensitivity Verification confirms the presence of noise-sensitive receptors within the broader area, while also indicating that the industrial character of the environment dominates the acoustic profile. This supports the conclusion that community sensitivity to noise is relatively limited, and that exposure is spatially defined by proximity to receptors. The significance of this finding is low, but it provides important validation for targeted monitoring and mitigation.

The Visual Impact Assessment indicates that the project will be located within an already industrialised landscape, with visible infrastructure extending up to approximately 3 km. Exposure occurs through visual and psychosocial pathways, influencing perception rather than direct physical health. Health implications include stress, reduced sense of place, perceived environmental risk and reduced wellbeing, particularly in communities with direct line of sight to the facility. While these impacts are not associated with physical disease, they are relevant in terms of mental and psychosocial health, particularly under cumulative industrial conditions. The significance is assessed as low to moderate.

Overall Health Risk Characterisation

The findings of this assessment confirm that the proposed CCGT Power Plant does not introduce fundamentally new health risk pathways. Instead, it contributes to the intensification of existing environmental and social pressures within a cumulatively stressed industrial system. The most critical pathway is air quality, where health outcomes are driven by cumulative exposure rather than project-alone emissions. Other pathways, including traffic, water systems and social determinants, represent context-dependent risks that are influenced by management effectiveness and system integrity.

In the absence of mitigation, several impacts—particularly those related to air quality and socio-economic conditions—are of moderate to high significance. With the implementation of appropriate mitigation measures, including emission controls, traffic management, stormwater containment and social programmes, these impacts can be reduced to moderate or low levels, and managed within acceptable limits.

Recommendations

Based on the findings of this assessment, the following overarching recommendations are made to ensure the protection of human health:

- Strict emission control and air quality management must be maintained, including continuous monitoring and alignment with broader airshed management initiatives, given the cumulative nature of air quality impacts.
- Robust stormwater and contamination control systems must be implemented and maintained to prevent event-driven exposure associated with spills, runoff and flooding.
- Comprehensive traffic management measures must be enforced, including routing, scheduling and safety controls, to reduce accident and injury risk.
- Occupational health and safety systems must be rigorously applied, with particular attention to noise, heat and hazardous material exposure within the plant environment.
- Social management programmes must be implemented to address labour influx, healthcare pressure and inequality, ensuring that positive impacts are maximised and negative outcomes are mitigated.
- Ongoing monitoring and adaptive management must be implemented across all health pathways, ensuring that emerging risks are identified and addressed in a timely manner.

Summary of Potential Health Impacts

The potential health impacts associated with the proposed Project are therefore best understood as manageable but context-sensitive, requiring continuous oversight and control. The project does not represent a dominant source of risk in isolation; however, its interaction with an already complex and burdened environment necessitates a high level of management, monitoring and accountability to ensure that health outcomes remain within acceptable limits.

Table: Integrated Specialist Findings and Health Implications

Specialist Study	Key Findings	Exposure Pathways	Human Health Implications	Key Receptors / Vulnerable Groups	Significance (Pre-Mitigation)	Significance (Post-Mitigation)	Justification for Post-Mitigation Significance
Air Quality Impact Assessment (AQIA)	Emissions of NOx, SO_2, PM_{10} and CO from gas turbine operations. Project-alone impacts are low; cumulative exceedances predicted within an already stressed airshed.	Inhalation of ambient pollutants; cumulative industrial exposure; atmospheric dispersion beyond site boundary.	Increased respiratory illness, cardiovascular disease, hospital admissions; chronic exposure risks; acute symptoms during peak events.	Children; elderly; individuals with pre-existing respiratory/cardiac conditions; nearby communities (Wild en Weide, Brackenham).	Moderate–High (cumulative-driven)	Moderate	Emission controls, efficient combustion (GE 9FA turbines), and continuous monitoring reduce project contribution. However, cumulative background pollution remains outside project control, sustaining residual risk.
Noise Impact Assessment	Predicted noise within acceptable standards; industrial baseline already elevated.	Environmental noise exposure; occupational exposure.	Minor community annoyance or sleep disturbance; occupational hearing loss risk if unmanaged.	Nearby residents (low sensitivity); workers (primary risk group).	Low (community) / Moderate (occupational)	Low (community) / Low–Moderate (occupational)	Engineering controls, PPE, and compliance with occupational standards reduce worker risk. Community noise remains low due to distance, baseline conditions and design controls.
Traffic Impact Assessment (TIA)	Increased traffic volumes and heavy vehicles; intersection pressure during construction peak.	Road traffic interaction; pedestrian exposure; vehicle emissions.	Increased accidents/injuries; pedestrian safety risk; stress; potential delays in emergency response.	Road users; pedestrians; nearby communities; construction workforce.	Moderate	Low–Moderate	Traffic management plans, routing, scheduling and safety controls reduce likelihood of incidents. Residual risk remains due to interaction with public roads and external drivers.
Hydrological Assessment	Canal with wetland characteristics; acceptable baseline water quality; risks of stormwater	Contact with contaminated water; flood pathways; ecological exposure.	Waterborne disease risk; contamination exposure; vector breeding; flood-related injuries.	Nearby communities; downstream users; environmentally dependent populations.	Moderate (if unmanaged)	Low	Effective stormwater separation, containment systems and spill prevention significantly reduce likelihood of contamination

Specialist Study	Key Findings	Exposure Pathways	Human Health Implications	Key Receptors / Vulnerable Groups	Significance (Pre-Mitigation)	Significance (Post-Mitigation)	Justification for Post-Mitigation Significance
	contamination and flooding.						events. Residual risk limited to extreme failure scenarios.
Socio-Economic Impact Assessment (SEIA)	Job creation and economic growth; labour influx; existing socio-economic vulnerability.	Social determinants; population movement; economic pathways.	Positive: improved income and access. Negative: HIV/STIs, service pressure, inequality, psychosocial stress.	Low-income households; migrant workers; women and children; local service systems.	High (positive and negative)	Moderate	Implementation of social management programmes, local hiring policies and health interventions reduces negative outcomes. However, broader socio-economic dynamics remain partially outside project control.
Noise Site Sensitivity Verification	Confirms presence of noise-sensitive receptors; industrial setting dominates.	Spatial proximity to receptors.	Validates exposure zones; confirms limited sensitivity.	Residential receptors near site.	Low	Low	No significant change post-mitigation as baseline sensitivity remains low and project contribution is minimal.
Visual Impact Assessment	Industrial visual character; visible infrastructure within ~3 km; low–moderate sensitivity.	Visual/psychosocial exposure; perception pathways.	Stress; reduced sense of place; perceived risk; reduced wellbeing.	Nearby communities; visually exposed receptors.	Low–Moderate (psychosocial)	Low	Landscape context already industrial; mitigation (design, screening where feasible) reduces perception impacts. Residual effect remains minor.

Table: Summary of Potential Health Impacts and Mitigation

This table consolidates the findings of the specialist studies and the detailed impact assessment (Chapter 16), and translates them into project-specific health impacts, clearly defined exposure pathways, practical mitigation measures and defensible residual (post-mitigation) significance ratings. The table is explicitly aligned to the actual process flow of the proposed CCGT plant, the cumulative Richards Bay context, and the Environmental Health Areas (EHAs) assessed in this report.

Health Impact (Linked to Project Activity & EHA)	Description of Impact (Project-Specific)	Primary Exposure Pathways	Mitigation Measures (Practical & Enforceable)	Post-Mitigation Significance	Justification (Linked to Baseline, Cumulative Context & Controls)
Air Quality and Cardio-Respiratory Health (EHA 2 & 12)	Emissions from GE 9FA gas turbines (NOx, SO_2, PM_{10}, CO) contribute to ambient air quality within an already stressed Richards Bay airshed. Project does not dominate emissions but contributes incrementally to cumulative exceedance conditions.	Inhalation of ambient pollutants via atmospheric dispersion; cumulative exposure from industrial, port and transport sources.	High-efficiency turbine operation; AEL compliance; continuous emissions monitoring; optimisation of combustion; integration with airshed management; rapid response to abnormal emissions.	Moderate	Project-alone impacts are low, but cumulative baseline is already elevated. Mitigation controls reduce contribution to within regulated limits, but cannot eliminate background burden. Residual risk persists due to cumulative exposure conditions beyond project control.
Short-Term Air Pollution Peaks (Acute Exposure Events)	Episodic increases in SO_2 and NO_2 during peak operations or unfavourable meteorological conditions may result in short-term exposure spikes.	Acute inhalation during peak dispersion events; localised plume exposure.	Real-time emissions monitoring; operational controls during abnormal conditions; maintenance of emission systems; alert systems for exceedances.	Low–Moderate	Frequency of events reduced through operational control; however, cumulative industrial conditions and atmospheric variability mean episodic exposure cannot be fully eliminated.
Traffic and Injury Risk (EHA 7)	Increased heavy vehicle movement during construction and operation (fuel delivery, equipment transport, workforce commuting) interacting with public road networks.	Vehicle–vehicle collisions; pedestrian–vehicle interaction; exposure to traffic-related stress and emissions.	Traffic management plan; designated haul routes; scheduling to avoid peak hours; speed controls; driver training; signage and intersection upgrades where required.	Low–Moderate	Existing road infrastructure is adequate, and controls reduce likelihood of incidents. Residual risk remains due to reliance on public roads and third-party drivers outside project control.
Stormwater and Surface Water Contamination (EHA 5)	Potential contamination from hydrocarbons, chemicals, cooling system blowdown and sediment during rainfall events or system failure.	Contact with contaminated runoff; downstream exposure; indirect ecological pathways.	Stormwater separation systems; bunded storage; oil-water separators; spill prevention and response plans; routine inspection and maintenance.	Low	Risks are event-driven and largely mitigated through engineered systems. Residual risk limited to failure scenarios or extreme rainfall events.

Health Impact (Linked to Project Activity & EHA)	Description of Impact (Project-Specific)	Primary Exposure Pathways	Mitigation Measures (Practical & Enforceable)	Post-Mitigation Significance	Justification (Linked to Baseline, Cumulative Context & Controls)
Flood-Related Health Risk (EHA 5 & 7)	Localised flooding may mobilise contaminants or create unsafe conditions around infrastructure.	Physical exposure to floodwaters; contamination pathways; vector breeding.	Site drainage design; flood risk management; maintenance of channels; emergency preparedness.	Low	Proper engineering design significantly reduces likelihood. Residual risk remains under extreme weather conditions.
Cooling Tower Aerosol and Legionella Risk (EHA 2 & 8)	Induced draft cooling tower may generate aerosolised droplets with potential for Legionella proliferation under poor management conditions.	Inhalation of aerosolised water droplets; occupational and limited community exposure.	Water treatment programmes; biocide dosing; routine microbiological testing; drift eliminators; maintenance protocols.	Low	Risk is well understood and controllable. With proper management, likelihood of exposure is minimal. Residual risk exists only under system failure conditions.
Hazardous Materials Exposure (EHA 8)	Storage and handling of fuels, lube oils, transformer oils, chemicals and diesel backup systems introduce risk of spills, leaks or accidental exposure.	Dermal contact; inhalation; ingestion through contamination pathways.	Bunded storage; handling procedures; SDS compliance; spill kits; training; emergency response plans; routine inspections.	Low	Exposure risk is controlled through standard industrial practices. Residual risk limited to accidental release events.
Occupational Health Risks (EHA 7 & 8)	Worker exposure to heat (turbines, HRSGs), noise, confined spaces, chemicals and mechanical hazards during operation and maintenance.	Direct occupational exposure (inhalation, dermal, physical injury, thermal stress).	Occupational health and safety systems; PPE; permit-to-work systems; medical surveillance; training; monitoring.	Low–Moderate	Risks are inherent to industrial operations but are significantly reduced through compliance with occupational standards. Residual risk remains due to nature of work.
Environmental Noise and Community Disturbance (EHA 8)	Noise from turbines, cooling systems and operational equipment within an already industrial acoustic environment.	Environmental noise exposure; potential sleep disturbance or annoyance.	Equipment design controls; noise attenuation; maintenance; compliance monitoring.	Low	Baseline noise already industrial; project contribution minimal. Residual impacts limited to minor annoyance under certain conditions.

Health Impact (Linked to Project Activity & EHA)	Description of Impact (Project-Specific)	Primary Exposure Pathways	Mitigation Measures (Practical & Enforceable)	Post-Mitigation Significance	Justification (Linked to Baseline, Cumulative Context & Controls)
Visual and Psychosocial Impacts (EHA 9)	Visible industrial infrastructure and plume emissions contribute to perception of industrialisation and environmental change.	Visual exposure; perception pathways; psychosocial response.	Site layout optimisation; visual integration where feasible; stakeholder engagement and communication.	Low	Landscape already industrial; incremental visual change limited. Residual impact primarily perception-based.
Social Determinants of Health (EHA 9 & 4)	Employment opportunities alongside labour influx, inequality, service pressure and behavioural risks (including HIV/STIs).	Socio-economic pathways; population movement; service demand.	Local hiring policies; worker accommodation management; health awareness programmes; community engagement; support for local services.	Moderate	Positive impacts realised; negative impacts reduced but not fully controllable due to broader socio-economic conditions beyond project influence.
Health Systems Pressure (EHA 11)	Increased demand on local clinics and emergency services during construction and operation.	Increased utilisation of healthcare services; emergency response demand.	On-site medical capability; emergency response planning; coordination with local health services.	Low–Moderate	Demand managed through planning and coordination. Residual pressure possible during peak construction phases.
Vector and Disease Risk (EHA 1 & 5)	Potential for stagnant water (stormwater systems, flooding) to create breeding conditions for mosquitoes.	Vector exposure (mosquito-borne disease pathways).	Drainage maintenance; elimination of standing water; monitoring.	Low	Risk is low under proper management; only arises under poor maintenance or unusual conditions.

The table demonstrates that the most material residual health risk remains air quality, driven by cumulative exposure within an already stressed airshed. All other pathways are either event-driven, occupationally contained, or effectively mitigated through standard engineering and management controls.

The key distinction emerging from this assessment is that the proposed Project:

- does not introduce new health risk pathways,
- but intensifies existing ones, particularly within a cumulative industrial system.

As such, the effectiveness of mitigation is not measured by elimination of impact, but by control of incremental contribution and prevention of system failure.

Monitoring, Management and Control

A comprehensive monitoring framework has been developed to ensure that health risks are actively managed and verified over time. This includes monitoring of air quality, system integrity (including stormwater and cooling systems), occupational health, traffic safety and community health indicators. Monitoring is designed to function as an adaptive management tool, enabling early detection of deviations from expected conditions and timely implementation of corrective measures.

The effectiveness of this framework is critical to the acceptability of the project. Monitoring must be continuous, responsive and linked to decision-making processes, ensuring that risks are not only identified but actively controlled.

Overall Health Significance and Acceptability

The overall health significance of the project is assessed as moderate to high in the absence of mitigation, driven primarily by cumulative air quality impacts and social determinants of health. With the implementation of mitigation measures and operational controls, the significance is reduced to moderate, with impacts considered manageable within the existing environmental and social context.

The most critical determinant of acceptability is the management of cumulative air quality impacts, which require strict emission control, ongoing monitoring and integration with broader airshed management processes.

Conclusion

Based on the findings of this assessment, the proposed 750 MW CCGT Power Plant is considered acceptable from a community health perspective, subject to strict implementation of mitigation measures, effective monitoring and ongoing adaptive management.

The project does not introduce fundamentally new health risk pathways, but it does intensify existing risks within a cumulatively stressed environment. Its acceptability is therefore conditional on maintaining operational performance, preventing system failures, managing social impacts and ensuring that its incremental contribution to environmental and health burden remains within acceptable limits.

Under these conditions, the project is not expected to result in unacceptable health outcomes and may proceed in a manner that is technically defensible, scientifically grounded and regulatorily robust.

Specialist Statement

This Community Health Impact Assessment has been prepared in accordance with internationally recognised methodologies and standards, including IFC Performance Standard 4 and WHO environmental health frameworks. The assessment is based on a comprehensive review of specialist studies, project design information, baseline data and established scientific literature.

In my professional opinion, based on the information available and the analyses undertaken, the findings and conclusions presented in this report are technically sound, scientifically defensible and appropriately reflective of the health risks associated with the proposed development within its receiving environment. The assessment has been conducted independently, and the conclusions reached represent an objective evaluation of potential health impacts.

It is my considered view that, provided the recommended mitigation measures and monitoring requirements are implemented and maintained, the proposed Project will not result in unacceptable community health outcomes and may proceed in a manner that is consistent with applicable regulatory and international good practice requirements.

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Appendix A: Specialist CV

List of Abbreviations and Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ARC	Annualised Rate Of Change
ART	Antiretroviral Drug Therapy
CO_2	Carbon Dioxide
CO	Carbon Monoxide
CBD	Central Business District
CDC	Centres For Disease Control and Prevention
cHIA	Community Health Impact Assessment
CHMP	Community Health Management Plan
CV	Curriculum Vitae
DFFE	Department Of Forestry, Fisheries and The Environment
DMRE	Department of Mineral Resources and Energy
DoH	Department Of Health
DPM	Diesel Particulate Matter
e.g	Example
EMPR	Environmental Management Programme
EAP	Environmental Assessment Practitioner
EHS	Environmental, Health and Safety
EHA	Environmental Health Areas
EIA	Environmental Impact Assessment
GBD	Global Burden Of Disease
GWMF	General Waste Management Facility
GCL	Geosynthetic Clay Layer
GPN	Good Practice Note
GHGs	Greenhouse Gases
HIA	Health Impact Assessments
HRA	Health Risk Assessment
HIV	Human Immunodeficiency Virus)
HPV	Human Papillomavirus
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPIECA	International Petroleum Industry Environmental Conservation Association
KII	Key Informant Interview
MRF	Material Recovery Facility
MMR	Maternal Mortality Ratio

CH_4	Methane
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR	Mining Right
MDR-TB	Multi-Drug Resistant Tuberculosis
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM: AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHI	National Health Insurance
NHLS	National Health Laboratory Service
NO_X	Nitrogen Oxide
NCD	Non-Communicable Disease
PM;	Particulate Matter
PAC	Potentially Affected Communities
PS	Performance Standards
PHC	Primary Health Care
PPP	Public Participation Process
SADC	Southern African Development Community
SO_2	Sulphur Dioxide
SDG	Sustainable Development Goal
TMP	Traditional Medical Practitioners
TB	Tuberculosis
WML	Waste Management Licence
WHO	World Health Organization
U5MR	Under-5 Mortality Rates
UN SDGs	United Nations Sustainable Development Goals
VOCs	Volatile Organic Compounds
YLDs	Years Lived With Disability

Glossary of Terms

Term	Definition (Project-Specific & Technical)
Acute Exposure	Short-term exposure to a pollutant or hazard, typically resulting in immediate or rapid-onset health effects such as irritation or respiratory distress.
Adaptive Management	A structured, iterative approach to managing environmental and health risks through continuous monitoring, evaluation and adjustment of mitigation measures.
Air Quality Standards (NAAQS)	Legally enforceable ambient air quality limits set to protect human health, used as a benchmark for assessing pollutant concentrations.
Airshed	A defined geographic area sharing common atmospheric conditions within which pollutants disperse and accumulate.
Ambient Air Quality	The concentration of pollutants in outdoor air within a defined environment, reflecting cumulative emissions from multiple sources.
Atmospheric Dispersion	The process by which pollutants emitted into the atmosphere are transported and diluted by wind and meteorological conditions.
Baseline Conditions	The existing environmental, social and health conditions prior to project development, used as a reference point for impact assessment.
Biocide Dosing	The controlled addition of chemicals to water systems (e.g. cooling towers) to prevent microbial growth, including Legionella.
Blowdown (Cooling Systems)	The discharge of water from cooling systems to control concentration of dissolved solids and maintain system efficiency.
Cardio-Respiratory Effects	Health impacts affecting both the respiratory and cardiovascular systems, often associated with air pollution exposure.
Chronic Exposure	Long-term or repeated exposure to a pollutant or hazard, potentially leading to cumulative health effects over time.
Combined Cycle Gas Turbine (CCGT)	A power generation technology that combines gas turbine and steam turbine systems to improve efficiency and reduce emissions.
Combustion Emissions	Pollutants released during fuel combustion, including NOx, SO_2, CO and particulate matter.
Community Health Impact Assessment (cHIA)	A structured process to evaluate potential health effects of a project on surrounding communities, considering environmental and social determinants.
Cumulative Impact	The combined effect of multiple activities or sources over time and space, influencing environmental and health outcomes beyond individual contributions.
Cumulative Burden	The total environmental and health stress experienced by a population due to multiple overlapping exposures.
Determinants of Health	Environmental, social, economic and behavioural factors that influence health outcomes.
Dispersion Modelling	A predictive tool used to estimate how pollutants spread in the atmosphere under varying conditions.

Term	Definition (Project-Specific & Technical)
Environmental Health Areas (EHAs)	A framework categorising health risks into 12 domains (e.g. air quality, water, social determinants) to structure health impact assessment.
Exposure Pathway	The route through which a person comes into contact with a hazard (e.g. inhalation, ingestion, dermal contact).
Fugitive Emissions	Uncontrolled or unintended releases of pollutants from industrial processes (e.g. leaks, handling losses).
GE 9FA Turbines	High-efficiency industrial gas turbines used in large-scale CCGT power plants, designed to optimise combustion and reduce emissions.
Health Receptor	A population or individual potentially exposed to environmental or social risks (e.g. communities, workers).
Heat Recovery Steam Generator (HRSG)	A system that captures waste heat from gas turbines to produce steam for additional power generation.
Incremental Impact	The additional effect of a project when added to existing environmental and social conditions.
Industrial Emissions	Pollutants released from industrial processes, including combustion, material handling and chemical operations.
Legionella	A bacterium that can grow in water systems and cause Legionnaires' disease when inhaled via aerosols.
Malodours	Unpleasant smells generated by industrial processes that may cause nuisance or psychosocial stress.
Mitigation Measures	Actions implemented to avoid, reduce or manage adverse environmental and health impacts.
Non-Communicable Diseases (NCDs)	Chronic diseases not transmitted between individuals, including cardiovascular disease, cancer and respiratory conditions.
NOx (Nitrogen Oxides)	A group of gases produced during combustion, associated with respiratory irritation and secondary pollutant formation.
Occupational Exposure	Exposure to hazards experienced by workers during the course of their employment.
Particulate Matter (PM_{10} / $PM_{2.5}$)	Fine airborne particles that can penetrate the respiratory system and cause adverse health effects.
Pathway-Based Assessment	An approach linking project activities to exposure routes and resulting health outcomes.
Peri-Urban Environment	A transitional zone between urban and industrial areas with mixed land uses.
Plume Dispersion	The spread of emissions from a point source (e.g. stack) into the surrounding atmosphere.
Potentially Affected Communities (PACs)	Communities located within the zone of influence of the project and potentially exposed to its impacts.
Process Flow	The sequence of operational steps within a facility, defining how materials, energy and emissions move through the system.
Psychosocial Impacts	Effects on mental health, wellbeing and perception arising from environmental or social changes.
Quantitative Risk Assessment (QRA)	A structured method for estimating the likelihood and severity of adverse health outcomes from exposure to hazards.
Receiving Environment	The environmental and social context within which a project operates and where impacts occur.
Residual Impact	The remaining impact after mitigation measures have been implemented.

Term	Definition (Project-Specific & Technical)
Richards Bay Industrial Development Zone (RBIDZ)	A designated Special Economic Zone aimed at promoting industrial and energy-related development.
Sensitive Receptors	Individuals or groups more vulnerable to environmental exposure (e.g. children, elderly, medically compromised individuals).
Social Determinants of Health	Conditions such as income, employment, education and access to services that influence health outcomes.
Stack Emissions	Pollutants released from a controlled point source, typically through a chimney or stack.
Stormwater Management System	Infrastructure designed to control runoff, prevent contamination and manage flood risk.
Thermal Stress	Physiological strain caused by exposure to high temperatures, particularly in occupational settings.
Toxicological Assessment	Evaluation of the health effects of chemical exposures based on dose-response relationships and exposure pathways.
Traffic Impact Assessment (TIA)	A study evaluating how project-related traffic affects road safety, congestion and transport systems.
Vulnerable Groups	Populations at increased risk due to age, health status, socio-economic conditions or environmental exposure.
Wastewater Management	Systems and processes used to treat and dispose of contaminated water from industrial operations.
Zone of Influence (ZoI)	The geographic area within which project-related impacts may occur.

1 Introduction

The development of large-scale energy infrastructure plays a critical role in supporting economic growth, strengthening energy security and enabling industrial development. At the same time, such developments may influence environmental and social conditions in ways that can affect the health and well-being of surrounding communities. Understanding and managing these interactions between development activities, environmental conditions and human health is therefore an essential component of responsible project planning and environmental decision-making.

South Africa's electricity sector has experienced significant supply constraints over the past decade, prompting national policy interventions aimed at diversifying the country's energy mix and introducing new generation capacity. The Integrated Resource Plan for Electricity 2019 (IRP 2019) identifies natural gas as an important component of the future energy mix due to its ability to provide flexible generation capacity that can complement renewable energy technologies while producing lower emissions compared to conventional coal-fired power generation. In support of this policy direction, the Gas Independent Power Producers Procurement Programme (GASIPPPP) has been established to facilitate private sector investment in gas-fired electricity generation projects.

Within this context, Mabasa Energy and Fuels (Pty) Ltd (hereafter referred to as the Applicant) proposes the development of a 750 MW Combined Cycle Gas Turbine (CCGT) Power Plant within Phase 1F of the RBIDZ, located in the City of uMhlathuze Local Municipality in KwaZulu-Natal Province. The RBIDZ has been established as a strategic industrial development zone designed to attract large-scale investment in energy, logistics and manufacturing industries due to its proximity to the Port of Richards Bay, existing transport corridors and established bulk infrastructure networks. The proposed development therefore aligns with both national energy policy objectives and regional economic development strategies aimed at positioning Richards Bay as a major industrial and energy hub.

The development of the proposed Project is subject to an Environmental Impact Assessment (EIA) process in terms of the Environmental Impact Assessment Regulations, 2014 (as amended) promulgated under the National Environmental Management Act (Act 107 of 1998). Nemai Consulting (Pty) Ltd has been appointed as the Environmental Assessment Practitioner (EAP) responsible for undertaking the Scoping and Environmental Impact Reporting (S&EIR) process and coordinating the suite of specialist studies required to inform the environmental assessment. As part of this process, Niara Environmental Consultants (Pty) Ltd has been appointed to undertake a Community Health Impact Assessment (cHIA) in order to evaluate the potential implications of the proposed development for community health and well-being.

Large-scale industrial developments such as gas-fired power plants may influence a range of environmental and social determinants of health. These determinants include factors such as air quality, noise levels, traffic patterns, occupational safety, environmental pollution, and broader socio-economic changes associated with infrastructure development. These changes may influence community health through a range of exposure pathways, potentially resulting in both positive outcomes, such as employment opportunities and improved local economic conditions, and potential adverse impacts if environmental or safety risks are not appropriately managed.

The purpose of the cHIA is therefore to systematically identify, evaluate and manage the pathways through which the proposed Project may influence the health of surrounding communities during the construction and operational phases of the development.

The assessment also considers opportunities to enhance positive health outcomes associated with economic development and infrastructure investment in the region.

This assessment has been undertaken in accordance with internationally recognised good practice for health impact assessment, including approaches recommended by the World Health Organization (WHO) and the International Finance Corporation (IFC). These frameworks emphasise the importance of understanding how environmental, social and economic changes associated with development projects may influence community health, particularly for vulnerable populations. Within this assessment, potential health impacts are evaluated using a structured framework based on Environmental Health Areas (EHAs), which allows for the systematic identification of exposure pathways linking project activities to potential health outcomes.

The findings of this cHIA contribute to the broader environmental decision-making process by ensuring that community health considerations are appropriately integrated into the planning, design and management of the proposed power plant.

1.1 Background and Project Context

Richards Bay has developed into one of South Africa's most significant industrial and logistics centres due to its strategic coastal location and the presence of the Port of Richards Bay, the largest bulk export port in Africa. Over several decades, the area has attracted a concentration of heavy industries, including aluminium smelting, mineral processing, bulk commodity handling and associated logistics infrastructure. This industrial base has played an important role in supporting regional economic development and export-driven growth in KwaZulu-Natal.

In order to further strengthen industrial investment and economic development in the region, the RBIDZ was established as SEZ designed to attract both domestic and international investors. The RBIDZ provides a platform for large-scale industrial projects through the provision of serviced industrial land, access to port and transport infrastructure, and a regulatory environment aimed at facilitating industrial development. As a result, the zone has become a focal point for strategic sectors such as energy generation, manufacturing, logistics and mineral beneficiation.

The continued development of the RBIDZ forms part of broader national and provincial strategies aimed at strengthening energy infrastructure and industrial capacity within South Africa. Richards Bay has increasingly been identified as a suitable location for energy-related infrastructure due to its proximity to port facilities, industrial energy demand and established transmission networks. Consequently, several energy projects have been proposed within the region as part of broader efforts to expand electricity generation capacity and support industrial growth.

The proposed 750 MW CCGT Power Plant is one such development and is planned within Phase 1F of the RBIDZ. The project represents an investment in new electricity generation infrastructure intended to contribute to national energy supply while supporting the continued industrial development of the Richards Bay region. Given the scale and industrial nature of the proposed facility, it is necessary to understand the broader environmental, economic and social context within which the project will be developed, particularly in relation to existing industrial activities and surrounding communities.

This broader development context is important for the Community Health Impact Assessment, as the health implications of new industrial infrastructure must be considered alongside existing environmental conditions and cumulative industrial pressures within the Richards Bay area. Understanding the regional industrial setting therefore provides an essential foundation for evaluating how

the proposed development may interact with existing environmental conditions and influence the health and well-being of nearby communities.

1.2 Special Economic Zones

In energy and logistics, policy decisions at national level are having a spinoff for KwaZulu-Natal as Richards Bay continues to build its energy portfolio and a major international ports operator has been brought on board as a partner at the Port of Durban. Additional Special Economic Zones are planned to bolster textile and leather manufacturing.

The Provincial Government of KwaZulu-Natal has created a KZN Energy War Room. Over and above the interventions into energy efficiency of government buildings and investments in things like solar panels and plans to continue rolling out electricity connections to previously unserviced households, the administration intends turning Richards Bay into an energy hub.

This ambition received a big boost in 2023 with the decision by the National Energy Regulator of South Africa to approve Eskom's application to build a 3 000 MW gas power station at Richards Bay. Battery storage has made a debut in the province as well. South Korean firm Hyosung Heavy Industries has signed on to implement the Eskom project to create a battery energy storage system, in this instance in the uMgungundlovu District Municipality.

In the 2023 State of the Province Address, Premier Nomusa Dube-Ncube said that, in addition to the R97-billion Eskom project, the following facilities would be established at the deepsea port:

- Mabasa Energy and Fuels, R10-billion;
- NFE BGE Gas Supply, R25-billion; and
- Phakwe RBGP, R34-billion.

The provincial government is working on an investment pipeline, through the Special Economic Zones (SEZs), of R22-billion. The SEZs at Richards Bay and King Shaka International Airport (the Dube TradePort) are key components of the strategy and are now well-established nodes of investment.

Milestones have been reached in the plan for creating further SEZs to focus on leather and textiles. A business case has been completed by units within the provincial government and land at Ezakheni (Ladysmith) in the uThukela District has been identified and secured. Dube TradePort will be the SEZ operator and R780 million in investments has been pledged by companies keen to relocate to the SEZ. To spread the benefits of the SEZ, the concept of "The Textile Belt" will be followed.

The corridor approach will leverage comparative advantages of various regions in the clothing and textile value chain. This belt will start from Newcastle and link Ladysmith, Mooi River, Pietermaritzburg, Hammarsdale, Durban, Isithebe and the Dube TradePort to the Richards Bay Industrial Development Zone. Infrastructure upgrades at Madadeni, Isithebe and Ezakheni have been completed, which went some way to creating jobs and which will create a more conducive environment for investors.

Tourism is a key sector in the KwaZulu-Natal economy and provides livelihoods to many thousands of families in urban and rural areas. The closing of borders brought real hardship to many areas. A number of flights have been resumed to King Shaka International Airport by the likes of Turkish Airlines and a new flight has been inaugurated by SA Airlink, connecting the province to Zimbabwe.

1.2.1 Richards Bay Industrial Development Zone

The RBIDZ was established as a strategic industrial development initiative aimed at strengthening regional economic growth and positioning the Richards Bay area as a major industrial and export hub within South Africa. The RBIDZ seeks to attract large-scale investment into key sectors such as energy generation, mineral and metal processing, manufacturing, logistics and maritime industries. Through the development of serviced industrial land and supporting infrastructure, the zone is intended to facilitate industrial expansion, stimulate economic activity and contribute to broader national objectives related to industrialisation and economic diversification.

A key objective of the RBIDZ is to promote economic development in the region by creating an enabling environment for both domestic and international investors. This includes the development of high-quality industrial infrastructure such as roads, utilities, bulk services and logistics facilities that support large-scale industrial operations. In addition to supporting industrial investment, the zone also aims to promote job creation by attracting industries that require both skilled and semi-skilled labour, thereby contributing to employment opportunities for surrounding communities. The RBIDZ further seeks to strengthen South Africa's export capacity by establishing a manufacturing and processing hub capable of producing goods for international markets, while promoting environmentally responsible industrial practices and the adoption of cleaner technologies within the zone.

The RBIDZ provides a number of advantages to investors operating within the zone. These include access to various investment incentives designed to encourage industrial development, such as favourable tax arrangements, customs duty exemptions on imported goods and other forms of financial support aimed at reducing the cost of investment. The strategic location of the RBIDZ adjacent to the Port of Richards Bay provides direct access to international shipping routes and established transport corridors, significantly enhancing the logistical efficiency of export-oriented industries. In addition, collaboration between the RBIDZ and local educational and training institutions supports the development of a skilled workforce capable of meeting the labour requirements of industries operating within the zone.

Since its establishment, the RBIDZ has played an important role in driving economic activity within the Richards Bay region by attracting substantial investment and supporting the growth of new industries. The development of the zone has contributed to regional economic growth, increased employment opportunities and improved socio-economic conditions within surrounding communities. Furthermore, the RBIDZ has supported the diversification of the local industrial base by facilitating the establishment and expansion of industries across a range of sectors. At the same time, the development of the zone has been guided by a commitment to environmentally responsible industrial practices to ensure that economic growth occurs in a manner that minimises potential impacts on surrounding ecosystems and communities.

Overall, the RBIDZ represents a significant component of South Africa's broader economic development strategy. By attracting investment, strengthening industrial capacity and supporting infrastructure development, the zone continues to play a key role in shaping the economic landscape of the Richards Bay region while contributing to national objectives related to economic growth, industrial development and sustainable development.

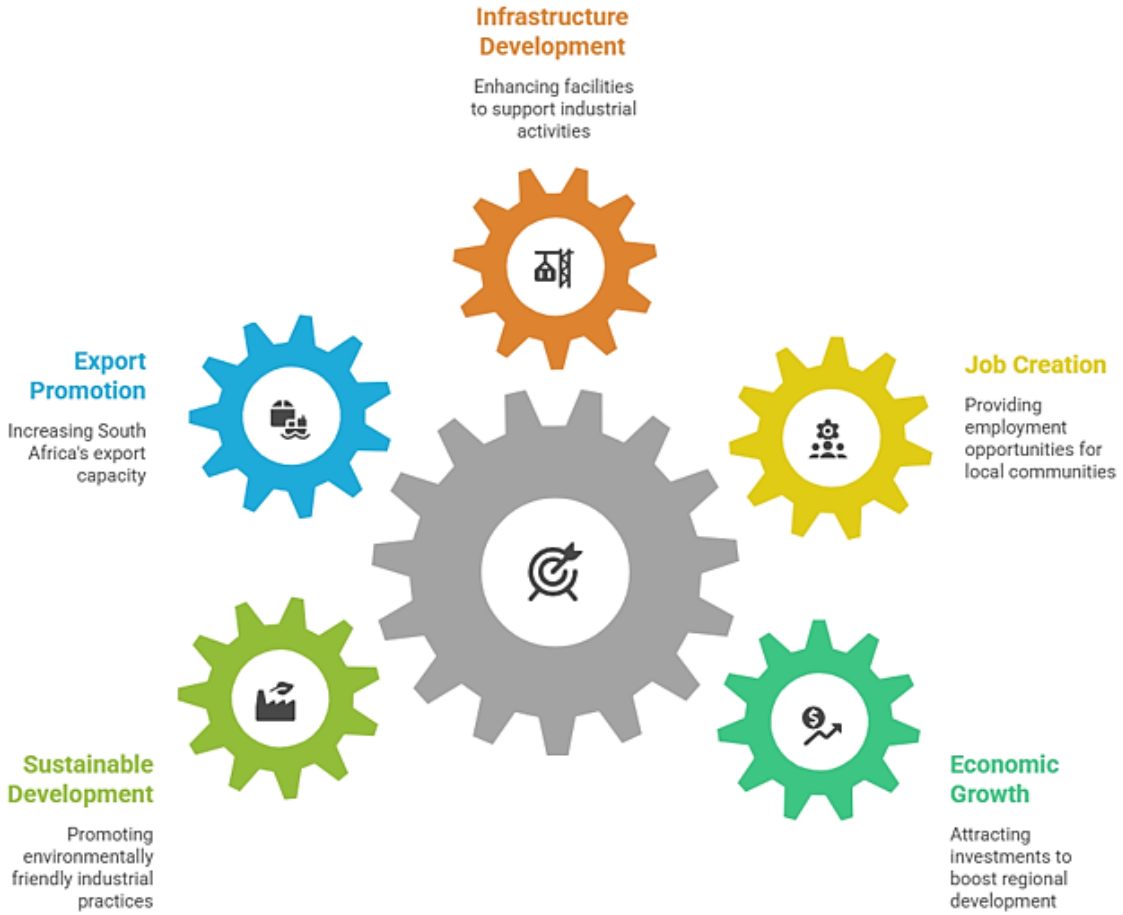


Figure 1-1: RBIDZ Objectives and Impacts

The RBIDZ is a vital initiative that supports South Africa's economic growth by attracting investments, creating jobs, and promoting industrial development. Its strategic location, investor-friendly incentives, and commitment to sustainability make it an attractive destination for both local and international businesses. As the RBIDZ continues to develop, it is expected to further enhance the economic and social landscape of the Richards Bay area and contribute to the broader goals of national economic development.

1.2.2 Special Economic Zones and Community Health

SEZs are designated geographic areas established to promote industrial development, attract investment and stimulate economic growth through targeted infrastructure development and investment incentives (Department of Trade, Industry and Competition, 2021). In South Africa, SEZs are governed by the Special Economic Zones Act, 2014 (Act No. 16 of 2014), which aims to support industrialisation and regional economic development.

One of the key SEZs in South Africa is the RBIDZ, located in the City of uMhlathuze Local Municipality, KwaZulu-Natal. The RBIDZ is strategically located adjacent to the Port of Richards Bay, the largest bulk export port in Africa, and has been established to attract investment in sectors such as energy generation, mineral processing, logistics and heavy industry (RBIDZ, 2023).

The development of SEZs such as the RBIDZ has important implications for community health and wellbeing. Industrial expansion within these zones can generate positive social determinants of health, including employment opportunities, improved infrastructure,

skills development and increased household income. These factors are widely recognised as key determinants influencing population health outcomes and quality of life (World Health Organization, 2014).

At the same time, large-scale industrial development may also introduce environmental health risks if not appropriately managed. Industrial facilities can generate environmental stressors including:

- atmospheric emissions;
- industrial noise and vibration;
- increased heavy vehicle traffic;
- hazardous material handling;
- changes in land use patterns and population dynamics.

These environmental and social stressors may influence health outcomes through exposure pathways such as air pollution, noise exposure, injury risk, and psychosocial stress, particularly for communities located in close proximity to industrial areas (IFC, 2009; WHO, 2014).

The Richards Bay region represents one of South Africa's largest industrial clusters, hosting aluminium smelters, mineral processing facilities, port operations and associated logistics infrastructure. Communities surrounding the RBIDZ therefore exist within an environment where existing industrial emissions and environmental pressures may already influence baseline environmental health conditions.

National energy policy has further reinforced the strategic importance of the Richards Bay region. The Integrated Resource Plan for Electricity 2019 (IRP 2019) identifies natural gas as a key component of South Africa's future energy mix, recognising its role in improving energy security and supporting a transition toward lower-carbon electricity generation (Department of Mineral Resources and Energy, 2019).

As part of this strategy, several gas-to-power projects have been proposed in the Richards Bay region. These developments form part of a broader provincial initiative to position Richards Bay as a regional energy hub within KwaZulu-Natal.

The proposed 750 MW CCGT Power Plant falls within this broader development context and will be located within the RBIDZ. While the project is expected to contribute positively to regional economic development and energy security, it is also necessary to evaluate the potential health implications associated with the construction and operation of additional energy infrastructure within an already industrialised environment.

For this reason, the cHIA considers the proposed Project within the broader industrial and environmental context of the RBIDZ and surrounding communities. This approach allows the assessment to evaluate both:

- potential positive health determinants, such as employment and economic development; and
- potential environmental health risks, including exposure to air emissions, noise, industrial hazards and cumulative industrial impacts.

Understanding the role of the RBIDZ as a major industrial and energy development zone is therefore essential for evaluating the baseline environmental health context, cumulative exposure pathways and potential health outcomes associated with the proposed Project.

1.2.3 Energy Policy Context

South Africa's electricity sector has undergone significant reform in recent years in response to persistent supply constraints and increasing electricity demand. Following the promulgation of the Integrated Resource Plan 2019 (IRP 2019), the Minister of Mineral Resources and Energy determined that the procurement of new electricity generation capacity is required to ensure national energy security.

The IRP 2019 specifically identifies natural gas as a strategic component of South Africa's future energy mix, recognising its potential to provide flexible and dispatchable generation capacity capable of stabilising the national electricity grid while supporting the transition towards lower-carbon energy sources (Department of Mineral Resources and Energy, 2019).

In line with this policy framework, the Minister determined that approximately 3000 megawatts (MW) of new generation capacity would be procured from gas-fired power generation technologies. In response, the Department of Mineral Resources and Energy (DMRE) formally invited interested parties in December 2023 to register prospective bids under the first bid window of the Gas Independent Power Producers Procurement Programme (GASIPPPP Bid Window 1).

Under this procurement programme, 2000 MW of generation capacity will be procured in the first bid window from projects supplying new generation capacity, ancillary services and energy output produced from gas-fired electricity generation technologies. The GASIPPPP specifically targets land-based electricity generation facilities utilising natural gas, located anywhere within the borders of the Republic of South Africa.

1.2.4 Project Overview

Mabasa Energy and Fuels (Pty) Ltd (hereafter "Mabasa Energy") is a company involved in the engineering, construction, operation, maintenance and management of facilities for the generation, transmission, sale and distribution of electrical power, as well as the marketing and distribution of liquid fuel and petrochemical products.

Mabasa Energy intends to bid for the Gas Independent Power Producers Procurement Programme (GASIPPPP) and has therefore proposed the development of a 750 MW CCGT Power Plant in Richards Bay (hereafter referred to as the "Proposed Project").

The proposed facility will be located on Portion of Erf 16673 within Phase 1F of the RBIDZ, which falls within the City of uMhlathuze Local Municipality in KwaZulu-Natal. The RBIDZ forms part of a designated Special Economic Zone aimed at promoting industrial development, investment and economic growth linked to the Port of Richards Bay.

Nemai Consulting (Pty) Ltd has been appointed by the Applicant to undertake the Scoping and Environmental Impact Reporting (S&EIR) Process for the Proposed Project in accordance with the Environmental Impact Assessment Regulations, 2014 (as amended) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The proposed development will also require additional environmental approvals, including an Atmospheric Emission Licence (AEL) in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) due to potential atmospheric emissions associated with gas turbine operations.

As part of the broader EIA process, Nemai Consulting has appointed Niara Environmental Consultants (Pty) Ltd (hereafter "Niara") to undertake a cHIA for the proposed development.

The purpose of this Community Health Impact Assessment is to evaluate the potential health implications associated with the construction, operation and decommissioning of the proposed 750 MW CCGT Power Plant.

The cHIA aims to:

- Identify potential pathways through which project activities may influence community and worker health;
- Assess baseline health conditions within potentially affected communities;
- Evaluate direct, indirect and cumulative health impacts associated with the proposed development;
- Identify vulnerable or sensitive population groups that may be disproportionately affected by project activities;
- Recommend mitigation measures and management interventions to minimise adverse health impacts and enhance potential health benefits; and
- Inform the Environmental Management Programme (EMPr) and project environmental management framework.

This assessment adopts a cHIA approach consistent with international good practice, including the International Finance Corporation (IFC) Good Practice Note on Health Impact Assessment and IFC Performance Standard 4: Community Health, Safety and Security (IFC, 2009; IFC, 2012).

The assessment applies the EHA framework, which recognises that health outcomes are influenced by complex interactions between environmental exposures, social determinants and health system capacity (Winkler et al., 2013).

The following EHAs were considered as part of this assessment:

- EHA #1 – Vector-related Diseases
- EHA #2 – Acute Respiratory Infections and Respiratory Effects
- EHA #3 – Veterinary Medicine and Zoonotic Diseases
- EHA #4 – Sexually Transmitted Infections, including HIV/AIDS
- EHA #5 – Soil-, Water- and Waste-related Diseases
- EHA #6 – Food and Nutrition-related Issues
- EHA #7 – Accidents and Injuries
- EHA #8 – Exposure to Hazardous Materials, Noise and Malodours
- EHA #9 – Social Determinants of Health
- EHA #10 – Cultural Health Practices
- EHA #11 – Health Systems Issues
- EHA #12 – Non-Communicable Diseases

This cHIA evaluates both environmental exposures and broader social determinants of health, ensuring a holistic understanding of potential health impacts associated with the Proposed Project.

2 Project Locality

The proposed 750 MW CCGT Power Plant will be developed within the RBIDZ located in the City of uMhlathuze Local Municipality, within the King Cetshwayo District Municipality, KwaZulu-Natal Province, South Africa. The earmarked site is located on Erf 16673 in Phase 1F of the RBIDZ (see Figure 2-1 below), under a long-term lease agreement.

Richards Bay is one of the largest industrial hubs in South Africa and forms a key component of the national logistics and energy infrastructure network due to the presence of the Port of Richards Bay, which is the largest bulk export port in Africa. The region

hosts a concentration of heavy industries including aluminium smelting, mineral processing, fertiliser production, petrochemical operations and energy infrastructure.

The proposed Project site is located on Portion of Erf 16673 within Phase 1F of the RBIDZ, approximately 1.5 km north-west of the Richards Bay Central Business District (CBD). The RBIDZ forms part of a designated SEZ aimed at promoting industrial development, foreign investment and economic growth within the region.

The location of the proposed development within an established industrial zone significantly influences the environmental and social context of the project. The surrounding area is characterised by:

- Existing heavy industrial activities;
- Established transportation infrastructure including national and regional road networks;
- Rail corridors linking the port to inland mining regions;
- Urban and peri-urban residential settlements.

Despite the industrial character of the area, a number of residential communities, social infrastructure facilities and ecological receptors are located within the broader project region. Consequently, the assessment of potential community health impacts must consider both existing industrial exposure levels and the potential incremental impacts associated with the proposed power generation facility.

2.1 Local Setting

At the local scale, the project site is located within the Alton industrial area, which forms part of the broader RBIDZ industrial complex. The area is characterised by existing industrial facilities, transportation corridors and supporting infrastructure associated with port and industrial operations.

The surrounding urban environment includes several established residential suburbs and communities located within a radius of approximately 10 km of the proposed Project site. These communities include both formal residential suburbs and peri-urban settlements.

Key residential areas in proximity to the proposed development include:

- Wild en Weide
- Brackenham
- Veld en Vlei
- Arboretum
- Birdswood
- Aquedene
- Alton
- Meer en See
- Greenhill
- Nseleni
- Empangeni
- Sebokwe

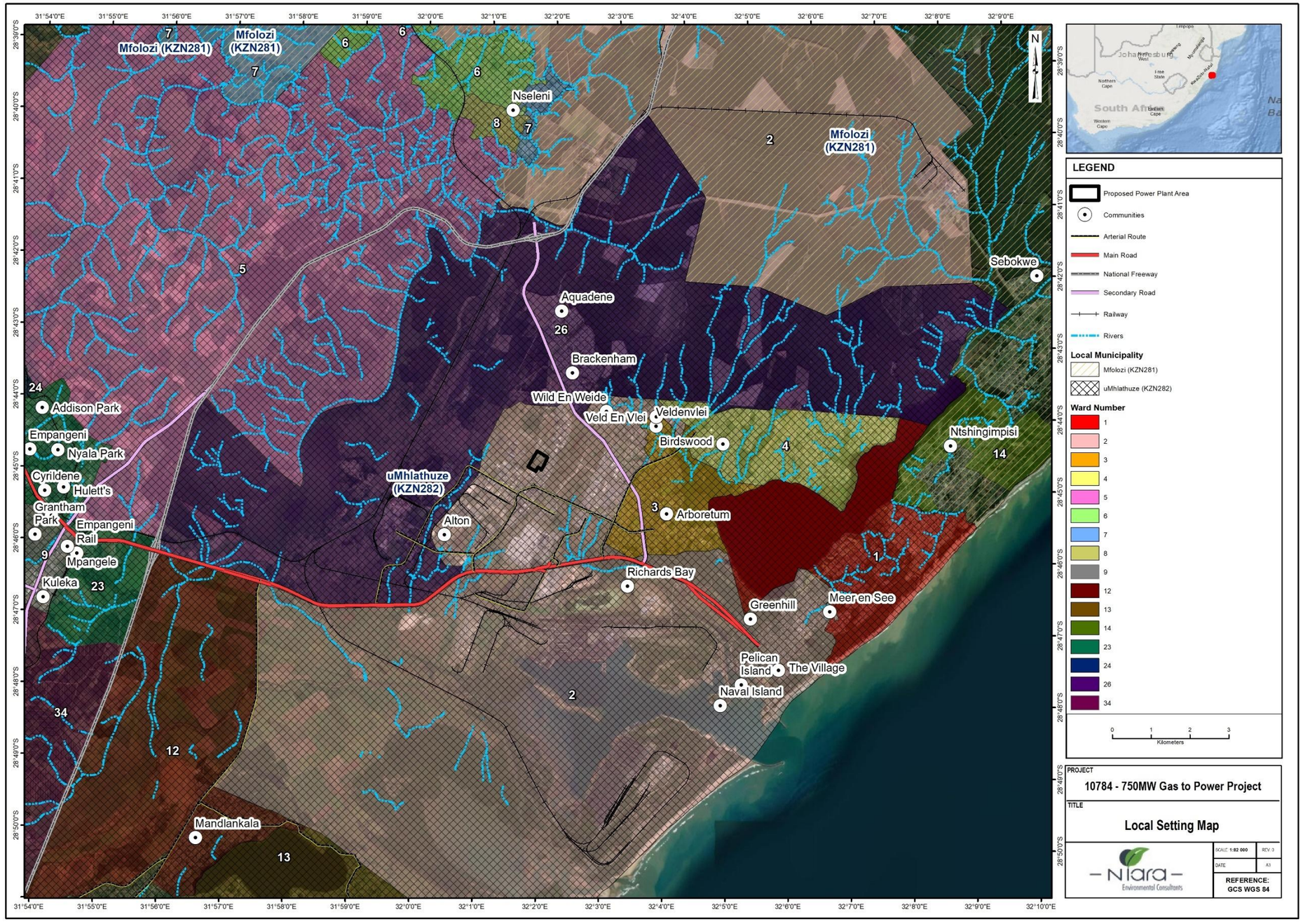


Figure 2-1: Local Setting

These communities vary significantly in terms of population density, socio-economic status, access to healthcare infrastructure and environmental exposure profiles.

The area also contains several sensitive social receptors, including schools, healthcare facilities and community infrastructure. Key health facilities in the vicinity include:

- Richards Bay Municipal Clinic
- Civic Centre Clinic
- CarePoint Industrial Health Services
- Mandlazini Clinic
- Medicross Medical Centre
- Greenhill Medical Centre

Educational facilities located within the broader study area include multiple primary and secondary schools serving surrounding communities.

In addition to social infrastructure, the area also includes ecological features such as the Enseleni Nature Reserve and Richards Bay Game Reserve, which contribute to the ecological sensitivity of the region.

2.2 Property Description

The proposed development will be located on Erf 16673, situated within Phase 1F of the RBIDZ in the King Cetshwayo Magisterial District, KwaZulu-Natal. The property forms part of the planned industrial land parcels within the RBIDZ that have been designated for large-scale industrial and energy-related developments. The site is strategically positioned within an established industrial precinct and lies approximately 1 km from nearby residential areas including Brackenham, Aquadene, Veld en Vlei and Wild en Weide.

The property is located within a fully serviced industrial development zone that provides access to essential infrastructure such as internal access roads, electricity distribution networks, bulk water supply and industrial services required to support large-scale industrial operations. The location within Phase 1F of the RBIDZ places the site within an area that has been specifically planned for industrial expansion and strategic investment in sectors such as energy generation, logistics and manufacturing.

The proximity of the property to the Port of Richards Bay, major transportation corridors and existing industrial infrastructure makes the site suitable for energy infrastructure development. At the same time, the presence of surrounding residential communities within the broader project area necessitates a careful assessment of potential environmental and social impacts, including potential implications for community health and well-being. The spatial relationship between the proposed development site, surrounding industrial activities and nearby communities therefore forms an important consideration in the assessment of potential environmental and health impacts associated with the project.

Table 2-1: Property Details

Farm Name	Erf 16673
Application area	Phase 1F of the Richards Bay Industrial Development Zone (RBIDZ)
Magisterial district	King Cetshwayo Magisterial District
Distance and direction from nearest town	1km away from Brackenham, Aquadene, Veld en Vlei & Wild en Weide

21-digit Surveyor General Code for each farm portion	

2.3 Zone of Influence

The Zone of Influence (ZoI) defines the geographic area within which project activities may result in potential environmental, social or health impacts.

For the purposes of this Community Health Impact Assessment, the Zone of Influence has been defined using concentric buffer distances extending up to 10 km from the proposed Project footprint. These buffers are illustrated in Figure X (Zone of Influence Map) and represent areas within which potential health determinants may be influenced by the proposed development.

The following spatial zones were defined:

Table 2-2: ZoI

Zone	Distance from Project Site	Description of Influence	Potential Health Pathways / Impact Types	Communities Located within Zone
Primary Zone	0–2 km	Area of direct influence where project-related impacts may be most pronounced during construction and operation.	Construction-related disturbances; industrial noise; air emissions from operational activities; increased traffic movements; occupational health and safety risks.	Alton; Wild en Weide; Brackenham; Veld en Vlei
Secondary Zone	2–5 km	Area where environmental impacts may still be detectable, but generally at lower intensity compared to the primary zone.	Exposure to air pollutants; noise propagation; increased traffic volumes; socio-economic changes associated with employment and labour influx.	Arboretum; Birdswood; Aquedene; Richards Bay Central
Broader Influence Zone	5–10 km	Area where indirect and cumulative impacts associated with the project may occur.	Socio-economic effects such as employment opportunities; increased demand on healthcare services; population movement and labour migration; cumulative exposure to regional industrial emissions.	Nseleni; Empangeni; Meer en See; Greenhill; Sebokwe; Ntshingimpisi

This spatial framework enables the assessment to consider both direct environmental exposures and broader socio-economic determinants of health that may be influenced by the project.

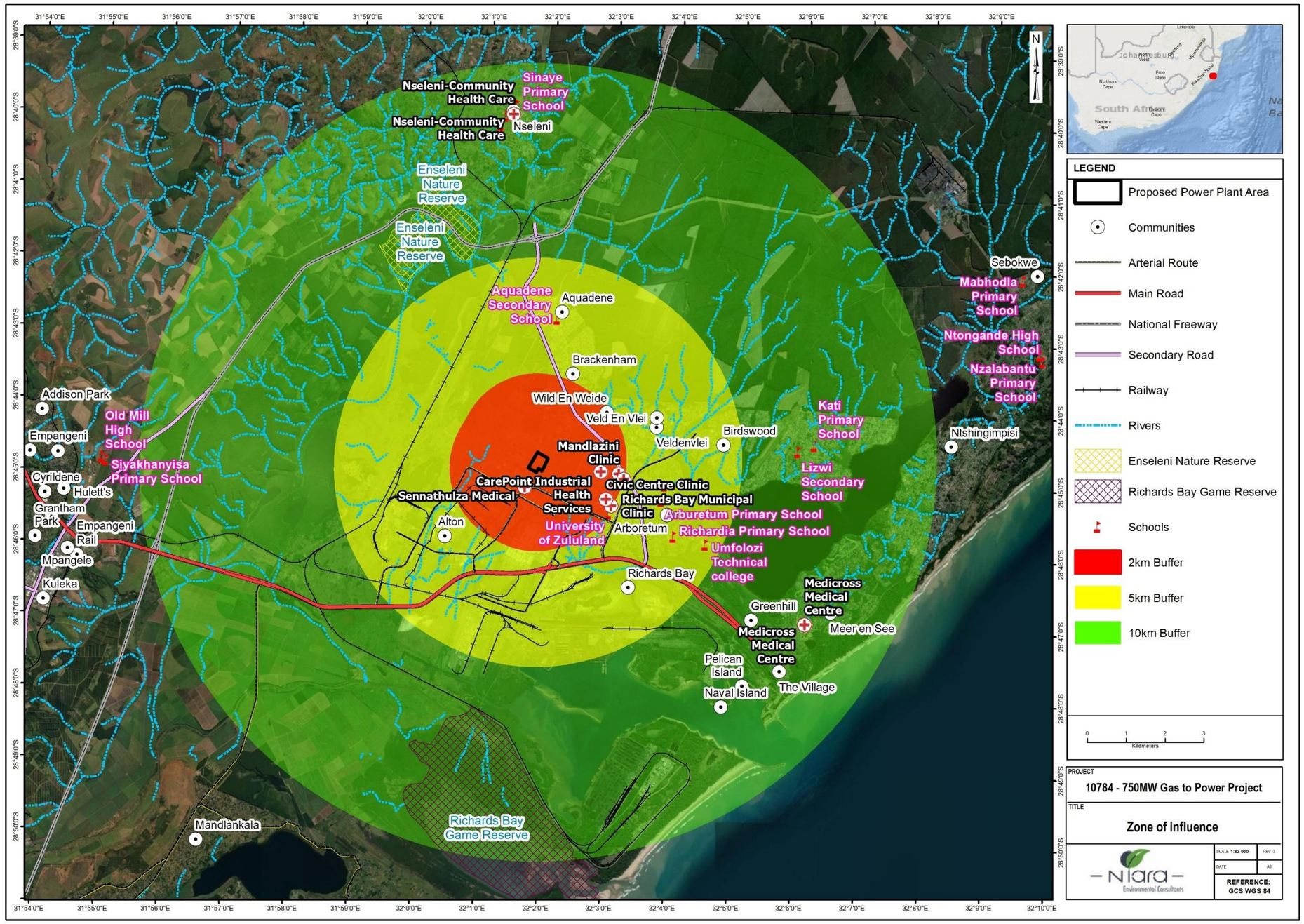


Figure 2-2: Zone of Influence

2.4 Potentially Affected Communities

Potentially Affected Communities (PACs) refer to communities located within the project's ZoI that may experience direct, indirect or cumulative impacts associated with the proposed development.

PACs were identified based on:

- Proximity to the project site;
- Population distribution;
- Presence of sensitive receptors;
- Environmental exposure pathways;
- Socio-economic linkages to the project.

Based on the spatial analysis presented in Figure X (Potentially Affected Communities Map), the following communities were identified as PACs:

Table 2-3: PACs

Category of Potentially Affected Communities (PACs)	Distance from Project Site	Nature of Potential Impacts	Communities
Primary PACs	2–5 km	Communities most likely to experience direct environmental exposures, including potential impacts from air emissions, noise propagation, traffic movements and industrial activities associated with the project.	Wild en Weide; Brackenham; Veld en Vlei; Alton
Secondary PACs	5–10 km	Communities that may experience indirect environmental and socio-economic impacts, including exposure to lower levels of air pollutants, increased traffic activity, and broader socio-economic changes linked to the project.	Arboretum; Birdswood; Aquedene; Meer en See; Greenhill
Tertiary PACs	>10 km / Regional Context	Communities located within the broader regional context that may experience indirect socio-economic effects, such as employment opportunities, labour migration and regional economic development associated with the project.	Nseleni; Empangeni; Sebokwe; Ntshingimpisi

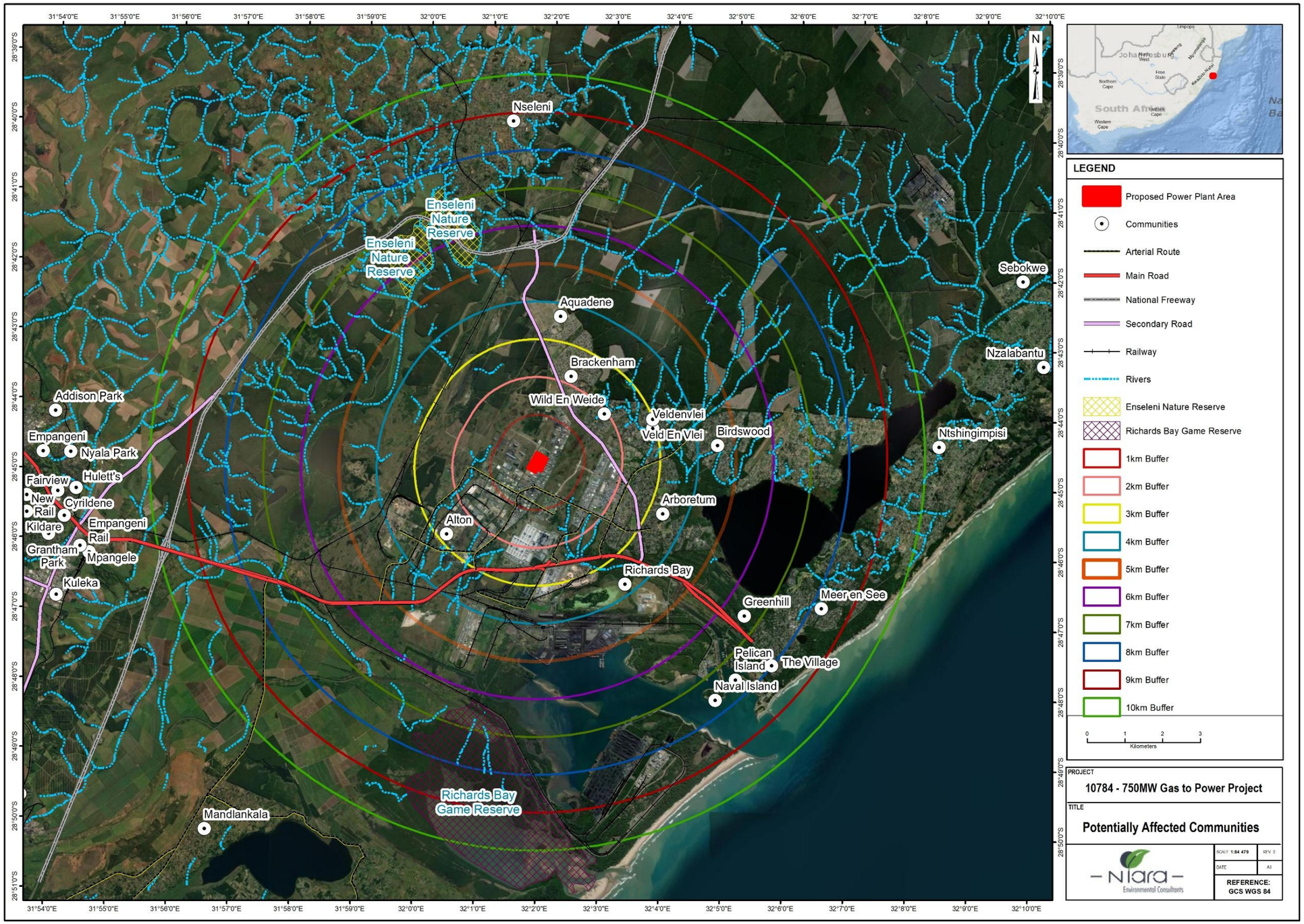


Figure 2-3: Potentially Affected Communities

2.5 Sensitive Receptors

2.5.1 Definition of Sensitive Receptors

Sensitive receptors refer to locations where populations may be more vulnerable to environmental exposures resulting from development activities. These receptors typically include residential areas, schools, hospitals, clinics, childcare facilities, and areas occupied by vulnerable populations such as the elderly or individuals with pre-existing health conditions. Such locations are considered sensitive because occupants may experience greater health risks from exposure to pollutants, noise, or other environmental stressors associated with industrial activities.

In EIAs and cHIAs, the identification of sensitive receptors forms an essential component of the baseline assessment. Sensitive receptors are used as key assessment points for evaluating environmental exposure pathways, including air quality impacts, noise propagation, traffic risks, and other environmental determinants of health.

The WHO recognises that health impacts from environmental exposures occur through complex interactions between environmental hazards and population vulnerability, which makes it essential to identify populations that may be particularly susceptible to environmental change when conducting a cHIA.

2.5.2 Types of Sensitive Receptors Relevant to Energy Infrastructure Projects

For industrial and power generation projects such as the proposed CCGT Power Plant, sensitive receptors typically include the following categories:

Residential Areas: Residential communities represent the most important sensitive receptors due to the continuous exposure of populations to environmental conditions. Long-term exposure to industrial emissions, noise, and traffic may influence respiratory health, cardiovascular outcomes, and general wellbeing.

Healthcare Facilities: Healthcare facilities such as clinics, hospitals, and medical centres are considered highly sensitive receptors due to the presence of patients with compromised health conditions who may be more susceptible to environmental stressors.

Educational Institutions: Schools are regarded as sensitive receptors because children are physiologically more vulnerable to air pollution and environmental exposures, particularly those affecting respiratory development.

Community Facilities: Community centres, religious facilities, and social infrastructure can also represent sensitive receptors because they serve as gathering points where exposure to environmental impacts may affect large numbers of people simultaneously.

Ecological Receptors: Although primarily relevant to ecological assessments, nature reserves, wetlands and protected areas may also be considered receptors due to their potential to influence ecosystem services that indirectly affect human health, such as air quality regulation and recreational access.

Sensitive receptors are locations where populations may be particularly vulnerable to environmental exposures.

Within the project's Zone of Influence, the following sensitive receptors were identified:

Healthcare Facilities

- Richards Bay Municipal Clinic
- Civic Centre Clinic
- Mandlazini Clinic
- Medicross Medical Centre
- Greenhill Medical Centre

- CarePoint Industrial Health Services

Educational Facilities

- Aquedene Secondary School
- Sinaye Primary School
- Mahubela Primary School
- Ntongande High School
- Lizwi Secondary School
- Old Mill High School
- Siyakhanyisa Primary School

Ecological Receptors

- Enseleni Nature Reserve
- Richards Bay Game Reserve
- Local river systems and wetlands

These receptors are important considerations when assessing potential environmental health risks associated with the proposed development.

The proposed 750 MW CCGT Power Plant will be located within an established industrial zone in Richards Bay. However, several residential communities, social infrastructure facilities and ecological receptors are located within the broader 10 km Zone of Influence.

The identification of PACs and sensitive receptors provides an important basis for assessing the potential health implications of the proposed development. These spatial relationships will inform the subsequent assessment of health determinants and potential health impacts presented in the following chapters.

3 Terms of Reference

3.1 Justification for a Community Health Impact Assessment

The adoption of a cHIA, rather than a generic Health Impact Assessment (HIA), is both necessary and appropriate for the proposed 750 MW CCGT Power Plant, given the nature of the project, its operational characteristics, and the receiving environment within which it is located. The project introduces continuous industrial activity into an already established industrial-port system in Richards Bay, where environmental, social and health pressures are not theoretical, but demonstrably present. In this context, the assessment of health impacts cannot be limited to generic or isolated considerations. It must explicitly interrogate how project activities interact with surrounding populations under cumulative conditions.

International good practice supports this position. The IFC's Performance Standard 4 on Community Health, Safety and Security requires that projects identify and manage risks posed to affected communities arising from environmental emissions, infrastructure, workforce interaction and socio-economic change (IFC, 2012). The emphasis is not on health in a general sense, but on community-level exposure and risk, particularly where industrial activities extend beyond the project boundary. A conventional HIA framework,

which often treats health outcomes in broad or abstract terms, does not sufficiently address this requirement. A cHIA is therefore necessary to ensure that the assessment is aligned with the expectations of PS4 and capable of evaluating real-world exposure pathways.

The need for a cHIA is further reinforced by the presence of clear and unavoidable community exposure pathways. The proposed plant will generate atmospheric emissions through combustion turbine operations, which will disperse into the surrounding airshed and contribute to ambient air quality conditions experienced by nearby communities. Project-related traffic will utilise public road networks, interacting directly with pedestrians, public transport users and other road users. Stormwater systems will discharge into receiving environments that are not confined to the site boundary. These pathways mean that the project's health footprint extends beyond its physical footprint, making it necessary to assess impacts at the level of the surrounding population rather than the site alone.

This requirement becomes more pronounced when considered within the cumulative industrial context of Richards Bay. The area is characterised by a concentration of industrial activities, including port operations, bulk material handling, heavy haul transport, smelting, fertiliser and chemical processing, shipping emissions, and both existing and planned IDZ developments. The Atmospheric Impact Assessment confirms that while the proposed plant's standalone emissions are relatively low, cumulative modelling indicates exceedances of SO_2, NO_2 and PM_{10} standards when existing and future sources are considered together. This demonstrates that the receiving environment is already under stress and that health outcomes are influenced by the combined effect of multiple emission sources. The World Health Organization has established that health risks associated with air pollution are driven by cumulative exposure over time, rather than isolated emissions from individual projects (WHO, 2021). In such a context, even relatively small incremental contributions may have measurable health implications, particularly for vulnerable populations. A cHIA is therefore required to evaluate the project's contribution to this cumulative burden in a structured and defensible manner.

The urban and peri-urban nature of the receptor environment further necessitates a cHIA approach. The project is located within an industrial zone that is functionally integrated with surrounding residential, commercial and institutional areas. These environments are characterised by continuous human presence, diverse and sensitive populations, and multiple exposure routes. Children, elderly persons and individuals with pre-existing health conditions are particularly vulnerable to environmental stressors. In addition, baseline exposure levels in such environments are often already elevated due to existing industrial and transport activities. This reduces the capacity of the receiving environment to absorb additional impacts without consequence. A cHIA is specifically designed to assess health outcomes at this scale, taking into account the complexity and variability of real-world exposure.

Health outcomes in this context are also strongly influenced by social determinants, including employment, income distribution, inequality, access to services and community stability. The proposed Project introduces both positive and negative social pathways. On the one hand, it may contribute to employment, income generation and local economic activity. On the other hand, it may introduce labour influx, increase pressure on housing and services, and alter local socio-economic dynamics. The WHO recognises that such determinants are fundamental drivers of health outcomes and must be considered alongside environmental exposures (WHO, 2008). A generic HIA framework does not adequately integrate these dimensions, whereas a cHIA explicitly evaluates how environmental and social factors interact to influence health.

A further critical consideration is the interface between the project workforce and surrounding communities. Construction and operational personnel will interact with local communities through housing, transport, services and economic activity. This interaction creates pathways for communicable disease transmission, increased demand on healthcare services, and changes in social behaviour and risk profiles. It also links occupational health risks with community health outcomes, particularly where workers reside in or move through surrounding areas. IFC Performance Standard 4 explicitly recognises the importance of managing risks arising from workforce-community interaction (IFC, 2012), reinforcing the need for an assessment approach that captures these dynamics.

In summary, the application of a Community Health Impact Assessment is required because the project is not isolated in its effects. It operates within a complex, cumulatively stressed environment where environmental emissions, infrastructure interactions, social determinants and human behaviour intersect. A cHIA provides the necessary framework to assess these interactions in a manner that is project-specific, scientifically grounded and regulator-defensible. A generic HIA would not adequately capture the scale, complexity or cumulative nature of the risks involved, nor would it meet the expectations of international best practice for community health assessment.

3.2 Scope of the Community Health Impact Assessment

Niara Environmental Consultants (Pty) Ltd was appointed by Nemai Consulting (Pty) Ltd to undertake a cHIA as part of the EIA process for the Proposed Development of a 750 MW CCGT Power Plant in Richards Bay.

The cHIA forms part of the specialist studies required to support the Scoping and Environmental Impact Reporting (S&EIR) Process undertaken in terms of the Environmental Impact Assessment Regulations, 2014 (as amended) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The purpose of the specialist study is to identify, evaluate and manage potential health impacts that may arise as a result of the construction, operation and decommissioning of the Proposed Project. The study also aims to provide evidence-based recommendations to support the protection and promotion of community health and wellbeing within the project area of influence.

The cHIA is undertaken in accordance with international good practice guidance, including the IFC Good Practice Note on Health Impact Assessment and IFC Performance Standard 4: Community Health, Safety and Security, which emphasise the need to identify and manage risks to community health and safety associated with large infrastructure developments (IFC, 2009; IFC, 2012).

3.3 Objectives of the Specialist Study

The key objectives of the cHIA are to:

- Establish a baseline health profile for the study area, including national, provincial, district and local health characteristics relevant to the project.
- Identify potentially affected communities (PACs) within the project's area of influence.
- Identify potential pathways of health impact associated with the proposed development.
- Assess potential direct, indirect and cumulative health impacts associated with the construction, operation and decommissioning of the project.
- Evaluate potential impacts on vulnerable or sensitive population groups, including children, the elderly and individuals with pre-existing health conditions.

- Assess the potential implications of the project for local healthcare infrastructure and services.
- Identify positive health outcomes, including potential socio-economic improvements associated with employment and economic development.
- Recommend mitigation measures, monitoring programmes and management interventions to prevent or minimise adverse health impacts.
- Provide inputs into the Environmental Management Programme (EMPr) and associated project management plans.

3.4 Key Health Determinants Considered

The assessment considers a range of environmental and social determinants of health that may be influenced by the proposed development. These determinants include:

- Air quality and atmospheric emissions;
- Noise and vibration;
- Water quality and availability;
- Soil contamination and waste management;
- Occupational and community safety risks;
- Traffic and transport-related risks;
- Labour influx and population dynamics;
- Social determinants of health, including employment, housing and service delivery;
- Access to healthcare facilities and health system capacity.

These determinants are evaluated using the EHA framework developed by the International Finance Corporation, which provides a systematic approach for linking project activities to potential health outcomes (IFC, 2009).

3.5 Environmental Health Areas Framework

The cHIA evaluates potential health impacts across the following EHAs:

- EHA #1 – Vector-related Diseases
- EHA #2 – Acute Respiratory Infections and Respiratory Effects
- EHA #3 – Veterinary Medicine and Zoonotic Diseases
- EHA #4 – Sexually Transmitted Infections, including HIV/AIDS
- EHA #5 – Soil-, Water- and Waste-related Diseases
- EHA #6 – Food and Nutrition-related Issues
- EHA #7 – Accidents and Injuries
- EHA #8 – Exposure to Hazardous Materials, Noise and Malodours
- EHA #9 – Social Determinants of Health
- EHA #10 – Cultural Health Practices
- EHA #11 – Health Systems Issues

- EHA #12 – Non-Communicable Diseases

This framework recognises that health outcomes are influenced not only by environmental exposures but also by broader social and economic factors that affect community wellbeing.

3.6 Study Area and Area of Influence

The study area for the cHIA includes communities located within the zone of influence of the proposed power plant, which encompasses both directly affected areas and surrounding communities potentially exposed to environmental or socio-economic changes associated with the project.

The area of influence is defined based on:

- The physical footprint of the proposed development;
- Potential environmental impact pathways (e.g., air emissions, noise, traffic);
- Socio-economic influence zones associated with labour influx and economic activity; and
- The distribution of surrounding communities and sensitive receptors.

The assessment considers health conditions at multiple spatial scales, including:

- National health context (South Africa);
- Provincial health context (KwaZulu-Natal);
- District health context (King Cetshwayo District Municipality);
- Local health conditions within the City of uMhlathuze Local Municipality and surrounding communities.

3.7 Specialist Study Activities

The key activities undertaken as part of this cHIA include:

- Desktop review of available literature, including national and regional health data sources;
- Review of relevant policy and legislative frameworks governing environmental health and public health in South Africa;
- Review of project information, including project design, infrastructure requirements and operational characteristics;
- Identification of potentially affected communities and sensitive receptors;
- Review of other specialist studies conducted as part of the EIA process (e.g., air quality, noise, socio-economic and risk assessments);
- Assessment of health determinants associated with the proposed Project activities;
- Identification and evaluation of potential health impacts using an established impact assessment methodology;
- Development of mitigation measures and monitoring recommendations to manage identified risks.

4 Limitations and Assumptions

The assessment is based on the project information available at the time of the study, including preliminary engineering design, project layout and associated infrastructure descriptions.

The cHIA relies on information obtained from:

- Published national and regional health statistics;

- Government planning documents, including Integrated Development Plans (IDPs);
- Existing environmental studies conducted as part of the EIA process;
- Available academic and policy literature relating to environmental health.

Where site-specific health data is limited, the assessment utilises proxy indicators and regional health statistics to establish baseline conditions.

5 Details and Expertise of Specialist

The Community Health Impact Assessment (cHIA) for the proposed 750 MW Combined Cycle Gas Turbine Power Plant in Richards Bay was undertaken by Vumile Ribeiro, Director and Principal Environmental Consultant at Niara Environmental Consultants (Pty) Ltd, who acted as the Community Health Specialist and report compiler for this study. Ms Ribeiro has approximately 18 years of professional experience in environmental assessment and management, with a strong focus on health, social and environmental risk assessments associated with large-scale industrial, mining and infrastructure developments. Over the course of her career, she has developed significant technical expertise in leading and conducting Health Impact Assessments (HIAs) and Community Health Impact Assessments (cHIAs) as part of Environmental and Social Impact Assessment (ESIA) and Environmental Impact Assessment (EIA) processes. Her experience includes the identification of health exposure pathways, evaluation of environmental health risks, integration of specialist study findings into health analyses, and the development of health mitigation and management measures in accordance with international good practice guidance.

Vumile holds a Bachelor of Social Science degree in Geography and Environmental Management from the University of KwaZulu-Natal (2007) and a Bachelor of Social Science Honours degree in Environmental Analysis and Management from the University of Pretoria (2011). She is currently completing a Master of Philosophy (MPhil) in Environmental Law at the University of Pretoria, further strengthening her expertise in environmental governance and regulatory frameworks. Her professional work focuses on analysing the relationships between environmental change, industrial development and community health outcomes, and applying multidisciplinary methodologies to evaluate potential environmental health risks and opportunities associated with development projects.

Vumile is a Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), Registration No. 2019/1183, in accordance with the requirements of Section 24H of the National Environmental Management Act (Act 107 of 1998). She is also a member of the International Association for Impact Assessment South Africa (IAIAsa) and the Public Health Association of South Africa (PHASA). Through her professional practice she has led or contributed to numerous Health Impact Assessments for mining operations, energy projects, industrial facilities and infrastructure developments across Africa, demonstrating strong technical capability in applying internationally recognised health assessment methodologies, including those aligned with the International Finance Corporation (IFC) Environmental and Social Performance Standards and World Health Organization health risk assessment frameworks.

The Specialist's Comprehensive Curriculum Vitae (CV) has been appended to this Report as Appendix A.

6 Project Description

6.1 Overview of the Proposed Development

Mabasa Energy and Fuels (Pty) Ltd proposes to develop a 750 MW CCGT Power Plant within the RBIDZ in the City of uMhlathuze Local Municipality, KwaZulu-Natal. The project will occupy approximately 12.7 hectares on Erf 16673 within Phase 1F of the RBIDZ, located approximately 1.5 km from the Richards Bay Central Business District.

The proposed development forms part of South Africa's national strategy to increase electricity generation capacity through gas-to-power technologies identified under the Integrated Resource Plan for Electricity (IRP 2019) and the Gas Independent Power Producers Procurement Programme (GASIPPPP).

The power plant will operate as a combined cycle power generation facility, consisting of gas turbines and steam turbines designed to operate continuously to supply electricity to the national grid. The plant is expected to operate 24 hours per day, seven days per week, generating approximately 500 MW in simple cycle mode and up to 750 MW in combined cycle mode.

The development of energy infrastructure such as gas-fired power plants can influence human health through both positive and negative pathways. On the one hand, electricity generation contributes to energy security, economic development and improved living conditions, all of which are recognised determinants of health. On the other hand, power generation facilities may generate environmental exposures such as air emissions, noise, traffic and occupational hazards, which may influence community health outcomes if not properly managed (World Health Organization, 2014; International Finance Corporation, 2009).

For this reason, the cHIA evaluates the potential health implications associated with the construction, operation and maintenance of the proposed power plant.

6.2 Combined Cycle Gas Turbine Technology

The proposed power plant will utilise CCGT technology, which is widely used in modern power generation due to its high efficiency and lower emissions relative to conventional coal-fired power plants.

The facility will consist of:

- Two gas turbines
- Two heat recovery steam generators (HRSGs)
- One steam turbine generator

Each gas turbine will have a generation capacity of approximately 250 MW, while the steam turbine will generate an additional 250 MW, resulting in a combined output of approximately 750 MW.

Combined cycle technology improves energy efficiency by capturing heat from the gas turbine exhaust gases and using it to generate steam, which drives a secondary steam turbine. This process allows a greater proportion of fuel energy to be converted into electricity compared to single-cycle gas turbine plants.

From a public health perspective, natural gas-fired CCGT plants generally produce lower emissions of sulphur dioxide (SO_2), particulate matter (PM) and mercury compared to coal-fired power plants. However, they still emit nitrogen oxides (NOx), carbon dioxide (CO_2), and trace air pollutants, which may contribute to respiratory and cardiovascular health effects if communities are exposed to elevated concentrations (World Health Organization, 2021; United States Environmental Protection Agency, 2022).

Consequently, air quality and emission management represent key determinants of community health associated with the proposed development.

6.3 Major Plant Components

The proposed power plant will include several key infrastructure components required for electricity generation and grid integration.

6.3.1 Gas Turbines and Generators

The plant will include two General Electric Frame 9 gas turbines (Model 9F.03), each connected to an electrical generator

Gas turbines operate by combusting natural gas within a combustion chamber to produce high-temperature, high-pressure gases that rotate turbine blades connected to an electrical generator.

From a health perspective, gas turbine operation is associated with several potential environmental exposures:

- combustion-related emissions such as nitrogen oxides (NOx);
- greenhouse gas emissions;
- noise generated by turbine operation.

Exposure to air pollutants such as nitrogen oxides has been associated with respiratory inflammation, asthma exacerbation and increased cardiovascular risks, particularly among vulnerable populations such as children and the elderly (WHO, 2021).

Noise generated by large industrial turbines may also contribute to sleep disturbance, stress and cardiovascular health effects if not adequately mitigated (WHO Environmental Noise Guidelines, 2018).

6.3.2 Heat Recovery Steam Generators

Each gas turbine will be connected to a HRSG, which captures heat from turbine exhaust gases and converts water into steam.

The HRSGs will operate as triple-pressure natural circulation steam generators, which are designed to maximise energy recovery from exhaust gases.

Although HRSGs do not directly produce emissions, they contribute to the overall power generation process and are associated with potential health considerations such as:

- thermal emissions;
- industrial noise;
- risks associated with high-temperature steam systems.

Industrial steam systems may pose occupational health and safety risks if not properly managed, including burn injuries and equipment failure hazards (International Labour Organization, 2019).

6.3.3 Steam Turbine Generator

The steam generated in the HRSGs will be used to drive a single steam turbine generator, producing additional electricity and increasing overall plant efficiency.

Steam turbine systems involve high-pressure steam and rotating mechanical equipment, which may present occupational hazards including:

- mechanical injury risks;
- high-temperature exposure risks;

- noise exposure.

Proper operational controls and safety systems are therefore essential to protect workers and prevent incidents that could potentially affect surrounding communities.

6.3.4 Cooling System

The plant will utilise an induced draft cooling tower system to dissipate excess heat generated during power production.

Cooling towers may produce visible plumes consisting primarily of water vapour. While these plumes are generally not harmful, poorly managed cooling systems can pose health risks associated with:

- aerosol formation;
- microbial contamination (e.g. Legionella bacteria).

Cooling tower management is therefore an important public health consideration, as poorly maintained systems have been linked to outbreaks of Legionnaires' disease, a severe form of pneumonia (WHO, 2007).

6.3.5 Electrical Switchyard and Grid Connection

Electricity generated by the plant will be transmitted through a 275 kV switchyard, which includes step-up transformers that increase voltage for transmission to the national electricity grid.

Electrical infrastructure may generate electromagnetic fields (EMFs). Current scientific evidence indicates that exposure to EMFs from transmission infrastructure at typical environmental levels does not cause significant adverse health effects. However, public concerns regarding EMF exposure are often raised in relation to large power infrastructure projects (World Health Organization, 2007).

6.4 Fuel Supply

The proposed plant will primarily utilise natural gas as its fuel source.

Natural gas will be supplied from planned gas import infrastructure associated with the Port of Richards Bay, although the gas pipeline infrastructure itself does not form part of the current project application.

The use of natural gas instead of coal results in significantly lower emissions of particulate matter, sulphur dioxide and heavy metals. However, natural gas combustion still produces nitrogen oxides and carbon dioxide, which may influence local air quality and climate-related health outcomes (IPCC, 2022).

In addition, the handling and storage of natural gas may introduce potential industrial safety risks, including fire or explosion hazards if appropriate safety systems are not implemented.

6.5 Construction Activities

Construction of the proposed power plant will involve:

- site clearing and earthworks;
- foundation excavation;
- installation of heavy industrial equipment;
- construction of buildings and infrastructure;
- transport of materials and machinery.

Construction activities may influence community health through several pathways including:

- dust generation and particulate exposure;
- construction noise and vibration;
- increased traffic volumes;
- occupational accidents;
- temporary population influx associated with construction workers.

Exposure to construction dust and particulate matter has been associated with respiratory irritation and exacerbation of pre-existing respiratory conditions, particularly among vulnerable individuals (WHO, 2021).

6.6 Operations and Maintenance

During operation, the plant will function as a continuous electricity generation facility operating throughout the year.

Operational activities will include:

- continuous turbine operation;
- monitoring and control of plant systems;
- routine equipment maintenance;
- periodic equipment inspections.
- Operational health considerations include:
- air pollutant emissions;
- industrial noise;
- hazardous materials handling;
- occupational safety risks.

The potential health implications of the proposed 750 MW CCGT Power Plant are evaluated by examining how specific project activities may influence environmental and social determinants of health. In accordance with internationally recognised HIA methodologies, particularly those recommended by the IFC and the WHO, potential health risks are assessed through the identification of exposure pathways that link project activities to health outcomes (IFC, 2009; WHO, 2014).

This approach recognises that large infrastructure projects may influence human health through both direct environmental exposures (such as air emissions, noise, and occupational hazards) and indirect social determinants of health (such as employment, economic development, and population dynamics). By systematically mapping project components against the 12 EHAs defined in international HIA guidance, the assessment is able to identify potential health risks, vulnerable populations, and opportunities for health enhancement.

The table below therefore provides a structured overview of the key project activities and infrastructure components, the relevant Environmental Health Areas, the associated exposure pathways, and the potential health outcomes that may arise during both the construction and operational phases of the proposed development. This framework forms the basis for the subsequent assessment of the significance of health impacts and the identification of appropriate mitigation and management measures.

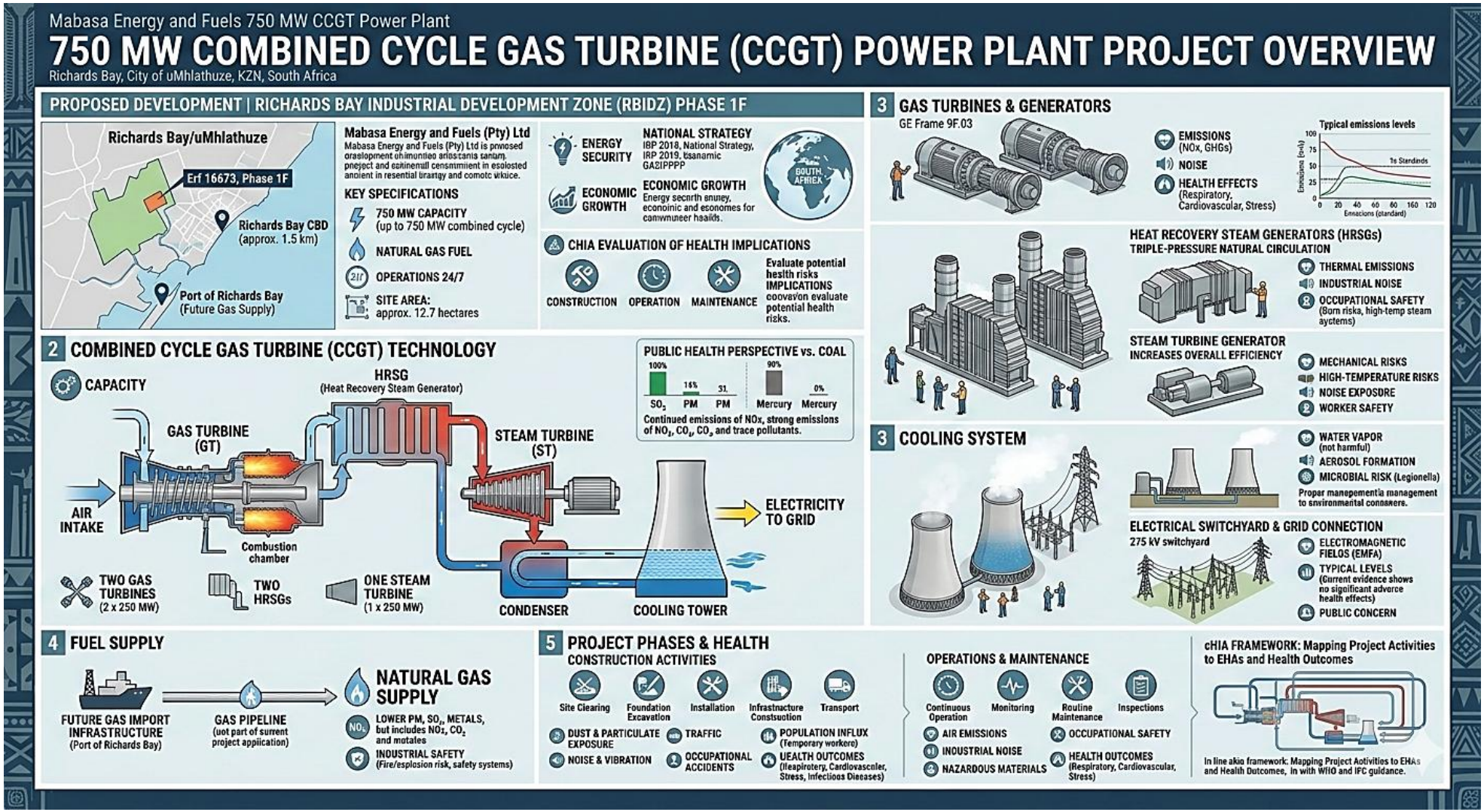


Figure 6-1: Project overview

Table 6-1: Project Activities, Environmental Health Areas and Potential Health Pathways

Project Activity / Component	EHA	Exposure Pathway	Potential Health Outcome
Site clearing and earthworks during construction	EHA 2 – Respiratory Diseases	Dust generation and particulate matter exposure from land clearing and construction vehicles	Respiratory irritation, exacerbation of asthma and chronic respiratory diseases (WHO, 2021)
	EHA 9 – Environmental Hazards	Soil disturbance, erosion and sedimentation affecting nearby drainage systems	Reduced environmental quality and indirect health effects through degraded ecosystems
	EHA 8 – Injuries and Occupational Health	Heavy machinery operation and construction hazards	Workplace injuries, accidents and trauma among workers
	EHA 12 – Non-Communicable Diseases	Physical stress and occupational exposure among workers	Long-term occupational health risks
Construction workforce presence and labour influx	EHA 4 – HIV/AIDS and STIs	Increased population mobility and interaction between workers and host communities	Increased transmission risks of communicable diseases
	EHA 10 – Social Determinants of Health	Population influx, pressure on housing and services	Community tension, social disruption and stress
	EHA 8 – Injuries	Increased traffic accidents due to construction vehicles	Road traffic injuries
Transportation of equipment and materials	EHA 8 – Injuries	Increased heavy vehicle traffic along regional roads	Road accidents involving workers and community members
	EHA 2 – Respiratory Diseases	Diesel emissions from construction vehicles	Increased exposure to nitrogen oxides and particulate matter
	EHA 10 – Social Determinants	Traffic congestion affecting daily mobility	Reduced quality of life and increased stress
Operation of gas turbines (combustion process)	EHA 2 – Respiratory Diseases	Emissions of nitrogen oxides (NOx) and trace pollutants from combustion	Respiratory inflammation, asthma exacerbation, cardiovascular impacts (WHO, 2021)
	EHA 12 – Non-Communicable Diseases	Long-term exposure to air pollutants	Increased risk of cardiovascular disease and chronic respiratory illness
	EHA 9 – Environmental Hazards	Contribution to greenhouse gas emissions	Climate-related health risks

Project Activity / Component	EHA	Exposure Pathway	Potential Health Outcome
Heat Recovery Steam Generators and steam systems	EHA 8 – Injuries	High-pressure steam systems and industrial equipment	Occupational injuries and burn risks
	EHA 9 – Environmental Hazards	Thermal emissions and industrial processes	Localised environmental hazards if not properly controlled
Cooling tower operation	EHA 1 – Vector-borne Diseases	Potential water stagnation and microbial growth in cooling systems	Risk of Legionella bacteria and Legionnaires' disease if poorly maintained (WHO, 2007)
	EHA 5 – Water-related Diseases	Aerosolised water droplets from cooling towers	Potential microbial exposure pathways
	EHA 9 – Environmental Hazards	Visible vapour plumes and aerosol formation	Public perception concerns and environmental exposure pathways
Gas supply and storage infrastructure	EHA 8 – Injuries	Potential gas leaks or explosions in extreme scenarios	Fire or explosion related injuries
	EHA 9 – Environmental Hazards	Accidental gas releases	Industrial safety risks
Power plant noise (turbines, cooling towers)	EHA 12 – Non-Communicable Diseases	Continuous industrial noise exposure	Sleep disturbance, stress, hypertension (WHO Noise Guidelines, 2018)
	EHA 10 – Social Determinants	Noise annoyance affecting community wellbeing	Reduced quality of life
Electrical infrastructure and transmission equipment	EHA 9 – Environmental Hazards	Exposure to electromagnetic fields (EMF)	Public concern and perceived health risks
Operational workforce and employment opportunities	EHA 10 – Social Determinants	Job creation and increased household income	Improved living standards and health determinants
	EHA 11 – Health Systems	Increased demand for local health services	Pressure on health facilities
Regional energy supply improvements	EHA 10 – Social Determinants	Improved electricity reliability	Improved household wellbeing, economic stability and access to services

7 Legislative Framework

The proposed 750 MW CCGT Power Plant is subject to a comprehensive and interrelated framework of environmental, water, air quality, waste management, occupational health and safety, and planning legislation within the Republic of South Africa. Compliance with this framework is not limited to obtaining authorisations, but requires demonstrable alignment between project design, operational activities and statutory obligations, supported by enforceable management and monitoring systems.

For a project of this scale and nature, regulatory authorities require clear evidence that all relevant legal provisions have been correctly identified, triggered by specific activities, and translated into practical compliance mechanisms. This is particularly important in a cumulatively stressed industrial environment such as Richards Bay, where regulatory decision-making is informed not only by project-level impacts, but also by broader environmental capacity and existing pressures.

This chapter therefore moves beyond a generic listing of legislation and establishes a direct, auditable linkage between project components, legal triggers and compliance pathways, ensuring that the assessment is both technically robust and regulator-ready.

7.1 Legislative Context and Applicability

The development of a gas-fired power generation facility introduces multiple regulated activities, including atmospheric emissions, water use, waste generation, hazardous material handling, and transport-related impacts. These activities are governed primarily by the following legislation:

- The National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended), which regulate the requirement for Environmental Authorisation (EA) prior to commencement of listed activities;
- The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), which regulates atmospheric emissions and requires licensing of listed activities through an Atmospheric Emission Licence (AEL);
- The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), which governs the generation, storage, transport and disposal of waste;
- The National Water Act, 1998 (Act No. 36 of 1998), which regulates water use activities, including abstraction, storage, diversion and contamination of water resources;
- The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the Hazardous Substances Act, 1973 (Act No. 15 of 1973), which regulate worker safety and the handling of hazardous materials; and
- The National Road Traffic Act, 1996 (Act No. 93 of 1996) and applicable municipal bylaws, which govern transport and road safety.

In addition to national legislation, the assessment is aligned with international good practice, including the IFC Performance Standards and WHO guidance, particularly in relation to community health, air quality and water-related risks.

7.2 Project-Specific Legislative Triggers and Compliance Pathways

The proposed CCGT facility comprises a number of integrated systems and operational components, each of which triggers specific legal requirements. These include the combustion process plant, cooling systems, water and stormwater infrastructure, hazardous material storage, waste management systems, and transport interfaces.

The combustion turbines and associated Heat Recovery Steam Generators (HRSGs) represent the primary source of atmospheric emissions, triggering licensing requirements under the Air Quality Act. Similarly, cooling towers introduce aerosol and water quality considerations, while stormwater systems interact directly with water resources, triggering provisions under the National Water Act. The handling of fuels, lubricants and treatment chemicals introduces occupational and environmental risks governed by safety and hazardous substances legislation.

To ensure regulatory clarity, these linkages are formalised in Table 7-1 below.

Table 7-1: Project Component – Legislative Trigger, Legal Provision and Compliance Framework

Project Component / Activity	Triggered Legislation	Legal Provision / Requirement	Project Relevance	Compliance Mechanism
Combustion Process Plant (Gas turbines, HRSG, stacks)	National Environmental Management: Air Quality Act, 2004	Section 21 Listed Activities	Emission of NOx, CO, PM and trace pollutants from gas combustion	Atmospheric Emission Licence (AEL); stack emission limits; continuous emissions monitoring systems (CEMS); regulatory reporting
	National Environmental Management: Waste Act, 2008	Waste management provisions	Generation of maintenance waste, filters, residues and general waste	Waste classification, storage, handling and disposal in accordance with waste regulations
Cooling Towers and Water Systems	National Environmental Management: Air Quality Act, 2004	Emission of aerosols and drift	Release of water droplets and potential airborne contaminants	Design controls to minimise drift; monitoring where applicable
	WHO / IFC Guidance	Legionella risk management	Potential proliferation of Legionella bacteria in warm water systems	Water treatment programmes, biocide dosing, routine monitoring and maintenance
Stormwater Management Infrastructure	National Water Act, 1998	Section 21(c) and (i) water uses	Diversion, containment and discharge of stormwater; potential contamination pathways	Stormwater Management Plan; clean and dirty water separation; pollution control infrastructure
Water Supply and Cooling Water Use	National Water Act, 1998	Section 21(a), (b), (c), (i) (where applicable)	Abstraction, storage and use of water for plant operation and cooling	Water Use Licence (if triggered); water balance; efficient use and recycling
Hazardous Materials (fuel gas, diesel, oils, chemicals)	Occupational Health and Safety Act, 1993	Hazardous Chemical Regulations	Storage and handling of potentially hazardous substances	Safe storage, handling procedures, PPE, emergency response plans
	Hazardous Substances Act, 1973	Control of hazardous substances	Use of chemicals with potential human health risk	Compliance with labelling, storage and handling requirements
Waste Management Systems	National Environmental	Listed Waste Activities	Generation of general and hazardous waste streams	Waste Management Plan; licensed disposal; record keeping and reporting

Project Component / Activity	Triggered Legislation	Legal Provision / Requirement	Project Relevance	Compliance Mechanism
	Management: Waste Act, 2008			
Traffic and Transport	National Road Traffic Act, 1996	Road safety provisions	Movement of heavy vehicles during construction and operation	Traffic Management Plan; compliance with vehicle and road safety requirements
	Municipal Bylaws	Local infrastructure and traffic control	Interaction with local road networks and communities	Coordination with municipality; access control; road upgrades if required
Air Emissions (Overall Plant Operation)	National Environmental Management: Air Quality Act, 2004	Atmospheric Emission Licence (AEL)	Primary regulated emission source	AEL application, compliance monitoring, reporting and periodic audits

In line with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998), the assessment considers not only project-specific impacts but also cumulative impacts, the interests of affected parties, and the need to avoid, minimise and remedy environmental harm, including risks to human health.

7.3 Integrated Impact–Legal–Mitigation Linkage

A critical requirement for regulatory defensibility is the explicit integration of project activities, exposure pathways, health impacts, applicable legislation and enforceable mitigation measures within a single analytical framework. While this assessment robustly establishes the relationship between project components, exposure pathways and associated health impacts, it must further demonstrate how each identified impact is anchored in statutory requirements and translated into practical compliance mechanisms. In its current form, the assessment presents a strong Project → Pathway → Impact logic. However, regulatory authorities require a complete chain of accountability that extends to legal triggers and enforceable controls. This requires the assessment to clearly articulate:

Project Activity → Exposure Pathway → Health Impact → Applicable Legislation → Compliance / Mitigation Measure

This linkage ensures that all identified impacts are not only scientifically assessed, but also regulated, controlled and enforceable within the applicable legal framework. Without this integration, the assessment risks being interpreted as descriptive rather than regulatory, limiting its defensibility during authorisation and potential appeal processes.

To address this, the assessment incorporates an integrated mapping of key project components against their associated pathways, impacts and legislative controls, ensuring that each risk pathway is directly tied to a statutory requirement and a defined management response.

Table 7-2: Integrated Project–Impact–Legislation–Mitigation Linkage

Project Activity	Exposure Pathway	Health Impact	Applicable Legislation	Compliance / Mitigation Measure
Combustion of natural gas (GE 9FA turbines)	Inhalation of NO_2, SO_2, PM_{10}, CO	Respiratory and cardiovascular effects; exacerbation of asthma and chronic disease	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	Atmospheric Emission Licence (AEL); emission limits; continuous emissions monitoring; optimisation of combustion efficiency

Project Activity	Exposure Pathway	Health Impact	Applicable Legislation	Compliance / Mitigation Measure
Cooling tower operation	Aerosol inhalation (including potential Legionella exposure)	Respiratory infection (Legionnaires' disease)	Occupational Health and Safety Act, 1993 (Act No. 85 of 1993); WHO / IFC guidance	Water treatment programmes; biocide dosing; routine microbiological monitoring; system maintenance
Stormwater runoff and contamination	Contact with contaminated water; downstream exposure	Waterborne disease; vector breeding; environmental health risk	National Water Act, 1998 (Act No. 36 of 1998) (Section 21(c) and (i))	Stormwater management plan; clean/dirty water separation; containment infrastructure; spill prevention
Hazardous material storage (oils, chemicals)	Dermal contact; inhalation; accidental release	Toxic exposure; irritation; acute health effects	Occupational Health and Safety Act, 1993; Hazardous Substances Act, 1973 (Act No. 15 of 1973)	Safe storage; handling procedures; PPE; emergency response planning
Traffic and transport	Road exposure; vehicle interaction	Accidents, injuries and fatalities	National Road Traffic Act, 1996 (Act No. 93 of 1996); Municipal bylaws	Traffic management plan; speed controls; route planning; signage
Waste generation and disposal	Environmental contamination; indirect exposure	Soil and water contamination; secondary health effects	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	Waste management plan; classification; licensed disposal; monitoring
Noise generation (construction and operation)	Environmental noise exposure	Sleep disturbance; annoyance; stress; occupational hearing loss	National Environmental Management Act, 1998 (Act No. 107 of 1998); OHSA	Noise management plan; equipment maintenance; occupational protection measures

7.4 Integrated Compliance Strategy

Compliance with the above legislative requirements will be achieved through a structured and integrated approach, combining authorisation, engineering design, operational controls and monitoring systems.

The project will obtain all required environmental approvals prior to commencement, including Environmental Authorisation (EA) in terms of NEMA and an Atmospheric Emission Licence (AEL) in terms of the Air Quality Act. Where applicable, water use authorisation will be secured under the National Water Act.

From a design perspective, the facility incorporates best available technology and process controls, including high-efficiency gas turbines, controlled combustion processes, and engineered water and waste management systems. These design elements serve to minimise emissions, reduce resource consumption and limit environmental exposure pathways.

Operationally, compliance will be maintained through the implementation of an Environmental Management Programme (EMPr), supported by standard operating procedures, maintenance protocols and training programmes. Particular emphasis is placed on preventative management, including routine inspection, system maintenance and early detection of deviations.

7.5 Monitoring, Enforcement and Reporting

A critical component of regulatory compliance is the establishment of a robust monitoring and enforcement framework, ensuring that legal limits are not only met, but actively managed.

This includes:

- Continuous and periodic monitoring of key parameters, including stack emissions, ambient air quality, water quality and noise levels;
- Defined trigger levels and escalation procedures, linking monitoring results to operational responses;
- Routine regulatory reporting, including submission of monitoring data and compliance reports to relevant authorities; and
- Periodic audits and performance reviews, ensuring ongoing compliance and enabling adaptive management.

This framework ensures that compliance is dynamic and enforceable, rather than static, and that any deviation from acceptable conditions is identified and addressed in a timely manner.

The proposed CCGT Power Plant triggers a comprehensive set of legislative requirements, primarily associated with air emissions, water use, waste management, hazardous materials and transport activities. By explicitly linking project components to legal provisions and compliance mechanisms, this assessment demonstrates that the project is capable of meeting all applicable statutory requirements, provided that the identified authorisations are obtained and the prescribed management measures are implemented.

Compliance with the identified legislative triggers is not limited to the identification of applicable laws, but is demonstrated through the integration of engineering design, operational controls, licensing requirements and monitoring systems. Each triggered legislative requirement is translated into a corresponding compliance mechanism, including but not limited to Atmospheric Emission Licence conditions, Water Use Licence requirements, Environmental Management Programme commitments, and Occupational Health and Safety procedures. These mechanisms are further operationalised through the monitoring and enforcement framework presented in Chapter 19, ensuring that compliance is measurable, auditable and enforceable throughout the project lifecycle.

8 Health Impact Assessment Framework and Methodology

It is important that a distinction is made between cHIA and Health Risk Assessment (HRA). HRA is usually concerned with the identification of hazards and risks to the workforce which relate to occupational health and safety and engineering design. Generally, HRA is “within the fence” while cHIA is “outside the fence” but there are distinct overlaps with cHIA often taking a central position as workplace activities can affect community health and existing community health needs or disease burdens can affect workplace health. cHIA is used to evaluate the public health consequences of proposed decisions in non-health sectors (CDC), while HRA is about “quantitative, analytic process to estimate the nature and probability of adverse human health effects associated with exposure to specific chemical contaminants or other hazards in the environment, now or in the future (CDC). Results from HRA can be used within a cHIA to predict human health effects of specific exposures. It is thus important that these assessments should not be placed into individual compartments but integrated to support an overall strategic plan for the Project. Workplace health is specifically outside the scope of an cHIA; however, it is important to understand which activities in the workplace can impact community health. This is important as the project activities can impart direct external influences on community health and the workforce also originates from the community and thus workplace activities and potential exposures must not be transferred back to the community at the end of shifts.

8.1 Potentially Affected Communities

To identify and quantify potential health impacts an accurate population profile is required and it is important to distinguish between differences in exposure and susceptibility. Thus, besides a demographic profile of the at-risk population and the identification of the

most vulnerable groups, it is crucial to understand how the development, construction and operational activities are likely to impact at both a household and community level. Impacts caused by resettlement, shifts in the social structures or influx triggered increases in population density are considered within the overall assessment.

The key aspects when considering the potential influence of the project to the Potentially Affected Communities (PACs) is the exposure pathway of the potential health determinant. The following key elements need to be considered:

- Whether there is a hazard;
- Who or what may be exposed to this hazard (pathway and rate of exposure to estimate the concentration/extent to which human receptors of concern may be exposed);
- The mode (air, water, food, vector, social determinants etc.) and route (inhalation, ingestion etc.) of exposure;
- The risk of exposure based on a likelihood and consequence analysis (magnitude, duration and length); and
- How sensitive or vulnerable the receptor is to the potential hazard or impact.

As part of the analysis, the relevant overall population is stratified into PACs. A PAC is a defined community within a clear geographical boundary where project-related health impacts may reasonably be expected to occur. PACs are inherently prospective and simply represent best professional judgments. PACs are likely to change over the course of project implementation; and there may be changes in the project design, and thus its longer-term implications are not fully known. This implies that the definition of PACs may need further adaptation as the project moves ahead; therefore, the specification of a PAC should be viewed as time-dependent as it will evolve over the project cycle. Findings of social and economic assessments, resettlement plans and migration management plans need to be carefully updated as this allows linkage between the PACs and key demographic determinants such as age structure and population numbers.

Mitigation strategies may also require specific considerations for the different PACs. On the one hand, not all the EHAs may be of concern for mitigation for the individual PACs. On the other hand, a separate risk analysis for a PAC may be indicated due to a particular susceptibility to a specific health impact. However, at this stage of the impact assessment only limited risk analysis will be carried out for different PACs based on the existing designs.

The properties adjacent to the proposed Project within a 1 km buffer are mainly industrial operations (Alton community). There are residential areas within approximately 3 -5 km of project, which would be the identified PAC's of this study (Figure 8-1). These are namely;

- Alton Communitty;
- Brackenham Community;
- Veld en Vlei Community;
- Aquadene Community;
- Wild en Weide Community;
- Birdswood Community; and
- Richards Bay central Community.

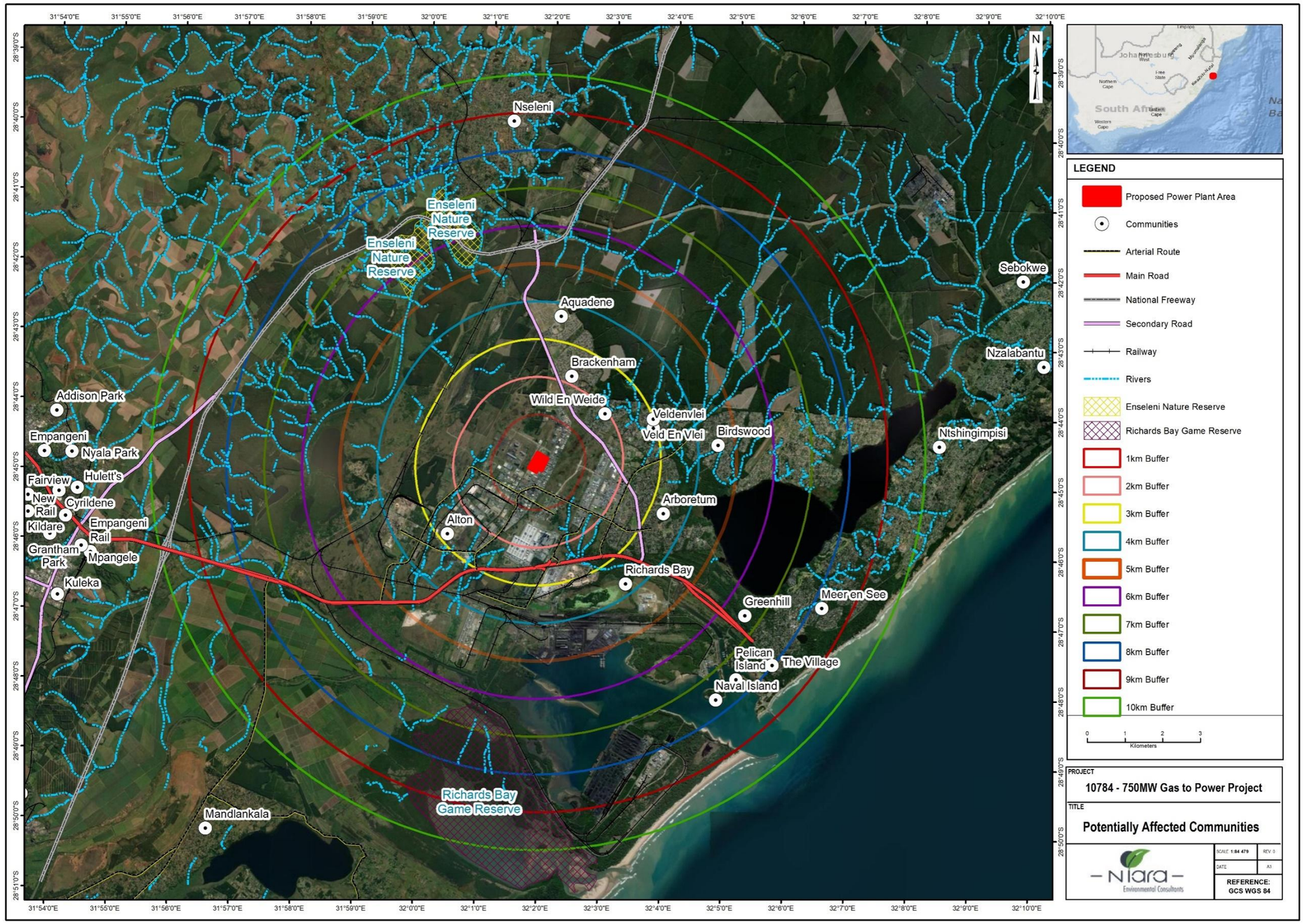


Figure 8-1: Potentially Affected Communities -within a 10km buffer

8.2 Introduction and Definition

A cHIA is a practical, multi-disciplinary process, combining a range of qualitative and quantitative evidence in a decision-making framework. A cHIA seeks to identify and estimate the lasting or significant changes of different actions on the health status of a defined population (Winkler et al., 2010). A cHIA may be defined as "a combination of procedures, methods and tools by which a Project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population". The objective of a cHIA is to deliver evidence-based recommendations to maximize potential positive health benefits and prevent or mitigate any detrimental health impacts that a Project may have on the potentially affected communities (PAC) (WHO/ECHP, 1999).

The WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. This is influenced through complex interaction of social, economic, genetic, and environmental factors (WHO, 2010c).

The ultimate deliverable of a cHIA is a Community Health Management Plan (CHMP) (Winkler et al., 2011). This plan would be based on evidence and stakeholder input, prioritised according to impacts and needs and having clear indicators to monitor and evaluate impacts and programs. The CHMP will also facilitate the development of social development programs linked to health.

The holistic model of health used in the cHIA process acknowledges that the health status of a population is affected by factors known as health determinants (e.g., education, income level, health services, etc.). All of these are closely interlinked and differentials in their distribution lead to health inequalities. These include both biophysical and social determinants of health as well and not just purely health outcomes. The methodology allows cHIA practitioners to consider how a Project affects these determinants of health, as well as health outcomes.

8.3 Determinants of Health

The driving concept behind cHIA is that individual and community health is not simply determined by health services or biological factors (e.g., age). It is also shaped by wider social, economic and environmental influences and factors. These health determinants are the factors that lead to health outcomes and include:

- Physical environment factors (e.g., air quality, water quality, hazards);
- Built environment factors (e.g., buildings, public spaces, roads, bike lanes);
- Livelihood factors (e.g., income, employment);
- Social and community factors (e.g., social support, family structure, access to services); and
- Lifestyle factors (e.g., diet, exercise, alcohol and tobacco use).

On the other hand, there are health-related outcomes. These health outcomes refer to the health status of both individuals and groups within a population or community and can include both positive and negative outcomes. The health determinants, as impacted by an activity, contribute to health outcomes in various ways, either directly or indirectly. Health outcomes can be measured by indicators such as morbidity rates (injuries), mortalities, asthma, diabetes, cardiovascular disease, and other diseases. Both determinants of health as well as health outcomes will be assessed in this Report. This Report does however use a broader definition of health outcomes that includes the behaviours and factors that contribute to an individual or community's health status. For example,

while physical activity is not exactly a health outcome, It is a determinant or contributor to health outcomes due to its ability to improve or exacerbate a health outcome. It is essentially a vulnerability factor that may increase the sensitivity and therefore the risk of someone who is exposed to a project-related hazard (e.g. air pollution).

Figure 8-2 illustrates the general relationship between an activity, the impacts activities can have on health determinants, and the resulting influences and changes to health-related outcomes. These determinants of health encompass all 12 EHAs.

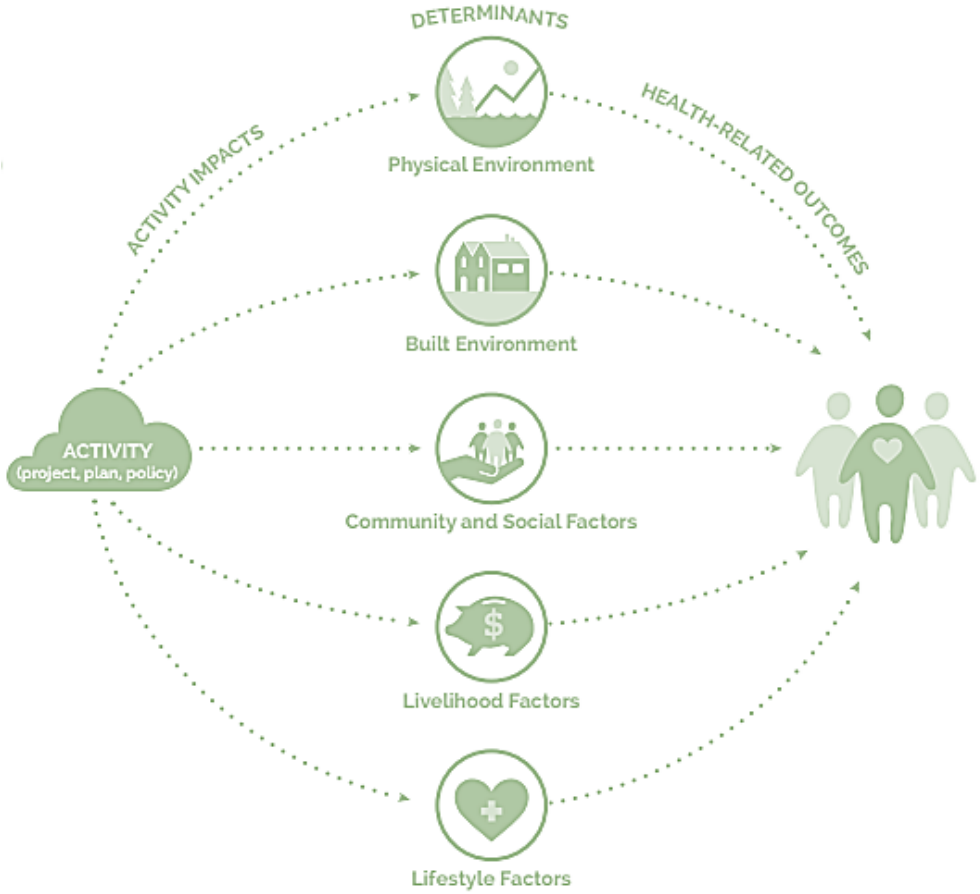


Figure 8-2: Activity Impacts, Health Determinants and Health-Related Outcomes

Source: CMM, 2010

8.4 Overview of the cHIA Process

A standardised approach was considered for the cHIA to ensure that evidence-based recommendations supported the impact assessment. To ensure compliance with the IFC performance standards, and especially PS4, the methodology outlined in the Good Practice Note for cHIA from the IFC, was adopted (IFC, 2009). The main elements of this are illustrated in Figure 8-3. These are also discussed briefly below so that the context of the cHIA is clear.

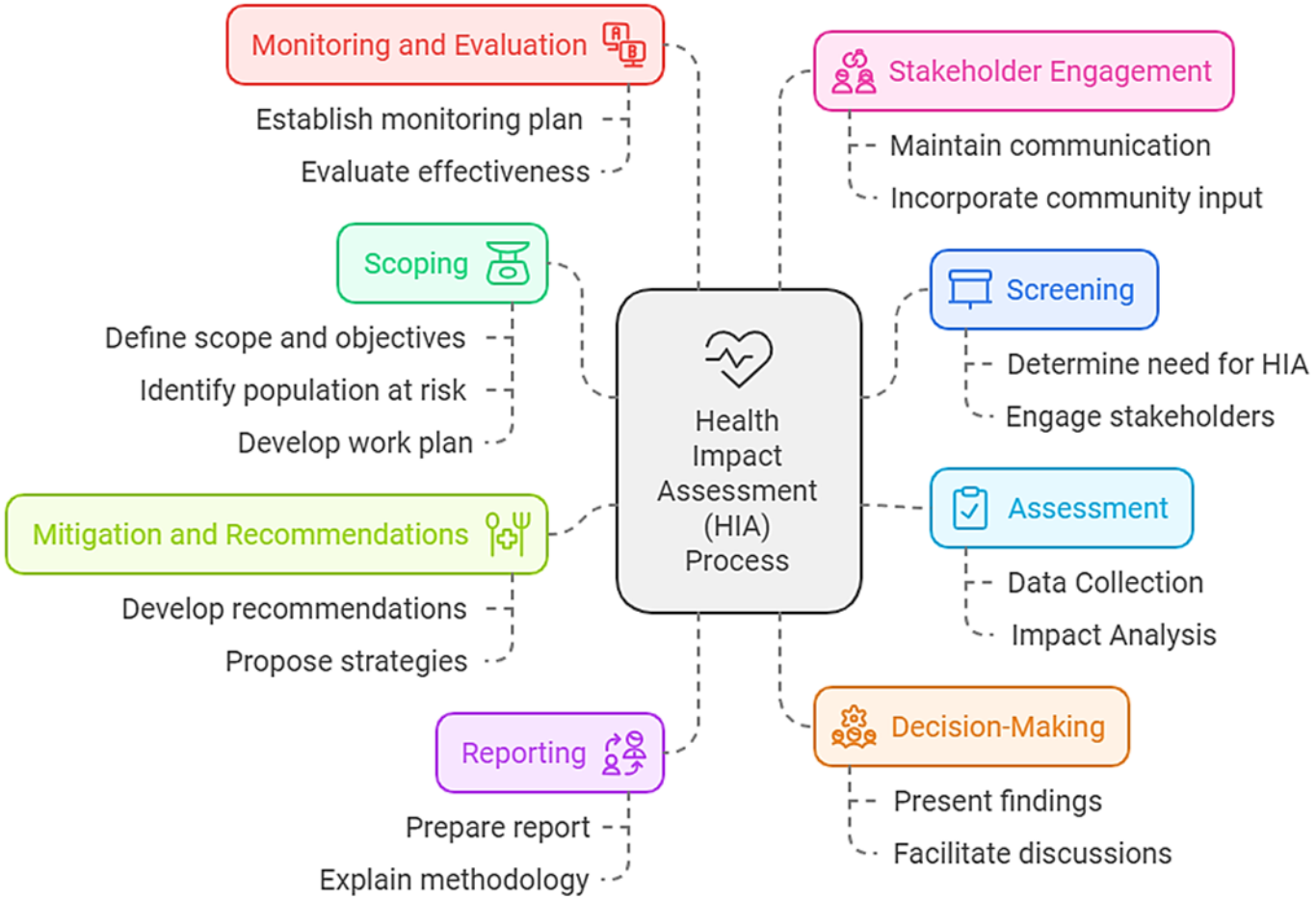


Figure 8-3: cHIA Procedure

(Source: CMM,2010)

The framework that is commonly used for a cHIA follows a six-step process (IFC, 2009):

- Screening (preliminary evaluation to determine the necessity of a cHIA);
- Scoping (identifying the range of potential Project-related health impacts and defining the terms of reference for the cHIA, based on published literature, local data and broad stakeholder consultation and how these may be influenced by the Project);
- Risk assessment (qualitative and quantitative appraisal of the potential health impacts in relation to defined communities and the Project development, including stakeholder participation);
- Appraisal and mitigation (development of a CHMP) based on the findings of the risk assessment);
- Implementation and monitoring (realisation of the CHMP including monitoring activities that allow for adaptation); and
- Evaluation and verification of performance and effectiveness (key step to analyse the cHIA process as a whole).

This cHIA aims to influence design and inform the construction, operation and decommissioning phases of the Project. As cHIAs are dynamic iterative processes they do require flexibility in their methodologies and tools, so that they can be fit for purpose for different Projects.

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8.4.1 Evidence Integration and Weight-of-Evidence Approach

The cHIA applied a weight-of-evidence approach to the identification, characterisation and evaluation of potential health impacts. This approach recognises that community health impacts associated with major industrial developments cannot generally be determined from a single source of evidence. Rather, health significance is established through the integration of information on the nature and magnitude of the environmental or social exposure, the characteristics and susceptibility of the potentially exposed population, the strength of scientific evidence linking the exposure to health outcomes, and the effectiveness of measures available to avoid or reduce exposure.

The assessment therefore considered several complementary evidence streams. These included project-specific specialist studies and modelling; available baseline environmental and population-health information; peer-reviewed epidemiological and toxicological literature; authoritative health guidance, including that published by the World Health Organization (WHO) and International Finance Corporation (IFC); information obtained through stakeholder engagement and field investigations; and professional judgement applied within the established cHIA framework.

Greater evidentiary weight was assigned to project-specific measured or modelled exposure information and to findings supported by authoritative systematic reviews, health guidelines and established epidemiological evidence. Qualitative stakeholder evidence was used principally to identify community concerns, perceived exposure pathways, vulnerable groups, local contextual factors and potential health outcomes requiring further investigation. Community perceptions were not treated as equivalent to measured environmental exposure; however, they remain relevant to health where concerns regarding pollution, safety, livelihood security or environmental change may themselves contribute to psychosocial stress and reduced wellbeing.

The assessment further distinguishes between hazard, exposure and health risk. The presence of a substance or activity capable of causing harm does not, in itself, demonstrate that an adverse health outcome will occur. Health risk depends on the existence of a credible exposure pathway, the magnitude, frequency and duration of exposure, and the susceptibility of the exposed population. Accordingly, the identification of a potential health hazard was followed by consideration of whether communities or workers could realistically be exposed and whether the anticipated exposure was sufficient to warrant a material health concern.

Where quantitative project-specific exposure information was available, including atmospheric dispersion modelling, noise modelling and traffic assessments, these findings were used to inform the health significance assessment. Where quantitative exposure information was unavailable, the cHIA did not infer numerical health outcomes or attributable disease incidence. Such pathways were instead assessed qualitatively or semi-quantitatively, with the associated uncertainty taken into account when determining significance and recommending mitigation or monitoring.

This approach is consistent with the IFC framework for Health Impact Assessment and with the broader principle that cumulative impacts should be evaluated in the context of the condition and resilience of affected environmental and social receptors, rather than solely in relation to the magnitude of an individual project's contribution (IFC, 2009; IFC, 2013).

8.5 Determining the scale of the cHIA

The level of assessment applied in a cHIA is determined by the magnitude of potential health impacts, the sensitivity of the receiving environment, and the scale and complexity of the proposed project. International guidance, including that of the IFC, distinguishes between three broad levels of assessment, namely desktop (screening), rapid appraisal, and comprehensive cHIA, each reflecting increasing levels of analytical depth, stakeholder engagement and data requirements (IFC, 2009; IFC, 2012).

The selection of the appropriate level is not a procedural step, but a risk-based determination, guided by two primary considerations:

- the potential health impact profile, including exposure to hazardous materials, baseline disease burden, environmental conditions and existing health system capacity; and
- the social sensitivity of the receiving environment, including proximity to communities, vulnerability of affected populations, socio-economic conditions, and the presence of existing or potential conflict, inequality or health system constraints.

These dimensions are illustrated conceptually in Figure 8-4, which demonstrates that projects with high potential health impacts and high social sensitivity require a comprehensive level of assessment, while projects of lower complexity may be addressed through rapid or desktop approaches.

In the case of the proposed 750 MW CCGT Power Plant, the determination of the assessment scale is informed by several project-specific and contextual factors.

Firstly, the project is located within the Richards Bay Industrial Development Zone, which is characterised by a cumulatively stressed environmental setting, particularly in relation to air quality. The presence of multiple industrial emission sources, combined with existing exceedances of key pollutants such as SO_2 and particulate matter, elevates the importance of assessing incremental contributions to population-level exposure.

Secondly, the project is situated in close proximity to multiple established residential areas, including Alton, Brackenham, Veld en Vlei, Aquadene, Wild en Weide, Birdswood and the broader Richards Bay urban area. This spatial configuration introduces direct community exposure pathways, particularly for air quality, traffic and psychosocial impacts, and increases the relevance of assessing impacts at a population level rather than a site-specific level.

Thirdly, the scale and nature of the proposed development, specifically a large-scale gas-fired power generation facility incorporating combustion turbines, cooling systems, fuel handling infrastructure and associated operational processes, introduces multiple

exposure pathways, including atmospheric emissions, traffic movement, occupational risks and potential system failure scenarios (e.g. stormwater contamination, chemical release).

Fourthly, the socio-economic context of the receiving environment reflects varying levels of vulnerability, including reliance on public health services, existing disease burdens and sensitivity to economic and social change. These factors influence how environmental exposures translate into actual health outcomes and necessitate a more detailed and integrated assessment.

Based on these considerations, the assessment has been undertaken as a comprehensive cHIA, as this level is most appropriate for:

- projects with defined community exposure pathways;
- developments located within cumulatively impacted environments;
- projects involving complex industrial processes and multiple health determinants; and
- situations where social determinants and health system interactions are material to outcomes.

It is, however, important to clarify the methodological basis of the assessment. While classified as comprehensive in scope and analytical depth, the cHIA has primarily utilised:

- existing specialist studies (e.g. air quality, noise, traffic, hydrology, socio-economic);
- publicly available health and demographic data;
- peer-reviewed scientific literature; and
- targeted stakeholder and key informant engagement.

This reflects a hybrid approach, consistent with international practice, where a comprehensive analytical framework is applied using a combination of available data and focused engagement, rather than extensive primary epidemiological surveys. This approach is appropriate given the nature of the project, the availability of robust specialist inputs, and the objective of assessing project-specific and cumulative health risks.

In summary, the selection of a comprehensive cHIA is justified by the interaction between project scale, cumulative environmental conditions and community exposure, and ensures that the assessment is sufficiently detailed, context-specific and defensible to support regulatory decision-making.

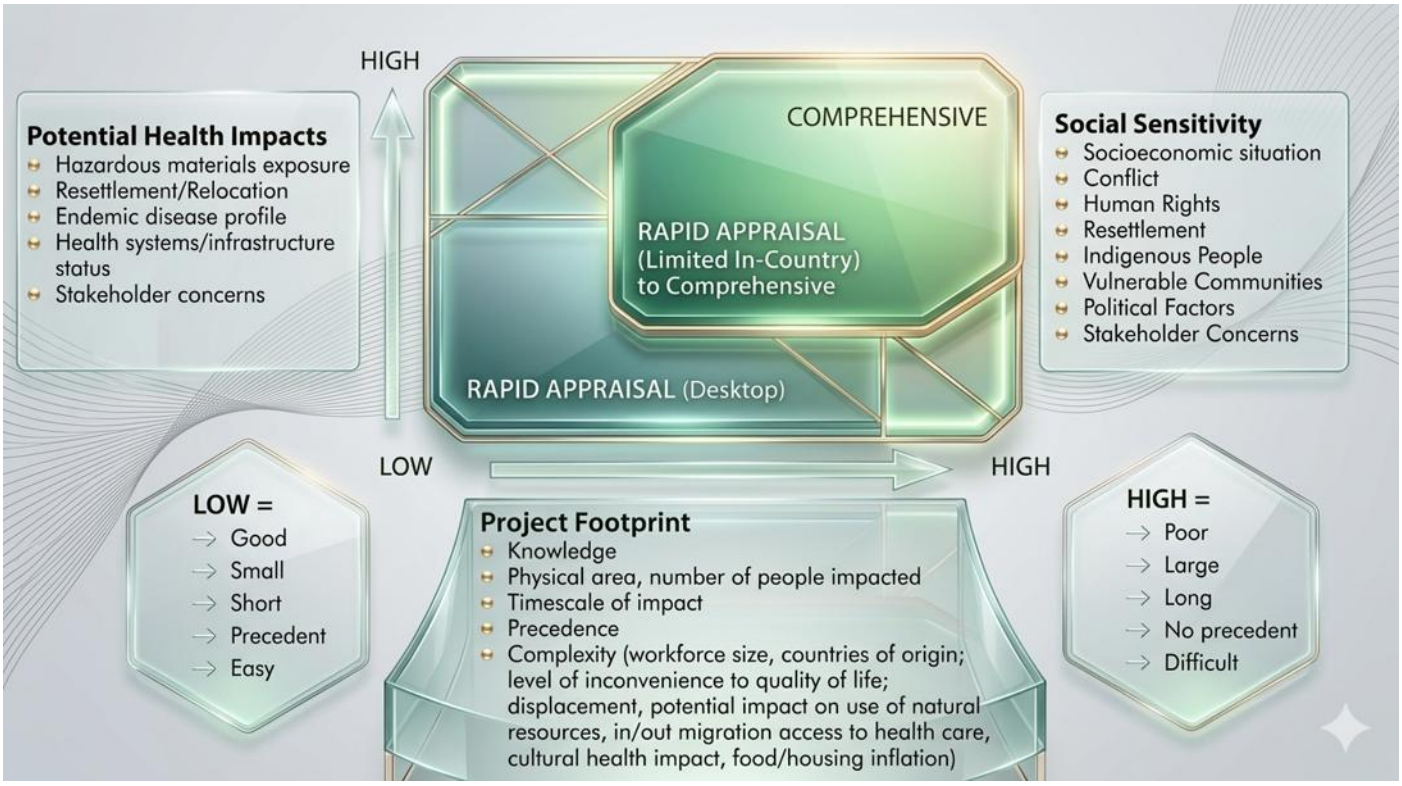


Figure 8-4: Selecting a cHIA Type

8.6 Mapping Health and Social Sensitivity Impacts

Mapping health and social sensitivity impacts was a crucial aspect of assessing the potential effects of the proposed CCGT power plant on local communities and the environment. Understanding these impacts helps stakeholders make informed decisions, minimize adverse effects, and enhance community well-being. This section outlines the methodologies and findings related to mapping health and social sensitivity impacts in the context of the CCGT power plant.

To effectively map health and social sensitivity impacts, a multi-faceted approach was employed, incorporating both quantitative and qualitative data collection methods. The following steps were undertaken

8.6.1 Data Collection and Analysis:

Demographic and health data: secondary data was sourced from national and local health statistics, including disease prevalence rates, access to healthcare facilities, and socio-economic indicators within the PACs.

Community engagement: Key Informant Interviews (KII) and focus group discussions were conducted with local stakeholders, including community leaders, healthcare professionals, and residents. This qualitative data provided insight into community health concerns and social sensitivities.

Geospatial analysis: GIS were utilized to map health data and identify areas of vulnerability in relation to the industrial operations. This included overlaying health data with information on industrial activities, infrastructure, and social services.

8.6.2 Identification of Health and Social Sensitivity Indicators:

Health Indicators: Indicators such as the prevalence of respiratory diseases, access to clean water, sanitation facilities, and incidence of vector-borne diseases were prioritized.

Social Sensitivity Indicators: Factors such as socio-economic status, education levels, community cohesion, and local cultural practices were considered to assess social sensitivity.

8.7 Stakeholder Analysis

Stakeholder engagement forms a central component of this cHIA, as it ensures that the assessment is informed not only by technical data, but also by the experience, knowledge and concerns of affected and interested parties. In the context of the proposed 750 MW CCGT Power Plant, stakeholder input is particularly important given the proximity of surrounding communities, the cumulative industrial setting of Richards Bay, and the presence of existing environmental and social pressures.

Stakeholder engagement has been undertaken to support the identification and validation of health risk pathways, receptor sensitivity and community-level concerns, particularly in relation to air quality, traffic, access to services and perceived environmental change. This process ensures that the assessment reflects actual conditions on the ground, including both measurable impacts and perceived risks, which are relevant to psychosocial health and community acceptance.

The stakeholder group for this project includes:

- Affected communities, including residents of Alton, Brackenham, Veld en Vlei, Aquadene, Wild en Weide, Birdswood and the broader Richards Bay area, who represent the primary receptors of potential community health impacts;
- The project proponent (Mabasa Energy and Fuels (Pty) Ltd), responsible for project design, implementation and operational management;
- Environmental and technical specialists, including those responsible for air quality, noise, traffic, hydrology and socio-economic assessments, whose inputs inform the identification of exposure pathways and impact significance;
- Relevant authorities, including local, provincial and national government departments responsible for environmental management, health services, planning and regulatory oversight; and
- Interested and Affected Parties (I&APs), including non-governmental organisations and other stakeholders with an interest in environmental performance, public health and socio-economic outcomes.

Stakeholder engagement has been conducted through the broader Public Participation Process and targeted interactions, including Key Informant Interviews and consultation with relevant institutions. Inputs from stakeholders have been integrated into the assessment to refine the understanding of health risks, vulnerability and local context, and to inform the development of mitigation and monitoring measures.

8.8 Baseline Data Collection

The data collection activities of the cHIA included a desktop literature review, participatory data collection (stakeholder input – informal, randomly selected discussions) and direct observation. This method allows for the triangulation of data and provides a robust description of data.



Figure 8-5: Baseline Data Collection for cHIA

Niara used a combination of three sampling methods, namely;

- **Snowball Sampling**: Use initial participants (registered I&APs) to recruit further participants, particularly useful in hard-to-reach populations.

  To this extent Niara requested the I&AP data base that Nemai Consulting had developed during their public participation phase, which we adopted for the cHIA engagements. Niara further went on site and conducted interviews with some of the registered I&APs who helped to expand the data base by directing Niara to other key I&APs that should be consulted during cHIA.
- **Probability Sampling**: Ensures every member of the population has a known chance of being selected.

  To this extent Niara sent emails and SMS's to all registered Interested and Affected Parties (I&APs) providing them with the opportunity to participate in the cHIA. Communication provided I&APs with a link to our website where they could access questionnaires to be used during the assessment, an email address to send completed questionnaires was provided as well as a deadline for submissions to ensure inclusion in study.
- **Stratified Sampling**: Divide the population into subgroups (e.g., directly-impacted residents in PACs, healthcare workers, and key stakeholders) and randomly sample from each sub-group

  Due to time frames provided to Niara to conduct the cHIA, Niara could not conduct in-person interviews with all registered I&APs as the cHIA follows a different methodology from the PPP undertaken by Nemai Consulting. Niara chose stratified sampling for I&APs which involved engaging selected stakeholders based on specific sampling criteria/sub-group, and participation occurred at various levels. All stakeholders identified for in-person interviews during the cHIA were engaged

via email and phone calls setting up appointments for consultation during our site visit. These included (but were not limited to) directly-affected PAC's, key informants, health care facilities and influential/active Non-Government Organisations (NGOs) as well as directly-impacted families living near the project site.

8.8.1 Desktop Work

This involved a literature review of health-related data in the public domain as well as a review of existing Project documentation and related secondary data. The literature review was completed before the field visit so that data gaps could be identified and questioning routes for KII and questionnaires could be developed. Priority was given to topics that contributed the most towards the burden of disease in South Africa and the proposed Project site and also to health-related incidents of concern to industrial developments.

The desktop work included an extensive literature review to inform the health profiling of the region and where possible the population surrounding the proposed Project site. The desktop work described the broad health status of the population, based on a systematic review of the 12 EHAs.

The outcomes of the literature review are presented in Section 8 of this Report and have been combined with the information that was acquired during the field visit and subsequent Project documentation review.

8.8.2 Field Visit

A field visit was undertaken in August 2024 to support the baseline assessment and ground-truth the findings of the desktop review. The purpose of the site visit was to obtain project-specific, contextually relevant information on community health conditions, service access and spatial relationships between the proposed development and surrounding receptors.

The fieldwork included semi-structured, one-on-one engagements with community members across the identified Project Area of Influence, capturing both male and female perspectives. These interactions provided insight into community health concerns, perceived risks, access to services and general living conditions, which are not fully reflected in secondary datasets.

In addition, the field visit facilitated the collection of supplementary qualitative and quantitative information not readily available in the public domain. This included engagement with local health facilities, review of available health system information, and consideration of relevant unpublished or institution-specific data sources where accessible.

Key informants were identified during the site visit, and targeted interviews were conducted using semi-structured questionnaires, allowing for consistent but flexible data collection across stakeholders, including community representatives and health practitioners. The visit also included on-site observation of local health infrastructure, enabling an assessment of facility condition, service availability and operational functionality. This was complemented by an evaluation of the health management information context, to the extent observable and accessible at facility level.

Importantly, the field visit allowed for direct visualisation of the proposed project site in relation to surrounding communities, including Alton, Brackenham, Veld en Vlei, Aquadene, Wild en Weide and Birdswood. This spatial understanding was critical in confirming proximity, potential exposure pathways and areas of heightened sensitivity, particularly in relation to air quality, transport routes and industrial land use.

The fieldwork was conducted by Nolwazi Dlamini and Orlinda Mafika, and provided a critical link between the technical assessment and the lived reality of affected communities. It strengthened the cHIA by ensuring that the analysis is grounded in observed conditions and informed by direct stakeholder input, rather than relying solely on secondary data.

8.8.3 Focus Group Discussion

Focus Group Discussions (FGD) were conducted with community members around the Project site. The FGDs were held with the following groups:

- Alton Communitty;
- Brackenham Community;
- Veld en Vlei Community;
- Aquadene Community;
- Wild en Weide Community;
- Birdswood Community; and
- Richards Bay central Community.

The approach to the FDG was to randomly approach community members within communities than are within a 3-5 km buffer of the project site. Community members were approached and a PAC HIA Questionnaire was conducted onsite.

8.8.4 Key Informant Interviews

Interviews were conducted with numerous key informants namely;

- Health care workers; and
- Schools around PAC's.

The objective of these interviews were to gain a better understanding of the structure and capacity of the local health system and also to enquire what health statistics would be available at the local level and where possible obtain authorised copies of statistics and reports. The KIIs were conducted with health personnel around project site, using a semi-structured questionnaire. This included specific questions about health, social and environmental determinants but with a different emphasis, depending on the level and role of each key informant being interviewed. Interviews and discussions were open and conducted in English.

8.9 Potential Impact Categorisation: Environmental Health Areas Framework

A World Bank analysis demonstrated that an almost 50% improvement in major health outcomes could be achieved by improvements in four sectors: (i) housing and urban development; (ii) water, food and sanitation; (iii) transportation; and (iv) communication. Building upon this sectoral analysis and incorporating a broad perspective on "environmental health" led to the development of a defined set of environmental health areas which have been adopted in the IFC Notes for PS4 the 2005 IPIECA (International Petroleum Industry Environmental Conservation Association) cHIA guidelines and the IFC cHIA GPN.

The IFC methodology uses twelve (12) EHAs to support the systematic analysis of health considerations. These are summarised in Table 8-1.

The set of EHAs provides a linkage between project-related activities and potential positive or negative community-level impacts and incorporate a variety of biomedical and key social determinants of health. In this integrated analysis, cross-cutting environmental and social conditions that contain significant health components are identified instead of a cHIA focusing primarily on disease-specific considerations – as is frequently done in many biomedical analyses of potential project-related public health impacts. The EHA framework is based on an analysis performed and published by the World Bank.

Table 8-1: Environmental Health Areas

Environmental Health Areas (EHAs)	
1.	Vector-related diseases – Mosquito, fly, tick and lice-related diseases (e.g., malaria, dengue, yellow fever, lymphatic filariasis, rift valley fever, etc.).
2.	Acute respiratory infections and respiratory effects from housing – Transmission of communicable diseases (e.g., acute respiratory infections, pneumonia, tuberculosis, meningitis, plague, leprosy, etc.) and respiratory infections.
3.	Veterinary medicine and zoonotic issues – Diseases affecting animals (e.g., bovine tuberculosis, swinepox, avian influenza) or that can be transmitted from animal to human (e.g., rabies, brucellosis, Rift Valley fever, Lassa fever, leptospirosis, etc.).
4.	Sexually-transmitted infections, including Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) – Sexually-transmitted infections such as syphilis, gonorrhoea, chlamydia, hepatitis B and, most importantly, HIV/AIDS. Linkages of TB will be discussed where relevant under HIV, but often linked to EHA1.
5.	Soil-, water- and waste-related diseases – Diseases that are transmitted directly or indirectly through contaminated water, soil or non-hazardous waste (e.g., diarrheal diseases, schistosomiasis, hepatitis A and E, poliomyelitis, soil-transmitted helminthiases, etc.).
6.	Food- and nutrition-related issues – Adverse health effects such as malnutrition, anaemia or micronutrient deficiencies due to e.g., changes in agricultural and subsistence practices, or food inflation; gastroenteritis, food-borne trematodiases, etc. This will also consider feeding behaviours and practices.
7.	Accidents/injuries – Road traffic or work-related accidents and injuries (home and Project related); drowning.
8.	Exposure to potentially hazardous materials, noise and malodours – This considers the environmental health determinants linked to the Project and related activities. Noise, water and air pollution (indoor and outdoor) as well as visual impacts will be considered in this biophysical category. It can also include exposure to heavy metals and hazardous chemical substances and other compounds, solvents or spills and releases from road traffic and exposure to mal-odours. There is a significant overlap in the environmental impact assessment in this section. Ionizing radiation also falls into this category.
9.	Social determinants of health – Including psychosocial stress (due to e.g., resettlement, overcrowding, political or economic crisis), mental health, depression, gender issues, domestic violence, suicide, ethnic conflicts, security concerns, substance misuse (drug, alcohol, smoking), family planning, health seeking behaviours, etc. There is a significant overlap in the Social Impact Assessment (SIA) in this section.
10.	Cultural health practices – Role of traditional medical providers, indigenous medicines, and unique cultural health practices.
11.	Health systems issues – Physical health infrastructure (e.g., capacity, equipment, staffing levels and competencies, future development plans); program management delivery systems (e.g., malaria-, TB-, HIV/AIDS-initiatives, maternal and child health, etc.).
12.	Non-communicable diseases – cardiovascular diseases, cancer, diabetes, obesity, etc.

8.10 Direct versus Indirect and Cumulative Effects

The purpose of a cHIA is to 'unravel the determinants of health, which include individual, social and environmental, and institutional factors, that are directly or indirectly (representing underlying issues), and cumulatively affected by the proposed Project. Consideration of these aspects allows for better management of the risks associated with individual determinants.

Numerous health determinants are affected by individual factors which may be genetic, biological, lifestyle or behavioural in nature, and specific circumstances. These factors include indicators of vulnerability that describes individual exposure, susceptibility or the ability to cope. Examples include gender, age, dietary intake, exercise, alcohol and tobacco use, education, and employment. The relationship between a project and the individual determinants is complex and often controversial. 'The cHIA is not a "social engineering" exercise; instead, the assessment aims to systematically analyse those potential direct, indirect (underlying), and cumulative community impacts that are predicted to occur due to the project.

Activities identified for the project during the construction, commissioning, operational and decommissioning phases have been used to identify relevant generic key issues as recommended by the IFC cHIA Guidelines. Associated EHAs and their implications in terms of the project activities were then used to guide the selection of potential positive and/or negative impacts.

8.11 Project Process Flow and Exposure Pathway Linkage

The assessment of human health impacts for the proposed 750 MW CCGT Power Plant is explicitly grounded in the operational process flow of the facility. Health risks associated with the project are not assessed in abstract terms, but are directly derived from the physical processes, infrastructure components and operational systems that define the plant.

This approach ensures that all identified health risks are traceable to specific project activities and emission sources, thereby strengthening the scientific and regulatory defensibility of the assessment.

The proposed facility comprises an integrated energy generation system in which natural gas is combusted to generate electricity through a combined cycle process. Each stage of this process introduces distinct potential exposure pathways for both community and occupational receptors.

8.11.1 Natural Gas Receipt and Supply Interface

Natural gas will be supplied to the facility via infrastructure linked to the Port of Richards Bay terminal. While upstream pipeline infrastructure may fall outside the immediate project scope, the gas receipt interface represents a critical operational node where pressurised gas is introduced into the plant system.

The primary health risks at this stage are associated with accidental releases, leaks or failures in gas handling systems. Although natural gas is not inherently toxic, it acts as an asphyxiant in confined environments and presents a significant fire and explosion hazard. Exposure pathways are therefore primarily acute and event-driven, affecting workers and emergency responders rather than surrounding communities.

8.11.2 Gas Turbine Combustion (GE 9FA Units)

The combustion turbines represent the primary source of atmospheric emissions. Natural gas combustion within the GE 9FA turbines generates high-temperature exhaust gases containing oxides of nitrogen (NOx), nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2) and particulate matter.

These emissions are released via stacks and dispersed into the atmosphere, forming the dominant chronic exposure pathway for surrounding communities. Inhalation of these pollutants, particularly under cumulative industrial conditions, drives respiratory and cardiovascular health outcomes.

This component is therefore the primary determinant of community-level toxicological risk.

8.11.3 Heat Recovery Steam Generators (HRSGs)

The HRSGs capture waste heat from turbine exhaust to generate steam, improving overall thermal efficiency. While the HRSGs do not introduce additional primary emissions, they form part of the exhaust pathway and influence emission characteristics such as temperature, plume rise and dispersion behaviour.

From a toxicological perspective, their significance lies in modifying the dispersion profile of pollutants, thereby influencing receptor exposure patterns rather than introducing new hazards.

8.11.4 Steam Turbine Generation

Steam generated in the HRSGs is used to drive a steam turbine, producing additional electricity. This process is largely enclosed and does not represent a major direct source of emissions. However, it contributes to the overall thermal load and operational footprint of the plant.

The primary health relevance at this stage is occupational, including exposure to high-temperature systems, pressurised steam and mechanical hazards.

8.11.5 Cooling System and Induced Draft Cooling Tower

The cooling system, including the condenser and induced draft cooling tower, represents a significant environmental interface. The cooling tower dissipates heat through evaporation, producing visible plumes of water vapour and generating aerosolised droplets (drift).

Exposure pathways associated with this system include:

- inhalation of drift droplets containing dissolved solids and treatment chemicals;
- potential biological exposure, particularly to *Legionella* bacteria in poorly managed systems;
- visual and psychosocial exposure related to visible plumes.

While the visible plume itself is primarily water vapour, it contributes to community perception of pollution and may influence psychosocial stress and risk perception.

8.11.6 Condenser System and Cooling Water Requirements

The condenser system requires substantial volumes of cooling water, introducing risks associated with water abstraction, thermal loading, and chemical treatment. Cooling water systems typically require dosing with biocides, anti-scalants and corrosion inhibitors.

Health risks are associated with:

- chemical exposure during dosing and maintenance (occupational);
- environmental contamination through leaks, overflows or blowdown discharge;
- indirect ecological impacts affecting downstream receptors.

8.11.7 Blowdown and Wastewater Management

Cooling tower blowdown and process wastewater must be managed to prevent accumulation of dissolved solids and chemical contaminants. These streams may contain elevated concentrations of treatment chemicals, metals and suspended solids.

The primary exposure pathways include:

- dermal and ingestion exposure through contaminated water;
- downstream ecological impacts affecting community health;
- accidental releases during system failure events.

The effectiveness of wastewater handling and containment systems is therefore critical to limiting environmental and human health risk.

8.11.8 Condensate Return Systems

Condensate return systems recycle water within the plant, reducing overall water demand. While largely enclosed, these systems may present occupational exposure risks during maintenance, particularly where high-temperature fluids and chemical residues are present.

8.11.9 Transformers and Switchyard

Electrical infrastructure, including transformers and the 275 kV switchyard, introduces hazards associated with transformer oils, electrical fields and potential fire scenarios.

Exposure pathways include:

- chemical exposure through oil leaks or spills;
- inhalation of combustion products during fires;
- occupational risk during maintenance and fault conditions.

These risks are typically low under normal operation but may become significant under abnormal or emergency conditions.

8.11.10 Emergency Backup Systems

Emergency generators and backup systems, typically diesel-powered, introduce additional emission sources during testing or emergency operation. Diesel combustion produces particulate matter, nitrogen oxides and hydrocarbons, which are toxicologically relevant.

These emissions are episodic rather than continuous but contribute to cumulative exposure, particularly for workers and nearby receptors.

8.11.11 Maintenance Chemicals, Lubricants and Fuels

The plant requires ongoing use of maintenance chemicals, lubricants, hydraulic oils and cleaning agents. These substances introduce occupational exposure pathways through dermal contact and inhalation, as well as environmental exposure pathways through accidental spills and contaminated runoff.

8.11.12 Fire Suppression Systems

Fire suppression systems may utilise water, foam or chemical agents. While essential for safety, these systems may generate contaminated runoff during fire events, introducing acute environmental exposure pathways.

8.11.13 Stormwater Management Systems

Stormwater systems separate clean and contaminated runoff. Failure of these systems may result in hydrocarbon and chemical contamination of receiving environments, particularly given the site's drainage toward a canal system with wetland characteristics.

8.11.14 Stack Emissions

Stack emissions represent the dominant continuous exposure pathway for surrounding communities. Pollutants released from the stacks disperse into the atmosphere and contribute to cumulative air quality conditions within the Richards Bay airshed.

This pathway underpins the majority of long-term health risks associated with the project.

8.11.15 Visible Steam Plumes

Visible plumes from the cooling tower consist primarily of water vapour but may influence community perception of pollution and environmental degradation. While not a direct toxicological hazard, this pathway contributes to psychosocial stress and perceived health risk.

9 Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

Table 9-1: Impact Rating Methodology

Magnitude		Quantitative Score
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant		
(VL) Very Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	1
(L) Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected significantly.	2
(M) Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.	3
(H) High	Function or process of the affected environment is disturbed to the extent where it temporarily ceases.	4
(VH) Very High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	5
Extent		
Classification of the physical and spatial aspect of the impact		
(F) Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
(S) Site	The impact could affect the whole, or a significant portion of the site.	2
(R) Regional	The impact could affect the area including the neighbouring Farms, the transport routes and the adjoining towns.	3
(N) National	The impact could have an effect that expands throughout the country (South Africa).	4
(I) International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.	5
Reversibility		
This describes the degree to which the impact can be managed following mitigation. The classes are rated as follows:		
Reversible	Can be avoided, managed or mitigated in such a way that natural processes are not affected and returned to natural state	1
Recoverable	Can be avoided, managed or mitigated to the degree that functions and processes continue in a modified way)	3
Irreversible	Irreversible impact (may cause irreplaceable loss of resources). Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	5
Duration		

The lifetime of the impact, that is measure in relation to the lifetime of the proposed development.		
(S) Short Term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.	1
(SM) Short - Medium Term	The impact will be relevant through to the end of a construction phase.	2
(M) Medium	The impact will last up to the end of the development phases, where after it will be entirely negated.	3
(L) Long Term	The impact will continue or last for the entire operational lifetime (i.e. exceed 20years) of the development, but will be mitigated by direct human action or by natural processes thereafter.	4
(P) Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient.	5
Probability		
This describes the likelihood of the impact actually occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:		
(I) Unlikely	The possibility of the Impact occurring is none, due to the circumstances or design. The chance of this Impact occurring is zero (0%)	1
(P) Possible	The possibility of the Impact occurring is very low, due either to the circumstances or design. The chance of this Impact occurring is defined as 25% or less	2
(L) Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of Impact occurring is defined as 50%	3
(H) Highly Likely	It is most likely that the Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.	4
(D) Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.	5
Weighting Factor		
Subjective score assigned by Impact Assessor to give the relative importance of a particular environmental component based on project knowledge and previous experience. Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance		
(L) Low		1
(LM) Low - Medium		2

(M) Medium	3
(MH) Medium - High	4
(H) High	5

Mitigation Measures and Mitigation Efficiency
Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures
Mitigation measures were recommended to enhance benefits and minimise negative impacts and address the following:
Mitigation objectives: what level of mitigation must be aimed at: For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make "educated guesses" based on professional experience;
Recommended mitigation measures: For each impact the specialist must recommend practicable mitigation actions that can measurably affect the significance rating. The specialist must also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided;
Effectiveness of mitigation measures: The specialist must provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible; and
Recommended monitoring and evaluation programme: The specialist is required to recommend an appropriate monitoring and review programme, which can track the efficacy of the mitigation objectives. Each environmental impact is to be assessed before and after mitigation measures have been implemented.
The management objectives, design standards, etc., which, if achieved, can eliminate, minimise or enhance potential impacts or benefits. National standards or criteria are examples, which can be stated as mitigation objectives.

Negligible	The impact will be mitigated to the point where it is of limited importance	</=20
Low	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels	</=40
Moderate	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw	</=60
High	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.	>60

Table 9-2: Recapitulation of Impact Rating Matric

Magnitude	Weight
Very Low	1
Low	2
Medium	3
High	4
Very High	5

Extent	Weight
Footprint	1
Site	2
Regional	3
National	4
International	5

Reversibility	Weight
Reversible	1
Recoverable	3
Irreversible	5

Duration	Weight
Short term	1
Short-Medium term	2
Medium term	3
Long term	4
Permanent	5

Probability	Weight
Unlikely	1
Possible	2
Likely	3
Highly Likely	4
Definite	5

Significance	Weight
Negligible	</=20
Low	</=40
Moderate	</=60
High	>60

9.1 Direct versus Indirect and Cumulative Effects

Social impacts can be categorized into direct, indirect, and cumulative effects:

- **Direct Effects:** These are the immediate and primary impacts of the proposed Development of a 750MW Combined Cycle Gas Turbine Power Plant on the surrounding communities, cultures, and societies. They are usually tangible and can be directly attributed to the project activities. Examples include:
  - Displacement of households or communities due to land acquisition.

- Changes in local employment opportunities and income levels.
- Physical changes to the landscape and natural environment.
- Impacts on local infrastructure such as roads, water supply, and health facilities.

- **Indirect Effects:** These are the secondary impacts that result from the direct effects of the proposed Development of a 750MW Combined Cycle Gas Turbine Power Plant . They are often less immediate and may be more diffuse, making them harder to predict and assess. Examples include:
  - Changes in the local economy due to increased demand for goods and services.
  - Changes in social dynamics, including migration patterns and community cohesion.
  - Changes in land use patterns and access to natural resources.
  - Changes in local markets and prices of goods and services.
- **Cumulative Effects:** These are the combined impacts of the proposed Development of a 750MW Combined Cycle Gas Turbine Power Plant along with other existing and potential future projects, activities, and developments in the area. Cumulative effects take into account the synergistic or additive impacts that multiple stressors may have on the social fabric of the community and the environment. Examples include:
  - Increased pressure on local infrastructure and services due to multiple projects.
  - Cumulative environmental degradation, such as loss of biodiversity and water pollution.
  - Cumulative social changes, including shifts in cultural practices and community identity.
  - Cumulative economic impacts, such as changes in land values and employment patterns.

Assessing direct, indirect, and cumulative effects requires a comprehensive understanding of the context, stakeholder perspectives, and potential pathways of impact.

9.2 Impact Variables to be Assessed

The following are usually assessed within a HIA:

- Population impacts, including population change (ethnic composition, size, etc.); inflow or outflow of temporary workers; presence of seasonal residents; and relocation of individuals and families.
- Socio-economic impacts, including job creation, enhanced economic equity; change in employment equity; impacts on women and possible economic and social vulnerabilities as a result of the Project; and changes in the industrial/commercial focus of the community.
- Individual and family level impacts, including disruption in daily living and movement patterns; disruption in social networks; introduction of new social classes and tourism and leisure impacts.
- Community/institutional arrangements, such as attitude formation; interest group activity; and alteration in size and structure of local government.
- Public health, safety and security impacts.
- Community infrastructure, including changes in community infrastructure; land acquisition and disposal; and effects on known cultural, historical and archaeological sites.

- Intrusion impacts, including noise pollution, light pollution, visual pollution, air pollution and malodour pollution.

Only impacts relevant to this proposed Project have been analysed and additional impacts that emerge during the PPP and consultation phases will be included.

9.3 Limitations and Assumptions

- This report and assessment are dependent on the accuracy of the publicly-available secondary information; from sources such as Statistics South Africa (Census, 2011 and Community Survey, 2016) and the Health Systems Trust (District Health Barometer, 2022/23). Where possible, the information was verified during a site visit. The data was considered sufficient for the purpose of this study.
- It should be noted that the social environment is a dynamic, constantly changing entity. It is therefore not always possible to predict all social impacts at a very high level of accuracy. Care has been taken to identify the most likely and significant impacts that are the most relevant to the current local context.
- Individuals view possible impacts differently due to their association with the anticipated impact. Impacts could therefore be perceived and rated differently from those contained in the Biophysical Studies. Further public participation can be used to inform and update findings.
- Limitations encountered on site include (but are not limited to);
- The public clinics declining to participate in the interviews for health care personnel / key informants. This was due to protocols that require a consultant to get permission from the district. Although the procedure was too lengthy for this cHIA, it will be taken into consideration for upcoming cHIAs. In order to get around this obstacle, the field consultants interviewed general practitioners for this cHIA.
- Sampling bias: results may not be 100% accurate as the survey sample is not representative of the entire community and may not accurately reflect the views or conditions of the broader population. This was overcome by ensuring a adequate number of community members were interviewed in each PAC which would thus serve as a baseline for that particular PAC
- Community trust and privacy concerns: there was indication of lack of trust between community members and surveyors and so some respondents were less willing to answer more sensitive questions. Ensuring the privacy and confidentiality of respondents was challenging, especially in small communities where anonymity is harder to maintain. This was overcome by providing interviewees the option of answering the questionnaire anonymously and emphasising that their responses would solely be used for this particular cHIA.

10 Country Health Profile: South Africa

Since the democratic transition in 1994, South Africa has experienced major shifts in population health. Early gains in primary healthcare access and equity were later reversed by the rapid escalation of HIV in the late 1990s and early 2000s, which reduced life expectancy and placed severe pressure on the public health system. The subsequent scale-up of antiretroviral therapy (ART), supported by domestic investment and international mechanisms, has fundamentally altered national health outcomes. South Africa now operates the largest HIV treatment programme globally, with approximately 5.9 million people receiving ART as of 2023

(UNAIDS, 2023; National Department of Health, 2023). Adult HIV prevalence in the 15–49-year age cohort remains high at approximately 17–18%, but AIDS-related mortality has declined markedly due to treatment coverage (Stats SA, 2023; UNAIDS, 2023). Life expectancy has correspondingly improved from approximately 52 years in the mid-2000s to approximately 65.5 years in 2022 (Stats SA, 2023).

South Africa continues to face a quadruple burden of disease, comprising HIV/TB, maternal and child health challenges, a dominant and rising non-communicable disease (NCD) burden, and persistently high violence and injury mortality. For purposes of an industrial cHIA, the relevance of this national profile is not descriptive breadth, but the way it defines baseline vulnerability, particularly cardiopulmonary vulnerability and injury risk, against which incremental exposures (particulate matter, noise, traffic and stress) must be assessed for the proposed Newlyn project in Saldanha Bay.

10.1 Communicable Diseases

Tuberculosis remains a major public health concern and South Africa remains among global high-burden TB countries, despite long-term declines since the mid-2000s. The estimated TB incidence in 2022 was approximately 468 per 100,000 population, down from levels exceeding 800 per 100,000 in the mid-2000s (WHO Global TB Report, 2023). HIV co-infection remains common, though declining with improved ART coverage. Drug-resistant TB remains a concern, but improved diagnostics and treatment regimens have strengthened response capacity. Treatment success rates for drug-sensitive TB now exceed 85%, while outcomes for multidrug-resistant TB have improved compared to earlier years (WHO, 2023).

Immunisation coverage remains comparatively strong, although COVID-19 disruptions temporarily reduced uptake in some areas. Expanded vaccine programmes, including HPV vaccination for school-aged girls, support long-term cancer prevention (National Department of Health, 2023). In the context of this cHIA, communicable disease relevance is primarily indirect: chronic respiratory and immune vulnerability can increase sensitivity to particulate exposure and respiratory irritants, and construction-phase workforce influx may interact with local primary healthcare capacity.

10.2 Maternal and Child Health

Maternal and child health indicators have improved substantially since peaks in the late 2000s, reflecting improved obstetric care and HIV treatment coverage. The maternal mortality ratio is estimated at approximately 109 deaths per 100,000 live births in 2021 (Stats SA, 2023). Under-five mortality is estimated at approximately 27 deaths per 1,000 live births, with neonatal mortality around 10 per 1,000 live births (Stats SA, 2023; UNICEF, 2023). These statistics provide context for population vulnerability, but they are not primary impact drivers for the proposed terminal; their relevance lies in identifying children as a sensitive receptor group for air pollution and cumulative stress, rather than suggesting that a port-industrial project would alter maternal or neonatal outcomes at scale.

10.3 Non-Communicable Diseases (NCDs)

Non-communicable diseases now account for the majority of mortality in South Africa. Approximately 55–60% of all deaths are attributable to NCDs, including cardiovascular disease, diabetes, chronic respiratory disease and cancers (Stats SA, 2023; WHO, 2023). Hypertension prevalence among adults exceeds 30%, with suboptimal control rates. Diabetes prevalence is increasing,

particularly in urban and peri-urban contexts, and cardiovascular disease is a leading cause of premature mortality, with a substantial proportion of deaths occurring before the age of 60 years.

Overweight and obesity remain major risk factors. National data indicate that approximately 68% of women and 31% of men are overweight or obese (South African Demographic and Health Survey, 2016; WHO country estimates, 2023). These burdens are directly relevant to the Newlyn project because particulate matter exposure and environmental noise are internationally recognised contributors to cardiopulmonary risk. In an industrial corridor such as Saldanha Bay, even small incremental exposures can interact with an already high background prevalence of hypertension, metabolic disease and chronic respiratory vulnerability, particularly among older adults and low-income households with limited adaptive capacity.

10.4 Violence and Injury

Injury and violence remain significant contributors to mortality and disability. Interpersonal violence and road traffic injuries are major causes of premature death, particularly among men, and road traffic injuries account for approximately 12,000–14,000 deaths annually (Road Traffic Management Corporation, 2023). Alcohol misuse is a key underlying risk factor for both injury and NCD burden. This national injury profile is directly relevant to the Newlyn project because the construction and operational logistics associated with a major bulk handling facility can increase heavy vehicle movement, commuting exposure and rail interface risk. Injury prevention is therefore not ancillary in the cHIA; it is a plausible and preventable health pathway in industrial and transport corridor settings.

10.5 Health System Reform and Universal Coverage

South Africa's Constitution guarantees the right to healthcare access, and the National Health Insurance (NHI) Act (2023) represents a major policy step toward universal health coverage, although implementation remains phased and resource-dependent. Persistent challenges include human resource constraints, infrastructure backlogs and uneven service delivery across provinces (National Department of Health, 2023). Primary healthcare remains the backbone of service provision, with emphasis on prevention, chronic disease management and integrated HIV/TB services. For this cHIA, the key relevance is local surge sensitivity: where district facilities operate under capacity constraints, incremental demand created by construction peaks, 24/7 operations and incident response needs can become locally significant even when national indicators show improvement.

10.6 Environmental and Climate Determinants

Access to improved water sources exceeds 90% nationally, although reliability varies regionally (Stats SA, 2023). Climate change is recognised as a national priority due to projected impacts on heat stress, extreme weather events, food security and water availability. Increasing frequency of high-intensity rainfall events is particularly relevant to industrial stormwater management and contaminant mobilisation pathways, including the potential for upset releases during extreme weather conditions. Air quality is a national concern in several industrialised regions, and ambient particulate exposure is increasingly recognised as a contributor to cardiovascular and respiratory disease burden (WHO, 2023). While Saldanha Bay is not among the most severe national hotspots, the area's industrial baseline and coastal wind regime mean that dust containment integrity and stormwater controls remain central determinants of health acceptability for the proposed facility.

10.7 Implications for the Proposed Project

South Africa's current health profile is defined by declining infectious disease mortality but a dominant and rising NCD burden, persistent injury risk and sustained socio-economic inequality. This epidemiological transition intersects directly with the plausible exposure pathways associated with bulk mineral handling facilities. The national baseline reinforces that the principal health sensitivities relevant to the Newlyn project include cardiopulmonary vulnerability (asthma/COPD and cardiovascular disease), transport-related injury risk and psychosocial stress. Accordingly, national context underscores the need for rigorous long-term particulate control and monitoring, credible injury prevention and traffic management, strong occupational health surveillance, protection of sensitive receptors (children, elderly and people with pre-existing disease), and governance systems designed to prevent and manage non-routine exposure events.

10.8 Life Expectancy and Population

South Africa's demographic profile continues to evolve in ways that influence health vulnerability and service demand. Stats SA Census 2022 indicates that the national population increased from approximately 51.7 million in 2011 to over 62 million in 2022, representing an average intercensal growth rate of 1.8%. Females accounted for 51.5% of the population and males 48.5% (Stats SA, 2023a). These demographic shifts matter for HIA because a growing, urbanising population increases cumulative exposure potential and places ongoing pressure on public services.

10.8.1 Population Structure and Distribution

In 2022, Black Africans constituted 81.4% of the population, followed by the coloured population at 8.2%, white population at 7.3%, and Indian/Asian population at 2.7% (Stats SA, 2023a). Gauteng (15.1 million) and KwaZulu-Natal (12.4 million) remain the most populous provinces, while the Northern Cape (1.36 million) and Free State (2.96 million) are the least populous (Stats SA, 2023a). The national median age increased from 25 years in 2011 to 28 years in 2022, reflecting gradual population ageing. This shift is epidemiologically significant because older age groups have higher baseline prevalence of NCDs and are more susceptible to pollution-related cardiopulmonary effects (Stats SA, 2023a; WHO, 2021).

10.8.2 Gender Composition and Health Implications

Gender composition varies by province. Gauteng is the only province where males marginally outnumber females, a pattern linked to labour migration, while Limpopo (52.8% female) and the Eastern Cape (52.6% female) record the highest proportions of females (Stats SA, 2023a). These patterns can influence household structure, caregiving burdens and health service demand—relevant considerations where occupational migration and shift work are introduced or intensified by large developments.

10.8.3 Life Expectancy Trends

Stats SA Mid-year Population Estimates 2023 estimate life expectancy at birth at approximately 62.8 years for males and 68.4 years for females, reflecting continuing recovery from HIV-related mortality due to expanded ART and improved primary care (Stats SA, 2023b). Despite gains, life expectancy remains below global averages and inequalities persist across socio-economic strata. Environmental exposures, occupational risks and cumulative industrial stressors remain preventable contributors to morbidity and premature mortality, particularly in communities already burdened by poverty and chronic disease (WHO, 2021). For this cHIA, these

trends reinforce the importance of protecting sensitive receptors, especially children, older adults and individuals with pre-existing respiratory or cardiovascular conditions, from incremental particulate, noise and psychosocial stress pathways.

10.9 Leading Causes of Death in South Africa

Mortality profiles provide a useful lens for understanding baseline vulnerability and the pathways through which environmental exposures may exacerbate disease. Stats SA's Mortality and Causes of Death (2022) records 486,841 deaths in 2022, representing an approximately 21% decline compared to 2021 as the COVID-19 pandemic receded. Natural causes accounted for approximately 86.2% of registered deaths and non-natural causes 13.8%.

10.9.1 Leading Underlying Causes of Natural Deaths

The leading underlying causes of natural death in 2022 were dominated by NCDs: diabetes mellitus (6.8%) with 32,863 deaths, hypertensive diseases (6.4%) with 31,230 deaths, and cerebrovascular diseases (5.9%) with 28,819 deaths. Other leading causes included influenza and pneumonia (4.1%), and continued contributions from HIV disease (~4.3%) and tuberculosis (~4.2%) (Stats SA, 2025). For the HIA, these mortality patterns reinforce that a large proportion of the population carries cardiometabolic vulnerability that can be aggravated by air pollution and chronic stress, even where incremental exposures are small.

10.9.2 Unnatural Causes and External Mortality

Non-natural mortality remains significant, particularly among younger cohorts. In 2022, assault accounted for 3.1% of registered deaths, and accidental injuries comprised over 77% of non-natural deaths. In the 15–29-year age cohort, nearly 48.1% of deaths were due to non-natural causes (Stats SA, 2025). This is directly relevant to project-level risk pathways involving construction traffic, commuting, rail interface operations and occupational safety.

10.9.3 Trends and Interpretation

Official death notification data show a shift toward NCD dominance, reflecting ART-driven reductions in HIV mortality and population ageing. However, independent analyses, including SAMRC burden of disease work, suggest HIV/AIDS may be underreported or misclassified in death registration, highlighting uncertainty in cause-of-death attribution and the value of triangulating data sources (SAMRC, 2023; WHO, 2021). For this cHIA, the practical implication is not to over-interpret national cause-of-death ranking, but to recognise that cardiopulmonary vulnerability and persistent infectious disease remain co-existing baseline conditions that can modify exposure–response relationships.

10.10 Natural Deaths

In 2022, natural causes accounted for 86.2% of all registered deaths (Stats SA, 2025). The leading natural causes, diabetes mellitus (32,863 deaths; 6.8%), hypertensive diseases (31,230; 6.4%), cerebrovascular disease (28,819; 5.9%), influenza and pneumonia (~20,500; ~4.1%), HIV disease (~20,900; ~4.3%), and tuberculosis (~20,300; ~4.2%), confirm that cardiometabolic and respiratory vulnerability is widespread (Stats SA, 2025). These vulnerabilities elevate sensitivity to particulate matter exposure and chronic stressors, and they support a conservative approach to managing incremental industrial emissions and noise exposures in settings such as Saldanha Bay.

10.11 Non-Natural Deaths

Non-natural deaths accounted for approximately 13.8% of registered deaths in 2022 (Stats SA, 2025). These deaths disproportionately affect young adults, with pronounced gender differences; males aged 15–29 experience markedly higher non-natural mortality than females, consistent with differential exposure to violence, transport intensity and occupational risks (Stats SA, 2025; SAMRC, 2023). The leading categories include accidental injuries (approximately 65–70% of non-natural deaths), assault (approximately 14–16%) and transport-related accidents (approximately 10–12%) (Stats SA, 2025). These national patterns reinforce the relevance of traffic management, commuting risk reduction and robust occupational safety systems for the Newlyn project's construction and operational phases.

10.12 Non-Communicable Diseases

The national NCD burden is strongly shaped by socio-economic inequality and cumulative stress exposure. A significant share of the population experiences poverty-linked vulnerabilities, including limited access to stable nutrition, safe environments and preventative healthcare, which can contribute to obesity, diabetes, cardiovascular disease and mental health disorders through long-term social and biological mechanisms (Samodien, 2021). For the purposes of this cHIA, the relevance is direct: NCD prevalence increases the likelihood that even small incremental increases in particulate exposure, chronic noise, sleep disturbance or psychosocial stress will translate into measurable health outcomes among sensitive receptors.

10.13 Public Healthcare

Public healthcare remains central to improving access and quality of services. The Ideal Clinic programme, disrupted during COVID-19, is being re-accelerated, with the Department of Health targeting an additional 200 facilities to attain Ideal Clinic status in the 2023/24 financial year, bringing the total to approximately 2,400. The Health Patient Registration System has been rolled out in 3,211 public health facilities, including 2,870 clinics, 267 PHCs and 74 hospitals, and the introduction of electronic health record modules focusing on HIV and TB has been identified as a priority (National Department of Health, 2023). EMS compliance is being assessed across provinces. For the Newlyn cHIA, the key relevance is capacity sensitivity: local facilities can be vulnerable to surge demand during construction peaks, 24/7 operations and emergency events, which supports proactive coordination and emergency preparedness planning.

10.14 Doctor Shortages

South Africa experiences persistent doctor shortages and uneven distribution across regions. Reported ratios vary across sources and time; one cited estimate indicates a doctor-to-patient ratio of 1:3,198, equivalent to 0.31 doctors per 1,000 patients, with earlier reporting indicating 0.79 doctors per 1,000 patients in 2019, and international comparisons showing higher ratios in the UK (3.03), India (0.93), Brazil (2.32) and Mexico (2.44) (DA, 2022). Reports also highlight constraints in public sector posts and retention challenges, including working conditions and budget limitations, alongside pipeline dynamics such as internship and community service placement (BizNews, 2024). For the cHIA, the relevance is local and operational rather than national narrative: if frontline services operate under staffing strain, incremental demand related to construction workforce health needs, incident response, and

emergency care can have disproportionate local effect, making health service coordination and prevention essential components of project health governance.

10.15 Health-Related Sustainable Development Goal Targets

The United Nations Sustainable Development Goals (SDGs) provide a global framework for addressing the social, environmental and economic determinants of health. Within the context of a project-level cHIA, the value of the SDG framework lies not in broad global commitments but in identifying how project-specific activities may influence health determinants and contribute to, or potentially undermine, relevant development targets. For the proposed 750 MW CCGT Power Plant in the RBIDZ, the relevance of the SDGs is primarily linked to the management of environmental exposures, occupational health and safety, infrastructure development, equitable distribution of project benefits, and the protection of community health in surrounding residential areas. These linkages are particularly relevant for pathways identified in this assessment, including air emissions, noise exposure, traffic risks, employment conditions, and broader social determinants of health.

The table below summarises the SDGs that are most relevant to the proposed development and explains how each goal relates to potential health determinants associated with the project.

Table 10-1: Relevant SDGs and their linkage to health determinants associated with the proposed Project

SDG	Relevant Target	Relevance to the Project
SDG 3: Good Health and Well-being	Target 3.9 – Reduce illnesses and deaths from hazardous chemicals and air, water and soil pollution. Target 3.6 – Reduce road traffic injuries and fatalities. Target 3.4 – Reduce premature mortality from non-communicable diseases.	The operation of a gas-fired power plant may influence environmental determinants of health through air emissions, noise exposure and increased traffic associated with construction and operations. Effective environmental management, emission controls and traffic management plans are required to minimise potential health risks to surrounding communities such as Wild en Weide, Brackenham, Veld en Vlei and Aquadene.
SDG 8: Decent Work and Economic Growth	Target 8.5 – Achieve full and productive employment and decent work for all. Target 8.8 – Protect labour rights and promote safe working environments.	The project is expected to generate employment opportunities during construction and operational phases, contributing to improved income and local economic development. At the same time, robust occupational health and safety systems are required to manage industrial hazards associated with construction activities, electrical infrastructure and mechanical systems within the power plant.
SDG 9: Industry, Innovation and Infrastructure	Target 9.1 – Develop reliable, sustainable and resilient infrastructure. Target 9.4 – Upgrade infrastructure to make it sustainable and resource-efficient.	The proposed CCGT facility represents modern energy infrastructure designed to support national electricity supply. Its relevance to health lies in ensuring that industrial infrastructure incorporates best practice environmental controls, including emission management systems, noise attenuation measures and safe operational procedures to minimise environmental and health risks.

SDG	Relevant Target	Relevance to the Project
SDG 10: Reduced Inequalities	Target 10.2 – Promote social, economic and political inclusion of all people.	Industrial developments may affect communities differently depending on their socio-economic status, proximity to industrial areas and existing health vulnerabilities. Ensuring equitable access to employment opportunities, transparent engagement processes and accessible grievance mechanisms is important to prevent disproportionate health impacts on vulnerable populations.
SDG 11: Sustainable Cities and Communities	Target 11.6 – Reduce the environmental impact of cities, including air quality. Target 11.2 – Provide safe and sustainable transport systems.	The project will operate within an industrial zone located near established residential communities in Richards Bay. Sustainable coexistence between industrial infrastructure and nearby communities requires effective air quality management, noise mitigation, traffic safety planning and stakeholder engagement to prevent adverse health impacts.
SDG 6: Clean Water and Sanitation	Target 6.3 – Improve water quality by reducing pollution and preventing hazardous discharges.	Although the power plant is primarily an energy facility, potential health pathways may arise through stormwater runoff, accidental spills, or wastewater generated during maintenance activities. Proper containment systems and water management infrastructure are therefore required to prevent contamination of surface and groundwater resources.
SDG 13: Climate Action	Target 13.1 – Strengthen resilience and adaptive capacity to climate-related hazards.	Energy infrastructure contributes to broader climate mitigation and adaptation efforts. Gas-fired power generation typically produces lower greenhouse gas emissions compared to coal-based electricity generation, and climate-resilient infrastructure design is important to manage extreme weather risks such as flooding or heat stress.
SDG 17: Partnerships for the Goals	Target 17.16 – Enhance partnerships between government, private sector and civil society.	Effective health protection requires collaboration between the project proponent, environmental authorities, local municipalities, health services and surrounding communities. This includes transparent environmental monitoring, emergency preparedness planning and responsive community engagement mechanisms.

11 Provincial Health Profile: KwaZulu-Natal Province

KwaZulu-Natal is the second most populous province in South Africa and experiences a substantial burden of disease associated with communicable diseases, non-communicable diseases (NCDs), and socio-economic determinants of health. The provincial health system operates through a district health system consisting of eleven health districts, including one metropolitan district (eThekwini) and ten predominantly rural districts. Health system performance and population health outcomes are monitored through

the District Health Barometer (DHB), which evaluates district health system performance across several indicators including service utilisation, disease burden, and healthcare capacity (Massyn et al., 2025).

KwaZulu-Natal faces significant health challenges associated with population density, socio-economic inequalities, and disparities in healthcare access between urban and rural areas. According to provincial health system data, public health facilities in the province recorded over 23.9 million primary healthcare visits in 2023/24, demonstrating the high reliance on public healthcare services within the province (KwaZulu-Natal Department of Health, 2024).

The provincial disease profile reflects a dual burden of disease characterised by the persistence of communicable diseases such as HIV and tuberculosis (TB), alongside a growing prevalence of non-communicable diseases including hypertension, diabetes, cardiovascular diseases and cancers.

11.1 Population Health Status and Burden of Disease

11.1.1 HIV and AIDS

KwaZulu-Natal remains the province most heavily affected by the HIV epidemic in South Africa and contributes substantially to the national HIV burden. Epidemiological studies estimate that approximately 1.9–2.0 million people in the province are living with HIV, representing a significant proportion of South Africa's HIV-positive population (Ndlovu et al., 2025).

Population-based surveys indicate that HIV prevalence in KwaZulu-Natal remains among the highest in the country. In some districts, adult HIV prevalence has been estimated at approximately 36.3 %, with prevalence significantly higher among women (44.1 %) than men (28.0 %) (Kharsany & Karim, 2020).

The eThekwini district, the largest metropolitan district in the province, is widely recognised as a major epicentre of the HIV epidemic and reports some of the highest HIV prevalence rates nationally (Groenewald et al., 2023).

Despite the high burden of HIV, the expansion of antiretroviral therapy (ART) programmes has significantly improved treatment outcomes. According to the District Health Barometer, approximately 93 % of patients receiving ART in KwaZulu-Natal achieved viral load suppression, indicating strong performance of HIV treatment programmes within the provincial health system (Massyn et al., 2025).

The continued expansion of testing, treatment and prevention programmes remains critical to reducing HIV transmission and improving population health outcomes within the province.

11.1.2 Tuberculosis

Tuberculosis remains a significant public health concern in KwaZulu-Natal due to its strong association with HIV infection. Individuals living with HIV are at significantly greater risk of developing active TB disease, and co-infection remains common across many communities within the province.

Data from the District Health Barometer indicate that TB treatment success rates for drug-sensitive TB cases in KwaZulu-Natal range between approximately 89 % and 94 % across districts, reflecting relatively strong treatment outcomes compared with many other high-burden regions globally (Massyn et al., 2025).

Furthermore, more than 90 % of TB patients aged five years and older were successfully initiated on treatment, indicating improvements in early detection and treatment initiation within the provincial health system.

However, TB continues to represent a significant disease burden due to underlying socio-economic determinants such as poverty, overcrowded living conditions, and limited access to healthcare services in some communities.

11.1.3 Maternal and Child Health

Maternal and child health outcomes have improved gradually across South Africa over the past decade due to strengthened maternal healthcare programmes, improved antenatal care services, and the expansion of prevention of mother-to-child transmission (PMTCT) interventions.

National data indicate that the maternal mortality ratio in South Africa was approximately 101 maternal deaths per 100 000 live births in 2022/23, reflecting improvements compared with earlier years but still remaining above global development targets (National Department of Health, 2024).

In KwaZulu-Natal, maternal and child health programmes focus on improving antenatal care access, increasing immunisation coverage, and strengthening early childhood health services. According to the District Health Barometer, approximately 71 % of pregnant women attended their first antenatal visit before 20 weeks gestation, indicating relatively strong maternal healthcare access within the province (Massyn et al., 2025).

Immunisation programmes have also expanded significantly. Child immunisation coverage for children under one year of age was estimated at approximately 84.5 %, reflecting continued improvements in preventative child health services.

Despite these improvements, disparities in maternal and child health outcomes remain between urban and rural districts, particularly in areas with limited healthcare infrastructure and higher levels of poverty.

11.1.4 Non-Communicable Diseases

Non-communicable diseases are an increasingly important contributor to the disease burden in KwaZulu-Natal. Demographic changes, urbanisation, and lifestyle factors have contributed to increasing prevalence of chronic diseases including hypertension, diabetes mellitus, cardiovascular disease, and cancers.

Population-based health studies estimate that approximately 32 % of adults in KwaZulu-Natal have hypertension, while approximately 9 % have diabetes, indicating a growing burden of chronic diseases within the provincial population (Peer et al., 2021).

Preventative health services have expanded to address these challenges. For example, cervical cancer screening programmes have improved significantly in recent years. KwaZulu-Natal recorded approximately 72.3 % cervical cancer screening coverage, exceeding the World Health Organization target of 70 % (Massyn et al., 2025).

The increasing prevalence of non-communicable diseases places growing pressure on the healthcare system due to the long-term nature of treatment and management required for chronic conditions.

11.2 District Health Context

KwaZulu-Natal consists of the following eleven health districts:

- eThekwini Metropolitan Municipality
- uMgungundlovu
- uMkhanyakude
- Zululand
- uThukela
- King Cetshwayo
- Amajuba
- uMzinyathi
- iLembe
- Harry Gwala
- Ugu

The eThekwini district is the most densely populated district and serves as the economic hub of the province. Healthcare facilities within this district experience high patient volumes due to population density and the concentration of specialised healthcare services. Rural districts such as uMkhanyakude, uMzinyathi and Zululand face different health challenges, including limited healthcare infrastructure, long travel distances to health facilities, and socio-economic vulnerabilities that influence health outcomes.

District-level disparities are therefore an important consideration when assessing health risks and vulnerabilities within the province.

11.3 Health System Capacity and Service Delivery

The KwaZulu-Natal provincial health system operates through a district health system consisting of primary healthcare clinics, community health centres, district hospitals and regional referral hospitals.

Primary healthcare services represent the first point of contact for most residents and play a critical role in delivering preventative, promotive and curative health services. According to the District Health Barometer, the primary healthcare utilisation rate in KwaZulu-Natal was approximately 2.6 visits per person per year, indicating substantial reliance on public healthcare services within the province (Massyn et al., 2025).

Health system performance is monitored through several indicators including healthcare utilisation, maternal health outcomes, TB treatment success rates, and immunisation coverage. These indicators support evidence-based planning and resource allocation within the provincial health system.

However, healthcare service delivery remains uneven across districts due to disparities in infrastructure, healthcare workforce distribution, and socio-economic conditions.

11.4 Healthcare Facilities and Referral Network in the Project Area

The King Cetshwayo District Municipality is served by a network of public healthcare facilities that form part of the KwaZulu-Natal Department of Health's district health system, which is structured around a tiered model consisting of primary healthcare clinics, district hospitals, regional hospitals and tertiary referral facilities. This structure ensures that basic healthcare services are available at community level while more complex medical conditions can be referred to higher-level facilities within the provincial health system.

Understanding the distribution and capacity of healthcare facilities within the district is important for the cHIA, as these facilities represent the primary institutions responsible for responding to health needs within communities located near the proposed Project.

At district level, several hospitals and clinics provide essential healthcare services to residents within the City of uMhlathuze Local Municipality and surrounding areas. Ngwelezana Hospital, located in Empangeni, functions as a regional hospital and is one of the largest healthcare facilities in northern KwaZulu-Natal. The hospital provides a broad range of medical services including emergency care, internal medicine, surgical services, obstetric care and specialised treatment for complex conditions. Richards Bay Hospital, located within the city of Richards Bay, serves as an important healthcare facility for the local population and provides a range of general medical services including outpatient care, emergency services and inpatient treatment. Eshowe Hospital, situated in the town of Eshowe, provides general district-level medical services and supports healthcare delivery for surrounding rural communities.

In addition to hospital-level services, several primary healthcare clinics provide essential preventative and curative healthcare services within the district. Facilities such as KwaMbonambi Clinic and Dududu Clinic form part of the primary healthcare network and provide services including routine medical consultations, maternal and child healthcare, immunisation programmes, HIV testing

and treatment services, and TB screening and treatment. These clinics represent the first point of contact for many patients within the public health system and play a critical role in disease prevention, early diagnosis and community-based health management.

Within the context of communicable disease management, particularly TB, several district healthcare facilities play an important role in diagnosis and treatment. Both Richards Bay Hospital and Ngwelezana Hospital provide services for the management of infectious diseases, including TB. These facilities have the capacity to diagnose, treat and manage TB cases, including more complex or drug-resistant cases that require specialised care. Given the continued high burden of TB within KwaZulu-Natal, the availability of such services forms an important component of the district's healthcare response.

For highly specialised medical services and complex medical conditions, patients within the district may be referred to tertiary healthcare facilities located in Durban. The Inkosi Albert Luthuli Central Hospital is a major tertiary referral hospital providing advanced diagnostic services, specialist care, and complex surgical procedures. Similarly, King Edward VIII Hospital, also located in Durban, provides a wide range of specialist services including internal medicine, surgery and specialised diagnostic services. These tertiary facilities serve as referral centres for the broader provincial healthcare system and support district and regional hospitals in managing complex medical cases.

The presence of this tiered healthcare network is significant because it determines the capacity of the local health system to respond to potential health demands associated with industrial development. Large infrastructure projects may influence healthcare demand through pathways such as population movement, occupational injuries, traffic-related incidents or environmental exposures. The availability of accessible primary healthcare clinics, district hospitals and referral hospitals within the region therefore plays an important role in supporting community health resilience and ensuring that potential health risks associated with development activities can be appropriately managed within the existing healthcare system.

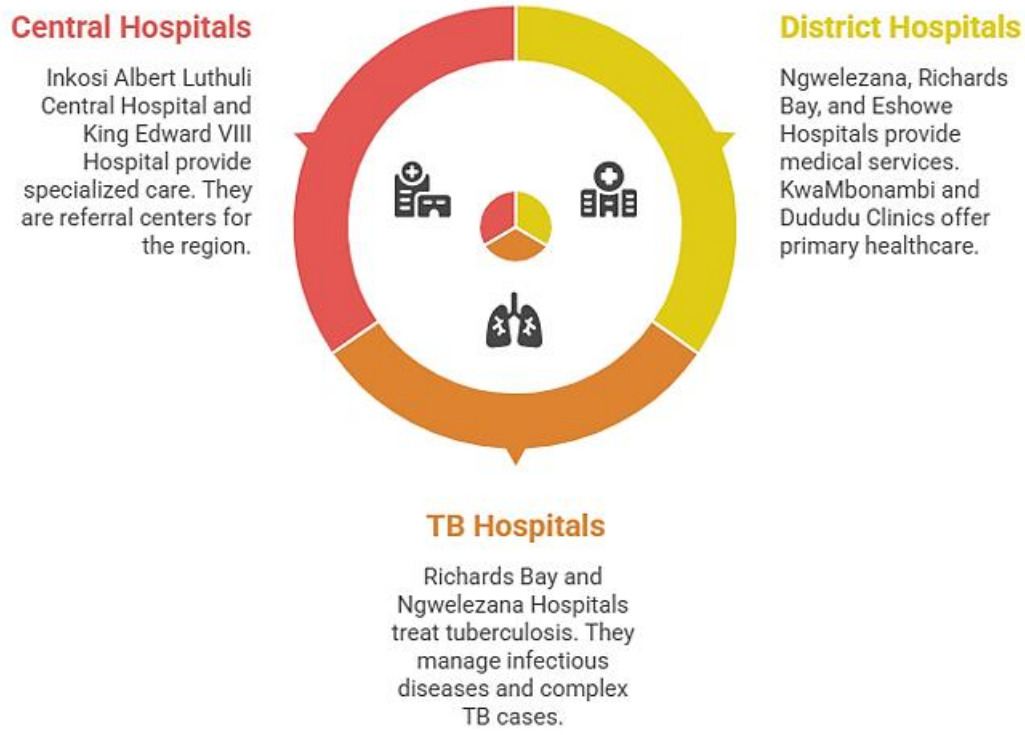


Figure 11-1 Types of healthcare faciliies

11.5 Key Health Indicators in KwaZulu-Natal

The table below summarises selected key health indicators for KwaZulu-Natal based on recent health system performance data.

Table 11-1: Selected Health Indicators for KwaZulu-Natal

Indicator	Value
PHC utilisation rate	2.6 visits per person per year
Antenatal first visit before 20 weeks	71.2 %
Immunisation coverage (<1 year)	84.5 %
TB treatment success rate	89–94 %
HIV viral suppression (patients on ART)	~93 %
Cervical cancer screening coverage	72.3 %
Maternal mortality ratio (national estimate)	101 per 100 000 live births

These indicators demonstrate both the strengths and challenges within the provincial health system. While HIV treatment and TB management programmes have shown positive outcomes, the overall burden of disease remains significant.

11.6 Environmental Health Determinants

Environmental and socio-economic conditions play an important role in shaping population health outcomes in KwaZulu-Natal. Key environmental health determinants include:

- Access to safe drinking water and sanitation
- Air quality and exposure to environmental pollutants
- Waste management practices
- Housing conditions and settlement density
- Household energy use and indoor air pollution

Communities experiencing poor environmental conditions may face increased risks of respiratory illness, water-borne diseases and vector-borne diseases. These risks are often amplified in rural areas and informal settlements where access to basic services may be limited.

Environmental health considerations are therefore an important component of cHIAs, particularly where proposed developments may influence environmental conditions and community health determinants.

KwaZulu-Natal faces a complex health landscape characterised by a dual burden of communicable and non-communicable diseases. HIV and tuberculosis remain major contributors to morbidity and mortality, while non-communicable diseases such as hypertension and diabetes are increasing due to demographic and lifestyle changes.

Although significant progress has been made in expanding HIV treatment coverage, strengthening maternal and child health services and improving preventative healthcare programmes, substantial health challenges remain. Addressing these challenges will require

continued investment in primary healthcare services, improved access to healthcare infrastructure, and broader interventions targeting socio-economic determinants of health.

11.7 Emergency Medical Services

Emergency Medical Services (EMS) form a critical component of the healthcare system in KwaZulu-Natal, providing rapid medical response, pre-hospital care, and patient transport for individuals experiencing medical emergencies. In the King Cetshwayo District Municipality, EMS services operate through a combination of public sector emergency services coordinated by the KwaZulu-Natal Department of Health and private emergency medical service providers, which together support the broader emergency response capacity within the district. The availability and accessibility of EMS services are particularly relevant in the context of a Community Health Impact Assessment, as large industrial developments may influence emergency service demand through occupational incidents, traffic-related accidents, or community health emergencies.

The KwaZulu-Natal Department of Health Emergency Medical Services is responsible for coordinating the provincial public EMS system, including the provision of ambulance services, emergency response units, and trained paramedic teams across the district. Public EMS teams provide both Basic Life Support (BLS) and Advanced Life Support (ALS) services and operate through a network of ambulance bases and dispatch centres distributed across the province. Within the Richards Bay–Empangeni area, provincial EMS services provide emergency response and patient transport to district and regional hospitals, including the Richards Bay Hospital and Ngwelezana Hospital, both of which play an important role in receiving and stabilising emergency patients. These facilities include emergency departments equipped to manage trauma cases, medical emergencies, and acute health events requiring immediate intervention.

The public EMS system is complemented by several private emergency medical service providers, which play a significant role in emergency response within the Richards Bay urban area and surrounding communities. Netcare 911, a private emergency medical service provider, offers ambulance services, advanced life support response, and specialised emergency medical care. Netcare 911 operates a network of emergency response vehicles, helicopters, and highly trained paramedics capable of responding to a wide range of medical emergencies including trauma incidents, cardiac events, and major accidents. Similarly, ER24 is another major private EMS provider operating within KwaZulu-Natal and the Richards Bay area. ER24 provides rapid emergency response services, patient stabilisation and ambulance transport to both public and private healthcare facilities, and may respond to incidents involving both medical emergencies and non-emergency patient transfers.

The availability of both public and private EMS services within the City of uMhlathuze contributes to the overall emergency response capacity of the district. However, EMS resources must often cover large geographic areas and respond to multiple emergency calls, which can place pressure on response times and service availability, particularly during peak demand periods. In industrialised areas such as Richards Bay, where heavy industry, port operations, and major transport corridors are concentrated, EMS services play a particularly important role in responding to potential incidents involving industrial accidents, traffic collisions, hazardous material exposure, and other emergencies.

The presence of an established EMS network within the district is an important component of community health resilience and emergency preparedness. The capacity of the EMS system to respond effectively to emergencies influences the ability of local health

services to manage potential incidents associated with industrial development, including occupational injuries, transport accidents, and community health events. The cHIA therefore considers the availability and functionality of emergency medical services as part of the broader assessment of the district's healthcare system capacity and its ability to respond to potential health risks associated with the proposed 750 MW CCGT Power Plant development in the RBIDZ.

The baseline health profile of KwaZulu-Natal demonstrates that several of these environmental health areas are particularly relevant due to the province's disease burden, socio-economic conditions, and environmental determinants.

Table 11-2: Linkage of KwaZulu-Natal Baseline Health Conditions to WHO Environmental Health Areas

Environmental Health Area	Baseline Health Context in KwaZulu-Natal	Relevance to Health Impact Assessment
Vector-borne diseases	Malaria transmission occurs in northern districts of KwaZulu-Natal, particularly uMkhanyakude and areas bordering Mozambique and Eswatini. Environmental conditions such as rainfall patterns and standing water influence mosquito breeding and transmission risks.	Development activities that alter water drainage, create standing water, or influence local ecosystems may increase vector breeding habitats and malaria transmission risk.
Respiratory diseases	Respiratory diseases remain common due to factors including air pollution, indoor fuel combustion, and infectious diseases such as tuberculosis. Tuberculosis remains highly prevalent in communities with high HIV infection rates.	Air emissions, dust generation, and exposure to particulate matter may increase respiratory disease risks for surrounding communities and workers.
Zoonotic diseases	Rural communities in KwaZulu-Natal may experience exposure to zoonotic diseases through livestock interactions and wildlife contact. Agricultural practices and animal husbandry influence exposure risks.	Land use changes, habitat disruption, or increased human-animal interaction may increase the potential for zoonotic disease transmission.
HIV and sexually transmitted infections (STIs)	KwaZulu-Natal has one of the highest HIV prevalence rates in South Africa, with some studies estimating adult prevalence exceeding 30% in certain communities.	Population influx associated with development projects may increase the risk of HIV and STI transmission if preventative programmes are not implemented.
Water- and sanitation-related diseases	Communities lacking adequate water supply and sanitation infrastructure may experience increased risk of diarrhoeal diseases and other water-borne infections.	Impacts on water resources, wastewater management, or sanitation infrastructure could influence disease transmission risks in nearby communities.
Nutrition and food security	Nutritional challenges exist in parts of the province, particularly among vulnerable groups such as children and low-income households. Both undernutrition and increasing obesity levels are observed.	Changes in economic conditions, employment opportunities, or food access associated with development projects may influence household nutrition and food security.

Environmental Health Area	Baseline Health Context in KwaZulu-Natal	Relevance to Health Impact Assessment
Injuries and accidents	Road traffic injuries, occupational accidents, and interpersonal violence are recognised public health concerns in South Africa.	Construction activities, increased traffic volumes, and industrial operations may increase the risk of injuries and accidents if appropriate safety measures are not implemented.
Environmental hazards and chemical exposure	Exposure to environmental contaminants such as industrial emissions, waste disposal sites, and chemical pollutants may pose health risks to communities.	Industrial activities may introduce new environmental hazards that require monitoring and mitigation to prevent exposure.
Social determinants of health	Socio-economic conditions including poverty, unemployment, housing quality, and education levels influence health outcomes across many districts.	Economic opportunities associated with development projects may improve livelihoods, while negative social impacts such as displacement may increase vulnerabilities.
Cultural practices	Cultural beliefs and traditional health practices influence healthcare utilisation and health behaviour within communities.	Community engagement strategies should consider cultural practices to ensure effective health communication and risk management.
Health systems and service capacity	The district health system provides primary healthcare services through clinics and hospitals; however, disparities in access exist between urban and rural areas.	Development activities may increase demand for healthcare services through population influx or occupational health risks.
Non-communicable diseases	Hypertension, diabetes and cardiovascular diseases are increasing due to lifestyle changes, urbanisation and ageing populations.	Changes in environmental conditions, employment patterns, and lifestyle behaviours associated with development activities may influence chronic disease risks.

11.8 Role of Traditional Medicine

Traditional medicine remains a central component of health-seeking behaviour in KwaZulu-Natal and must be understood within the framework of a pluralistic health system, where biomedical, traditional and complementary forms of care coexist and interact. The WHO recognises traditional and complementary medicine as a significant and enduring component of global health systems and emphasises the importance of strengthening its safe, regulated and contextually appropriate integration into formal healthcare systems (WHO, 2013). This position is reflected in the South African legislative framework through the Traditional Health Practitioners Act (Act No. 22 of 2007), which provides for the formal recognition, regulation and oversight of traditional health practitioners, thereby reinforcing their legitimacy within the national health system.

In KwaZulu-Natal, traditional medicine plays a particularly important role within isiZulu-speaking communities, where health and illness are often interpreted through interconnected physical, social, spiritual and ancestral frameworks. Traditional healers, including

isangoma (diviners), inyanga (herbalists) and umthandazi (faith healers), do not operate solely as providers of symptomatic treatment, but fulfil broader roles that include counselling, mediation, spiritual guidance and the maintenance of cultural continuity. As such, health-seeking behaviour is not limited to the management of physical symptoms, but reflects a broader socio-cultural process through which individuals and households interpret illness causation, risk and recovery (Moshabela et al., 2017).

Health-seeking behaviour in this context is best understood through established behavioural models such as Andersen's Behavioural Model of Health Service Use, which identifies three key determinants of care utilisation: predisposing factors (such as cultural beliefs and values), enabling factors (such as access to services and affordability), and need-based factors (perceived severity and type of illness) (Andersen, 1995). Within KwaZulu-Natal, cultural beliefs and explanatory models of illness significantly influence how symptoms are interpreted and which form of care is sought. Conditions perceived as "traditional" or spiritually mediated may prompt initial consultation with a traditional healer, while biomedical services are more likely to be utilised for conditions understood as physical or clinical in nature (Nxumalo et al., 2011).

This has direct implications for health outcomes. Research in KwaZulu-Natal indicates that traditional healers are often consulted when home-based care has failed, when biomedical services are perceived as ineffective, or when the underlying cause of illness is believed to be spiritual or social in origin (Moshabela et al., 2017). While traditional medicine can improve access to culturally appropriate care and provide psychosocial support, delayed presentation to formal health facilities has been associated with poorer outcomes in cases of severe illness, particularly among children and individuals with acute or chronic conditions (Nxumalo et al., 2011).

The project area, encompassing Richards Bay and Empangeni, is characterised by a culturally diverse population, including predominantly isiZulu-speaking communities alongside established South African Indian communities. Evidence from the broader KwaZulu-Natal urban corridor indicates that health-seeking behaviour in such contexts is often pluralistic, with individuals utilising both biomedical and traditional or complementary health systems either sequentially or concurrently. Studies conducted in Durban have shown that a substantial proportion of patients use complementary and alternative medicine (CAM) alongside allopathic treatment, with many not disclosing such use to healthcare providers (Peltzer et al., 2006). This co-utilisation introduces complexity into treatment adherence, clinical management and patient-provider communication.

From a Community Health Impact Assessment perspective, this pluralistic health-seeking behaviour has direct relevance to the proposed Project. Firstly, risk perception and symptom interpretation related to project activities—such as air emissions, odours, noise or perceived environmental change—may not be interpreted solely through biomedical frameworks. Communities may attribute symptoms to social disruption, spiritual imbalance or environmental change in culturally specific ways, influencing how and when care is sought. Secondly, health outcomes associated with project-related exposures may be affected by delays in accessing formal healthcare services where traditional pathways are utilised as the first point of contact. Thirdly, the co-use of traditional and biomedical treatments may influence adherence to prescribed therapies, particularly in the management of chronic conditions such as respiratory or cardiovascular disease.

These dynamics are particularly important given the nature of the proposed CCGT facility, where the primary health risks are associated with chronic, low-level environmental exposures, especially air quality, and cumulative industrial impacts. Early recognition and treatment of respiratory symptoms, for example, are critical in reducing long-term health burden. Where health-

seeking behaviour involves delayed engagement with biomedical services, the potential exists for increased morbidity, particularly among vulnerable populations such as children, the elderly and individuals with pre-existing conditions.

At the same time, traditional medicine represents an important resource within the community health system. Traditional healers are often highly accessible, culturally trusted and embedded within local social networks. They may play a valuable role in health communication, early identification of symptoms, psychosocial support and referral pathways, particularly where collaboration with formal healthcare services is strengthened.

From a project perspective, the implication is not to displace or undermine traditional health systems, but to recognise and engage with them as part of the broader health landscape. Effective health risk management for the proposed development requires culturally competent communication strategies that acknowledge diverse health beliefs, support timely referral to formal healthcare where required, and avoid assumptions of uniform biomedical health-seeking behaviour.

In this context, the role of traditional medicine is both an opportunity and a risk interface. It enhances access to care and supports culturally meaningful responses to illness, but may also contribute to delayed treatment or fragmented care where communication between systems is weak. A contextually appropriate approach to community health therefore requires alignment between project health management strategies and the pluralistic health-seeking realities of the KwaZulu-Natal setting.

12 Baseline Health Status: King Cetshwayo District Municipality

The King Cetshwayo District Municipality is a Category C municipality located in the north-eastern part of KwaZulu-Natal and comprises five local municipalities: the City of uMhlathuze, uMlalazi, Mthonjaneni, Nkandla and uMfolozi. According to the District Health Barometer (DHB) 2023/24, the district covers an area of 8 214 km², had an estimated population of 980 188 in 2023, and contained 225 797 households, of which 70.6% were formal dwellings. The district's principal urban centres are Empangeni and Richards Bay in uMhlathuze, with Eshowe, KwaGingindlovu, Mtunzini, Melmoth, Ntambanana, Nkandla and KwaMbonambi serving as other important service nodes. The DHB notes that district health information is drawn primarily from the WebDHIS, with additional inputs from national demographic, expenditure and human resource datasets, which makes it an appropriate source for establishing the public-sector health baseline for this cHIA.

From a demographic and settlement perspective, King Cetshwayo District Municipality reflects a mixed urban-peri-urban-rural profile, with substantial service concentration in the Richards Bay–Empangeni corridor and more dispersed settlement patterns in inland and rural local municipalities. The DHB 2024 indicates a district population estimate of approximately 997 821 in 2024, with a population density of about 123.4 persons/km², suggesting modest growth since the 2023 estimate. The same dataset also records relatively strong household access to electricity for lighting (97.8%) and piped water inside dwellings (77.5%), but weaker performance in flush toilets connected to sewerage (45.0%) and weekly refuse removal (39.9%), illustrating persistent infrastructure inequalities that remain relevant to environmental health, particularly for EHA #5 (soil-, water- and waste-related disease) and EHA #9 (social determinants of health). This mixed service profile is important in interpreting community vulnerability within the district, because baseline household infrastructure conditions influence the extent to which communities can cope with additional environmental stressors associated with industrial development (HST, 2025).

Maternal, neonatal and child health indicators show a generally functioning service platform, but one in which some indicators remain under pressure. Using the DHB 2024 dataset, antenatal first visit before 20 weeks in King Cetshwayo District Municipality was 73.3%

in 2023/24, which is lower than the KwaZulu-Natal average of 76.3% but above the South African average of 69.9%. Antenatal first visit coverage was 65.9%, while the antenatal client initiated on ART rate was notably high at 99.7%, exceeding both the provincial average of 97.8% and the national average of 95.4%. However, the maternal mortality in facility ratio was 114.4 in 2023/24, which is worse than both the KwaZulu-Natal average of 89.2 and the South African average of 100.6, indicating that although service access appears strong, adverse maternal outcomes remain a concern. The district also recorded a delivery in 10–19 years in facility rate of 17.4%, a stillbirth in facility rate of 23.8, an early neonatal death in facility rate of 9.3, and a neonatal death in facility rate of 11.8. These indicators point to the importance of maintaining maternal and reproductive health services as a core component of the district baseline (HST, 2025).

Child health performance in the district is mixed but, in several areas, comparatively strong. The DHB shows that in 2023/24 King Cetshwayo District Municipality achieved immunisation under 1 year coverage of 96.1%, measles second dose coverage of 101.3%, and vitamin A dose coverage (12–59 months) of 84.9%. By contrast, the death under 5 years against live birth rate was 1.9, broadly aligned with both the provincial and national averages, while the death in facility under 1 year rate stood at 3.5. Case fatality indicators for key childhood conditions were recorded as 1.0 for diarrhoea, 2.2 for pneumonia, and 7.3 for severe acute malnutrition under 5 years. The district also reported a live birth under 2500 g in facility rate of 13.4%, which signals a continuing burden of low birthweight and associated neonatal vulnerability. Overall, the district's immunisation platform appears relatively strong, but neonatal and under-five outcomes indicate that vulnerability persists among infants and young children, particularly where poverty, nutrition and household service deficits intersect. (HST, 2025).

The district remains part of KwaZulu-Natal's high-burden HIV and TB environment, but several HIV programme indicators are comparatively favourable. According to the DHB, the infant PCR test positive around 10 weeks rate was 0.4% in 2023/24, while the HIV test positive client 15 years and older rate (including ANC) was 1.7%. The district's HIV treatment cascade indicators are strong: adult viral load suppressed rate at 12 months was 93.7% in 2024 Q1, matching the provincial average and exceeding the national average of 92.4%; ART client viral load suppression rate (all ages) was 93.0%, again above the national average of 92.0%; child viral load suppression at 12 months was 76.3%, above both the provincial average (73.8%) and national average (66.7%); and antiretroviral effective coverage for those aged 15 years and older was 66.4%, compared with 61.4% provincially and 50.9% nationally. On the TB side, the district recorded a TB client 5 years and older start on treatment rate of 97.3% in 2023/24, better than both the provincial (92.8%) and national (90.3%) averages, as well as a TB symptom screening rate for persons aged 5 years and older of 102.1% and a TB child under 5 years start on treatment rate of 82.0%. These figures suggest a comparatively strong infectious disease programme response, although the district's broader socio-economic context means HIV/TB remains central to its baseline health burden. (HST, 2025).

In relation to non-communicable disease prevention and broader screening performance, King Cetshwayo District Municipality shows some notable strengths and some gaps. The DHB Indicates that cervical cancer screening coverage reached 83.6% in 2023/24, substantially higher than the KwaZulu-Natal average of 72.3% and more than double the South African average of 40.5%. By contrast, school Grade 1 screening coverage was 29.1% and school Grade 8 screening coverage was 17.1%, suggesting weaker reach in school health screening services. The district also recorded a mental disorders treatment rate (new) of 0.0, which should not be interpreted as an absence of need, but rather points to limitations in service uptake, reporting, or programme reach. These indicators

are relevant to the cHIA because they illustrate that the district health profile is not defined only by communicable disease, but also by evolving chronic disease prevention and service-access challenges. (HST, 2025).

From a health system perspective, King Cetshwayo District Municipality appears relatively well-resourced compared with many districts, particularly in primary healthcare utilisation and selected staffing indicators. The DHB shows a PHC utilisation rate of 2.4 visits per person per year in 2023/24, which is above the KwaZulu-Natal average of 2.0 and the national average of 1.7. OPD new client not referred rate was 62.4%, average length of stay was 6.0 days, inpatient bed utilisation rate was 54.0%, and inpatient crude death rate was 4.7. The district also achieved 100% ideal clinic status in 2023/24, ranking first nationally in that metric in the DHB. Human resource indicators from March 2024 show 45.4 medical practitioners per 100 000 population and 9.2 pharmacists per 100 000 population, both above provincial and national averages. Taken together, these indicators suggest that King Cetshwayo District Municipality has a comparatively functional public health platform, but one that still operates in a district marked by substantial disease burden, uneven household infrastructure, and a heavily industrialising local economy. For the purposes of the cHIA, this means that the district has a meaningful health system base, but additional industrial activity may still affect health outcomes through cumulative environmental exposure, service demand, occupational-community interfaces and the social determinants of health. (HST, 2025).

13 Health Profile: Umhlathuze Local Municipality and Ward

The City of uMhlathuze Local Municipality is the principal urban and economic node within King Cetshwayo District Municipality and includes Richards Bay and Empangeni, which function as the main commercial, industrial and service centres in the district. The broader district profile in the District Health Barometer (DHB) 2023/24 identifies Richards Bay and Empangeni as the dominant urban centres within King Cetshwayo, while the municipal website confirms that the City has dedicated Public Health and Emergency Services, as well as separate municipal functions for water and sanitation, transport, roads, coastal management and stormwater, and electrical and energy services. This is important for the cHIA because it shows that the municipality is both the local service hub for surrounding communities and the primary institutional interface for environmental health, emergency response and basic municipal service delivery in the project area.

At local municipality level, DHB identifies City of uMhlathuze LM: KZN282 and shows a generally stronger service and health platform than would typically be expected in more rural municipalities. Maternal and reproductive health indicators reflect relatively good access to antenatal care, but with some persistent outcome pressures. In 2023/24, the municipality recorded an antenatal first visit before 20 weeks rate of 74.1%, continuing the improving trend from 65.4% in 2015/16, while delivery in 10–19 years in facility declined from 16.1% in 2017/18 to 14.8% in 2023/24. These trends suggest gradual improvements in early maternal service utilisation and a modest reduction in adolescent delivery rates. However, the maternal mortality in facility ratio remained elevated at 153.4 in 2023/24, after fluctuating over time and peaking again during 2020/21 (213.5). The neonatal death in facility rate improved substantially from 27.7 in 2015/16 to 13.5 in 2023/24, although the indicator still reflects ongoing neonatal vulnerability. The same dataset also shows that antenatal first visit coverage declined to 74.2% in 2023/24, while the delivery by caesarean section rate increased steadily from 43.1% in 2018/19 to 51.9% in 2023/24. Taken together, these indicators suggest that uMhlathuze has an accessible maternal health platform, but one that continues to operate under significant clinical pressure. The broader DHB provincial profile supports this interpretation by showing that KwaZulu-Natal remains a high-burden province in relation to maternal and child health, HIV and TB, even where service access has improved.

From a community health perspective, the local profile of uMhlathuze must also be understood in relation to its industrial and urban character. The municipality contains the RBIDZ, the Port of Richards Bay, major industrial operations, established transport corridors, and surrounding residential communities. This means that local health outcomes are shaped not only by access to healthcare, but also by the environmental and social determinants of health associated with urban-industrial development, including air quality, traffic volumes, noise, occupational-community interfaces and differential access to infrastructure. The proposed 750 MW CCGT Power Plant is planned within this municipal setting, and its potential health implications must therefore be considered against an existing baseline characterised by concentrated industrial activity, mixed residential settlement patterns and established municipal service systems. This is particularly relevant for respiratory health, injuries and accidents, social determinants of health, health system capacity and cumulative exposure pathways, which are central themes in this cHIA.

In practical terms, the City of uMhlathuze should be regarded as the primary local health and service environment within which the proposed Project will operate. The municipality appears to have comparatively stronger institutional and service capacity than more remote parts of the district, but the DHB indicates that important health challenges remain, particularly in maternal and neonatal outcomes. Because uMhlathuze combines urban growth, industrial expansion and concentrated service delivery functions, it is likely to experience both the potential benefits of the proposed development, such as employment and local economic activity, and the potential burdens, including additional environmental stressors and service demand. The local municipal health profile therefore provides a critical baseline for assessing how project-related changes may interact with existing vulnerabilities and strengths within the host municipal area.

13.1 Infrastructure and Service Delivery

The Constitution of the Republic of South Africa (Act 108 of 1996) provides all South Africans with basic human rights, which includes the rights to access basic infrastructure and services. Free Basic Municipal Services (FBS) are provided by the government to those South African households who cannot afford these services. These services are assumed to be sufficient to cater for the basic needs of a poor household.

13.1.1 Water

Safe drinking water is a basic necessity for good health, as unsafe drinking water can be a significant carrier of diseases such as trachoma, cholera and schistosomiasis. Drinking water can also be tainted with chemical, physical and radiological contaminants with harmful effects on human health. Safe drinking water is a basic necessity for good health, as unsafe drinking water can be a significant carrier of diseases such as trachoma, cholera and schistosomiasis. Drinking water can also be tainted with chemical, physical and radiological contaminants with harmful effects on human health.

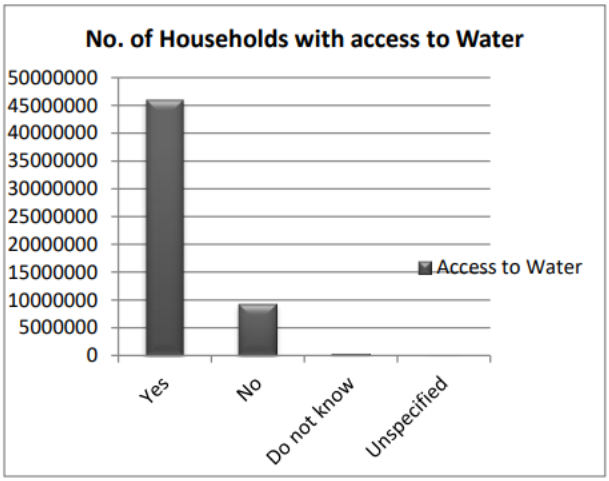


Figure 13-1 No. of households with access to water (uMhlathuze Local Municipality IDP (2022/2027

According to the uMhlathuze Local Municipality IDP (2022/2027), a community survey conducted in 2016 revealed that about 89% of households in uMhlathuze obtain water from the uMhlathuze Municipality. 3% households obtain water from Water tankers. Very few households are still reliant on Borehole and spring to obtain water. More than 43,000 households obtain water through pipes inside the dwelling. The survey further revealed that more than 45 000 households have access to safe drinking water in uMhlathuze Municipal. The Municipality continues to strive in an effort to ensure that all residents have access to clean water. Figure below depicts that about 103 880 households have access to piped water either inside their dwelling, inside the yar or a piped water on communal stand.

Table 13-1: Main source of drinking (IDP 2022/2027)

Main source of drinking water	No of HH
Piped (tap) water inside dwelling	47511
Piped (tap) water inside yard	53778
Piped water on communal stand	2591
Borehole in yard	100
Rain-water tank in yard	599
Neighbours tap	1232
Public/communal tap	817
Water-carrier/tanker	3476
Borehole outside yard	251
Flowing water/stream/river	94
Well	0
Spring	19
Other	35

Source: Statistics SA, Community Survey 2016

The Municipality currently receives funding through the Municipal Infrastructure Grant (MIG), of which 70% is for water and 30% for sanitation. It has been proven that such funding is not adequate to reduce backlogs for sanitation. The baseline information in the 2013/2014 Integrated Development Plan (IDP) with regards to basic services delivered were previously aligned with the most recent 2011 Census figures as recorded by National Statistics South Africa. A total of 96.75% households have access to the basic RDP level of water supply service as at 31 December 2016. The basic level for the provision of water is communal supply less than 200 metres from a household. The total percentage of households with basic level of service changed in 2017/18 due to the municipality inheriting 3 wards from Ntambanana Municipality. The Water Quality Monitoring Program (WQMP) (CR4711, 7 August 2008) has been developed and implemented, so that council meets the statutory requirements and for the sustainability of water resources within its area of jurisdiction.

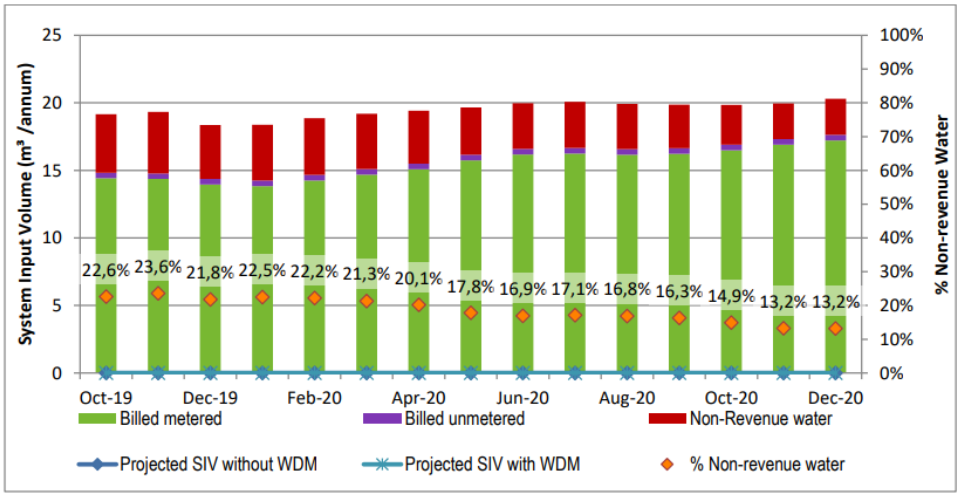


Figure 13-2 Richards Bay Water balance (IDP 2022/2027)

According to figure 12-3, It can be reported that the system supplying Richards Bay is operating well. The trend indicates a reduction in losses when compared to the same period of the previous year.

13.1.2 Sanitation

The availability of sanitation facilities not only improves the dignity of people, but also promotes their health. Areas without proper sanitation systems give rise to water borne diseases like cholera, diarrhoea, and typhoid. It is therefore important that as a municipality, prioritisation should be given to this service, particularly considering any backlogs.

95.5% of the households have access to flush or chemical toilets, which is slightly higher compared to district level. Some households mainly within the informal settlement do not have access to flush or chemical toilets facilities.

According to the uMhlathuze Local Municipality IDP (2022/2027), at commencement of the financial year a total of 80.94% households had access to the basic level of service for sanitation as at 30 June 2019. The basic (RDP) level is one VIP toilet per household. The target for 2020/2021 for basic RDP level of sanitation service is set at 81.12%. The approved target for 2021/2022 financial year of VIP toilets to be constructed is 200. Access to Sanitation as at 30 June 2021 is 80.94% and the Sanitation backlog is 19.06%.

Table 13-2: Municipality calculated sanitation backlogs (IDP 2022/2027)

Service Level	Baseline (2020/2021) (Audited)	2020/2021 Target	2021/2022 Mid-Year adjusted Target	Stats Ending September 2021
Total households = 110 503 (2016 Stats SA)	Households with access to sanitation	Targets		Households with access to sanitation
ACCESS TO SANITATION	89 444	89 644	89 444	89 444
Waterborne Sewerage	43 068	43 068	43 068	43 068
VIP Toilets	46 376	48 176	46 376	46 376
Backlogs	21 059	19 259	21 059	21 059
New Installations (VIP)	0	200	0	Actual Q1 = 0

13.1.3 Electricity

The supply of electricity to households throughout the country is central to the governments' aim of improving quality of life (SA Handbook, 2011). The cost of energy in South Africa is amongst the lowest in the world (as a result of a heavy reliance on coal power); however, the demand is growing due to increase in macro-economic activities and industrialisation (SA Handbook, 2011). Electricity services in South Africa are at crossroads. National economic growth has outstripped available generation capacity, while the regulatory uncertainty has undermined effective management of distribution assets at the municipal level.

The City of uMhlathuze has no electricity backlogs in its area of supply. The total backlogs of 6429 exist in the areas within the municipality which are directly serviced by Eskom. Municipality is only doing infills for new customers. The main focus of the municipality is on infrastructure provision and maintenance and also provision of public lighting in Traditional Areas (IDP 2022/2027)

13.1.4 Refuse Removal

South Africa generates 19 million tons of waste per year and this is often harmful to the environment and people's health. According to Section 24 of the national constitution, all South Africans have the right to an environment that is not harmful to a person's health and wellbeing. The pollution and Waste Management Act gives the local municipalities the responsibility on waste removal.

According to the uMhlathuze Local Municipality IDP (2022/2027), There are currently five areas where separation at source is taking place, which are Meerensee, Birdswood, Felixton, Brackenham, Esikhaleni J1 Section and some parts of Empangeni. In these areas each household gets a yellow plastic bag for recyclables over and above the trolley bin service. Recyclables from Meerensee and Birdswood are collected by a bush truck to Material Recovery Facilities on the day of removal for further sorting. Recyclables from Felixton, Brackenham and Esikhaleni J1 Section are collected by three separate waste-preneurs, under a six (6) month trial, with their own transport, on the day of removal and sort at their recycling sites. Recyclables from Empangeni are collected by informal waste-pickers who sell recyclables collected from trolley bins in order to sustain their livelihoods. This practice further minimizes waste going to the landfill while benefitting green economy.

Within the uMhlathuze local Municipality, a total of about 68 % (74 856) on average of total households (110 503) had access to the basic weekly solid waste removal service at the end of June 2018, and it should be noted that all wards have access to Waste Management Service (IDP 2022/2027). The Municipality alone conducted 19 waste management environmental awareness campaigns which took place in schools and communities in a form of clean up campaigns, school talks, door to door campaigns, etc. All these were aimed at ensuring that people start recycling, discourage illegal dumping, anti-litter, so as to promote a healthy environment (IDP 2022/2027).

Table 13-3: Solid Waste Management Indicators and Targets (IDP 2022/2027)

Objective	Strategies	Performance Indicator	2017/2018 Actual Baseline	2018/2019 Actual Baseline	2019/2020 Amended Annual	2019/2020 Actual Baseline	2020/2021 Annual Target	2021/2022 Annual Target	2022/2023 Annual Target
To improve access to domestic solid waste removal services to the community	Provide a weekly domestic solid waste removal service to the community	% Households with access to waste disposal	67.74%	69.71%	71.52%	71.55%	73.36%	75.17%	76.98%
		Number of Households with access to waste disposal	74,856	77,028	79,028	79,060	81,060	83,060	85,060
		Number of new Households with access to waste disposal	1,500	2,172	2,000	2,032	2,000	2,000	2,000
		Number of Households with access to free waste removal	31,391	33,563	35,563	35,595	37,595	39,595	41,595

13.1.5 Housing

According to 2016 Community Survey there are approximately 104 335 households in eMhlathuze municipal area, out of that 92 812 households are formal dwellings, 6697 are traditional dwellings, 4315 are informal, and 511 other. Data from community survey does not indicate the quality of these households but from the statistics it is clear that a substantial number of households are substandard (i.e. informal & traditional) (IDP 2022/2027).

From the 104 335 households in the municipal area, 92 812 are formal. Based on the dwelling types therefore, it can be assumed that 11 523 of the households are in need of housing. The majority of these informal settlements are located in Khoza/Bhejane, Dube and Mkhwanazi Traditional Authorities and these areas are therefore the areas of greatest need in relation to informal settlements upgrade and slums clearance projects. Also, from Buchanana 1349 households and Luwamba 467 households have been identified by the feasibility study as in need of houses (IDP 2022/2027).

13.1.6 Transport and Roads

In terms of road provision, the IDP states that some areas the roads infrastructure and maintenance are poor, roads are in a dilapidated condition, have potholes and some tar roads need patching (SDF, 2014-2034). With regards to infrastructure the IDP (2022/2027) indicates that the most common challenges which relate to infrastructure and services can be summarised as follows:

- Sewage spillage;
- Dumping / pollution – landfill site / inadequate refuse removal;
- Road maintenance; and
- Informal settlements.

The total length of the paved network is 560.4km (553.8km tar, 0.4km block paving and 6.2km concrete pavements) with an estimated replacement value of R1.85 billion. The average condition of the network can be rated as fair to poor, with 16% of the surfacing and 12% of the structure in the poor to very poor category as depicted in the figure below;

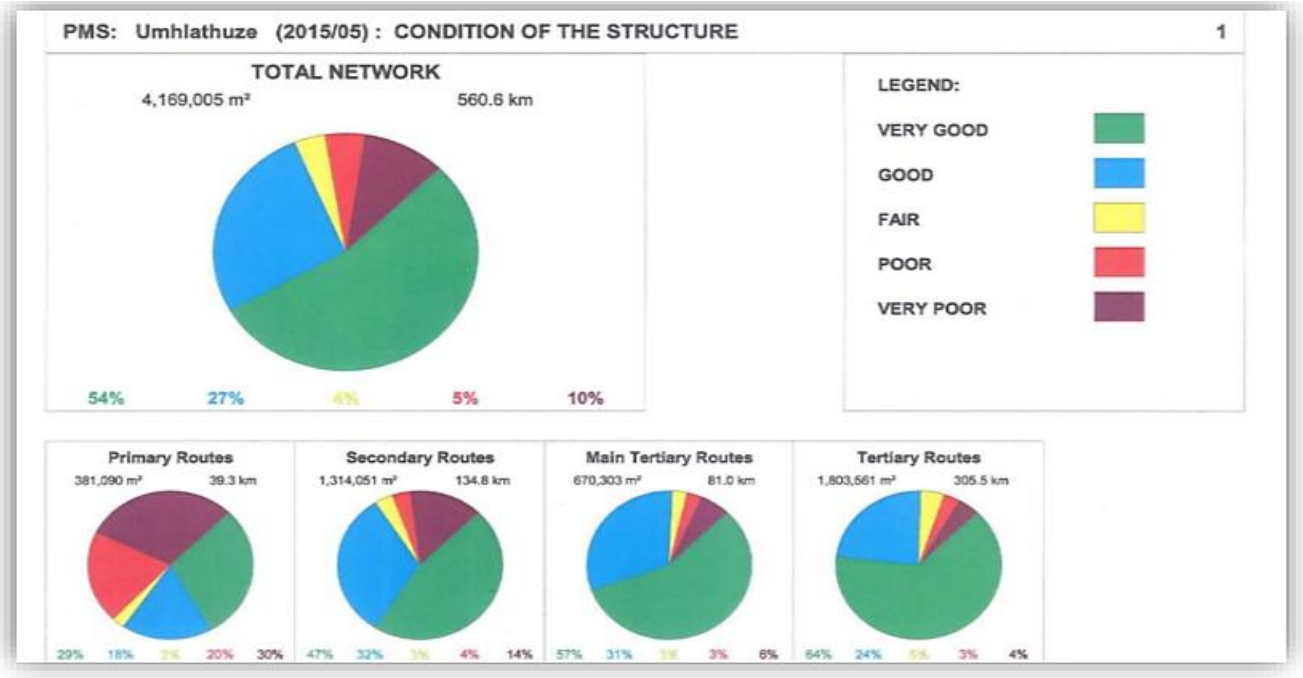


Figure 13-3: Conditions of the surfacing (IDP 2022/2027)

14 Baseline Health Status in the Primary Zones

The primary zone includes the following areas/ establishments:

- Alton;
- Brackenham;
- Veld en Vlei, Aquadene;
- Wild en Weide; and
- Birdswood.

The following section describes the baseline health status in the proposed Project area with reference to the EHAs. This is based on the national and regional baseline health data that was identified during the desktop review and during the site in August,2024. Data at the local level is based on the aforementioned FGD and KII that were carried out during the field visit.

The directly affected properties are currently zoned for Industrial use, depicted in figure 13-1.

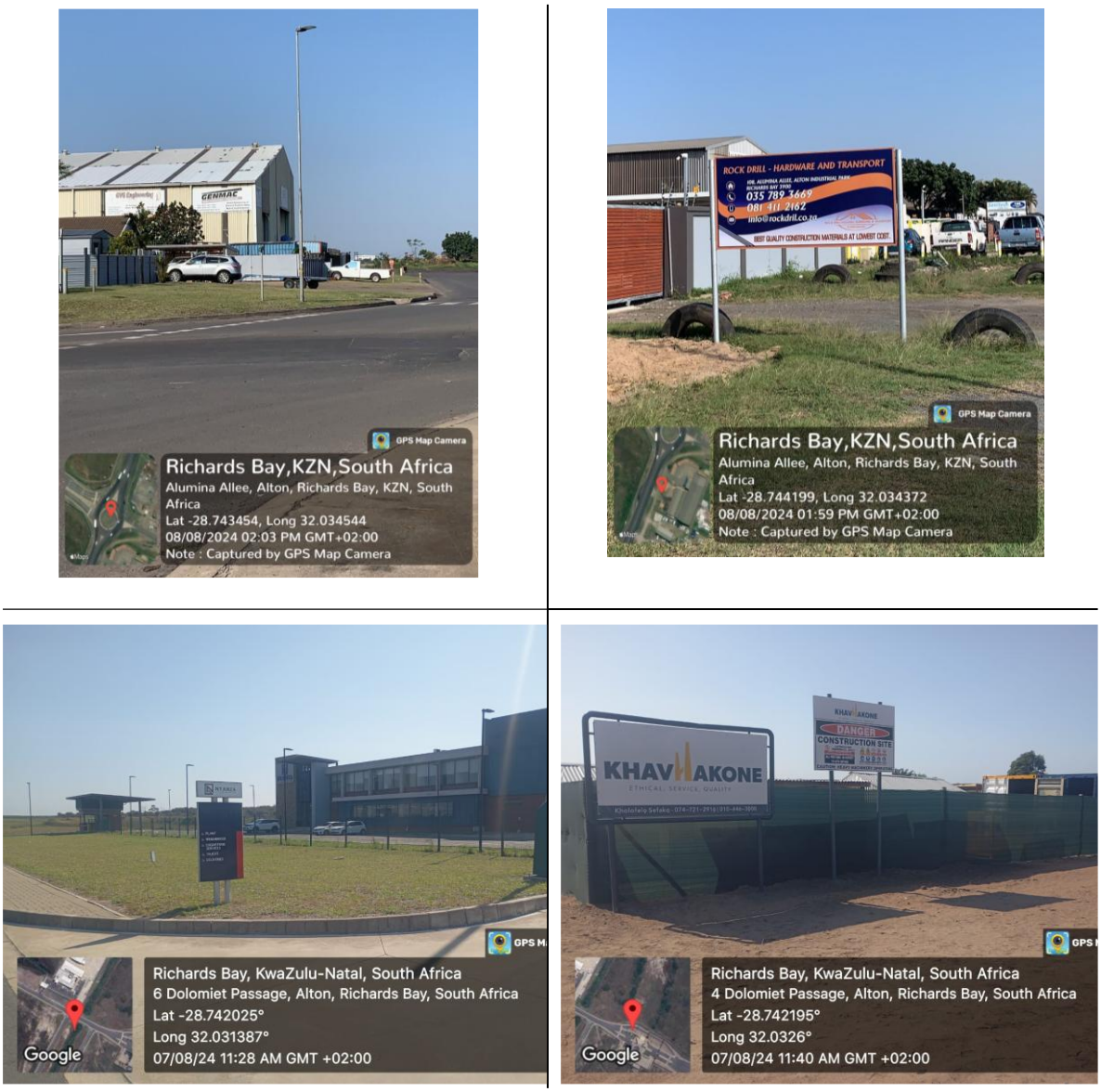


Figure 14-1: Directly affected properties, Alton, Richards Bay

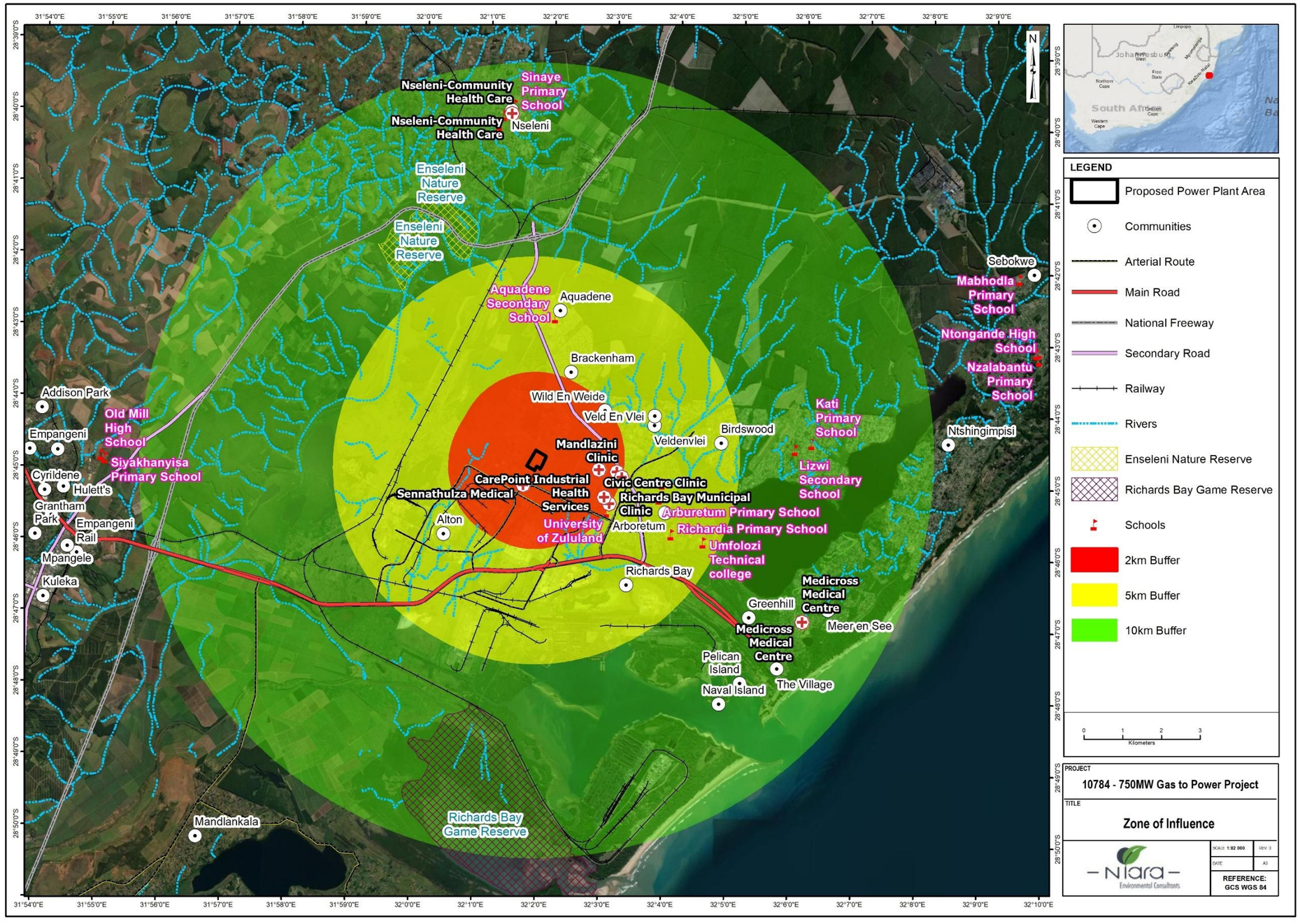


Figure 14-2: Zone of Influence Plan

The proposed 750 MW CCGT Power Plant will be located within Phase 1F of the RBIDZ in the City of uMhlathuze Local Municipality. Although the project site is located within a designated industrial development zone, several established residential communities are situated within the broader area of influence. The communities most likely to experience potential direct or indirect interactions with the project include Wild en Weide, Brackenham, Veld en Vlei and Aquadene, all of which are located within the greater Richards Bay urban area. These communities form part of the socio-economic and environmental landscape within which the project will operate and are therefore considered Potentially Affected Communities (PACs) for the purposes of the Community Health Impact Assessment.

Wild en Weide is a residential suburb located to the south-west of the RBIDZ and forms part of the urban settlement pattern surrounding Richards Bay. The area is characterised by predominantly formal housing and relatively well-developed municipal infrastructure, including access to piped water, electricity, sanitation services and road networks. Residents in this community generally have reasonable access to healthcare services through facilities located within Richards Bay and Empangeni, including public clinics, community health centres and private medical practices. From a health perspective, the community is likely to experience the broader disease profile typical of urban KwaZulu-Natal settings, including the dual burden of communicable diseases such as HIV and tuberculosis, as well as growing prevalence of non-communicable diseases such as hypertension, diabetes and cardiovascular conditions. Due to its proximity to existing industrial infrastructure and transport corridors, environmental determinants such as air quality, traffic volumes and industrial noise are relevant considerations when evaluating baseline health conditions in the area.

Brackenham is one of the larger residential suburbs in Richards Bay and is located relatively close to the RBIDZ industrial precinct. The community includes a mix of residential housing, schools, small commercial facilities and public service infrastructure. The area is served by municipal water, sanitation and electricity networks and has relatively good road connectivity to Richards Bay and Empangeni. Residents typically access healthcare services through local clinics and hospitals within the uMhlathuze municipal area. The socio-economic profile of Brackenham reflects a diverse population with varying income levels, which can influence health outcomes through determinants such as employment, housing conditions and access to services. Given the proximity of the community to industrial areas and major transport routes associated with port and industrial activities, residents may already experience certain environmental exposures, including industrial emissions and traffic-related air pollution, which are relevant baseline considerations for the cHIA.

Veld en Vlei is a well-established suburban residential area located in the southern part of Richards Bay. The suburb is characterised by formal housing developments and relatively stable municipal service provision. Residents generally benefit from access to public amenities, including schools, recreational facilities and healthcare services located within Richards Bay. The health profile of the population in this area is therefore influenced largely by urban lifestyle factors and the broader public health challenges affecting KwaZulu-Natal, including communicable diseases and the increasing burden of non-communicable diseases. As with other communities in the Richards Bay area, environmental health determinants such as air quality, noise exposure and traffic-related risks remain relevant considerations due to the proximity of industrial operations and transport infrastructure linked to port activities.

Aquadene is one of the more densely populated residential areas in Richards Bay and includes both formal housing developments and areas with higher population density. The community includes a range of social amenities such as schools, small businesses and public services, although socio-economic conditions in parts of Aquadene may differ from those observed in some of the more

affluent suburbs within the municipality. As a result, residents may experience different levels of vulnerability in relation to social determinants of health such as income, employment opportunities and housing conditions. Access to healthcare services is provided primarily through the public healthcare system, including local clinics and district hospitals serving the uMhlathuze municipal area. From a community health perspective, areas with higher population density may be more sensitive to environmental stressors such as air pollution, noise and traffic-related risks, which are therefore important considerations in the assessment of potential project-related health pathways.

Understanding the characteristics of these PACs is essential for interpreting the baseline health environment within which the proposed Project will operate. While the RBIDZ has been established as a dedicated industrial development zone, the surrounding urban landscape includes established residential communities whose health and well-being may be influenced by environmental conditions associated with industrial activities. The cHIA therefore considers these communities when evaluating potential exposure pathways related to air emissions, noise, traffic, industrial hazards and broader socio-economic changes associated with the proposed development. Assessing the baseline conditions and vulnerabilities of these PACs enables the identification of potential health risks and the development of appropriate mitigation measures to ensure that the project does not adversely affect the health of surrounding communities.

14.1 EHA #1: Vector-related Diseases

Vector-borne diseases are illnesses transmitted by pathogens and parasites through vectors such as mosquitoes, rodents, and other pests. The occurrence and spread of these diseases depend on a range of environmental and social factors, including poor waste management, stagnant water, and the presence of vectors like rats and mice. In the Newcastle area, although vector-borne diseases are not currently a significant health issue, certain environmental management practices may increase the probability of these vectors, such as rats and mice.

Illegal dumping of waste, particularly in informal settlements and areas lacking proper sanitation, creates breeding grounds for vectors. The increase in population due to the CCGT Power plant activities, combined with the strain this place on local waste management systems, heightens the risk of diseases related to these vectors. Poorly managed water bodies, coupled with unsanitary living conditions, may lead to an increase in vector populations, creating conditions conducive to the spread of diseases such as toxoplasmosis and other rodent-borne illnesses.

While these diseases are not currently prevalent in the region, the potential for their emergence exists if proactive environmental management measures are not implemented. Effective waste management, drainage systems, and vector control measures are essential to mitigating these risks and protecting community health as the project progresses.

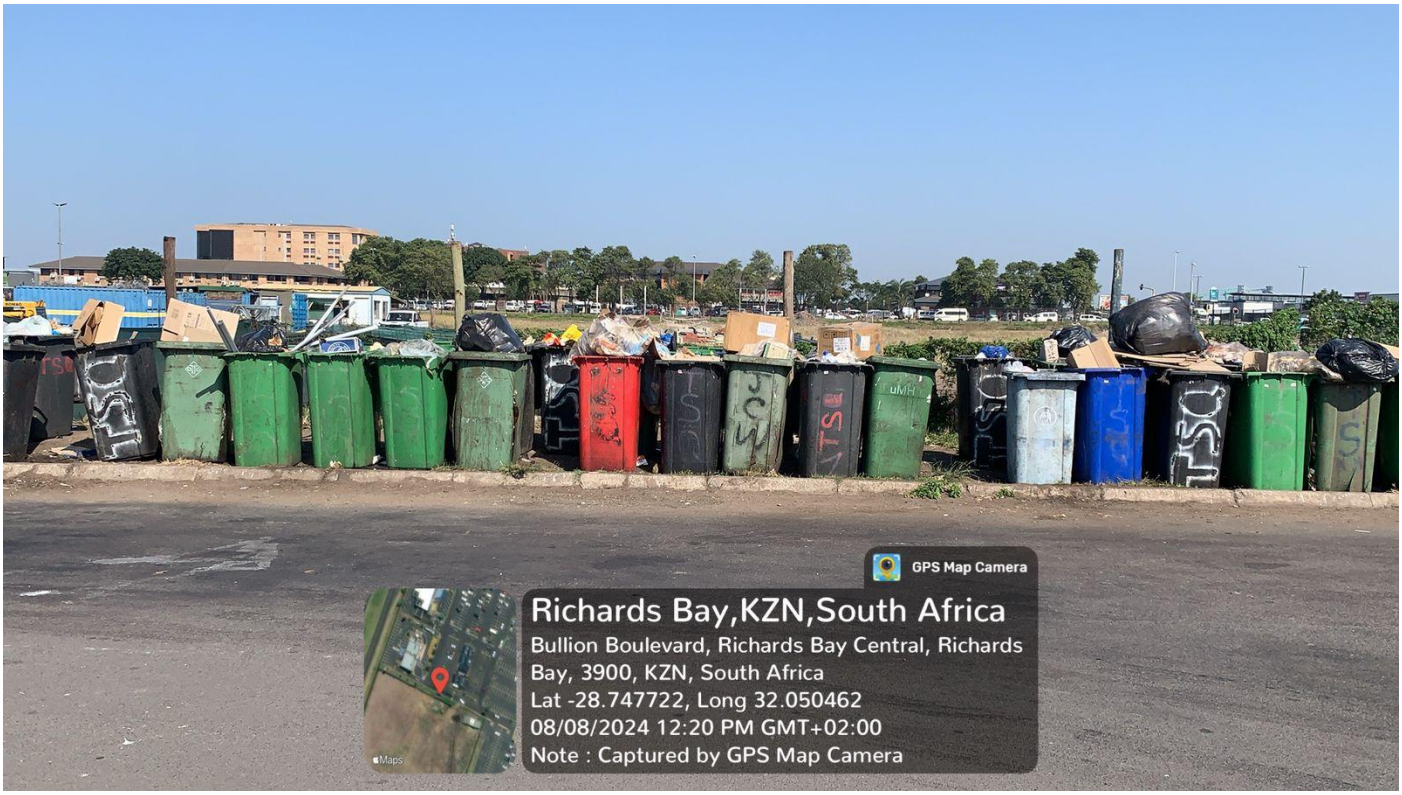


Figure 14-3: Waste Management in Richards Bay Central

The specialist studies do not identify any active vector-borne disease hotspot on the proposed site itself. However, the hydrological setting shows that the site drains toward a man-made canal along the western boundary that has developed wetland-like characteristics, while the surrounding area contains additional freshwater ecosystems and natural depression wetlands. The hydrology study further records relatively high rainfall conditions of approximately 1 200 mm per annum, low-lying areas subject to inundation, and the potential for localised ponding and stormwater accumulation if drainage is not properly managed. These features are relevant because vector ecology is strongly influenced by standing water, drainage inefficiencies, waste accumulation and the condition of surrounding habitats.

From a public health perspective, vector-borne disease risk is shaped less by the mere presence of water than by the quality of stormwater management, waste control and human settlement conditions. The World Health Organization notes that vectors such as mosquitoes, flies, fleas, lice and rodents transmit pathogens through water, waste, animals and the built environment, and that local environmental management is one of the primary determinants of risk. In this project area, the baseline should therefore be understood as one of potential environmental receptivity rather than established high endemicity: the wetland-canal interface, disturbed industrial land, nearby residential communities and the possibility of temporary standing water during heavy rainfall create conditions in which vector nuisance and localised disease transmission could become more important if waste, sanitation and drainage deteriorate.

Accordingly, the baseline for EHA 1 is best described as moderately sensitive but currently manageable. There is no evidence from the specialist reports of unusual current vector abundance or a documented outbreak environment. The key baseline issue is that the site and surrounding communities already contain the environmental ingredients that can support vector breeding if secondary stressors emerge, including stormwater stagnation, poor housekeeping, labour influx without adequate accommodation controls, or

illegal dumping in peripheral areas. That is particularly relevant in an industrial expansion context where project-related changes can increase nuisance pests and rodent attraction if ancillary waste streams are not tightly managed.

14.2 EHA #2: Acute Respiratory Infections and Respiratory Effects from Housing

Communicable diseases, such as acute respiratory infections, are a significant concern in the Project-Affected Communities (PACs) around the CCGT Power Plant. These diseases spread through airborne viruses or bacteria, and their transmission is exacerbated by poor living conditions, overcrowding, and inadequate housing. In the PACs, respiratory health issues are common, particularly among children, where coughs are frequently reported. KII identified tuberculosis (TB) and upper respiratory tract infections as two of the top-five illnesses affecting the community, indicating that respiratory health is a critical issue

Tuberculosis (TB), a highly contagious infection caused by Mycobacterium Tuberculosis, is of particular concern. TB primarily affects the lungs and is easily transmitted in environments where individuals live or work in close quarters, such as in overcrowded homes or within the workforce itself. The probability of TB transmission is elevated in communities with high levels of poverty and among immunocompromised individuals, particularly those living with HIV/AIDS, as a weakened immune system increases susceptibility to the disease.

The WHO emphasises that housing to be considered "healthy," certain critical elements must be adequately addressed, including proper shelter, clean water supply, effective sanitation, waste management, and reducing indoor air pollution. Houses in the surrounding communities within approximately 5km of project site namely; Brackenham, Veld en Vlei, Aquadene, Wild en Weide, and Birdswood community range between semi urban to urban homes. All the communities had low to medium density and Squatter areas and overcrowding do not appear to be a problem. Figure: 14-4 to Figure 14-8 below depict the housing conditions of the surrounding Communities.

This is one of the most important baseline EHAs for the project. The air quality study confirms that Richards Bay is already an industrialised airshed with relatively elevated baseline concentrations for some pollutants, particularly sulphur dioxide and PM_{10}, and that cumulative modelling with other industrial and approved future sources predicts exceedances of national standards for short-term SO_2, NO_2 and PM_{10} under higher combined operating scenarios. The study also identifies a 5 km receptor zone that includes high-sensitivity receptors such as schools and clinics in Aquadene, Brackenham, Arboretum and Alton, with surrounding residential suburbs such as Wild en Weide, Veldenvlei, Birdswood and Aquadene classified as medium sensitivity because they are areas where people spend most of their time.

The baseline respiratory environment is therefore not pristine. It is an urban-industrial setting in which communities are already exposed to a combination of industrial emissions, road traffic, port-related activity and other heavy industrial operations. The noise and traffic studies reinforce this characterisation, noting the dominance of industrial and road traffic activity in the area and the strong role of the R619, Alumina Allee and associated heavy vehicle routes in structuring daily exposure conditions.

The health literature is clear that ambient air pollution is strongly associated with acute and chronic respiratory morbidity, including exacerbation of asthma, bronchitis, lower respiratory infection and reduced lung function, while particulate matter, nitrogen dioxide and sulphur dioxide are among the pollutants of greatest public health concern. The WHO further recognises that children, older persons and people with pre-existing cardiopulmonary disease are disproportionately vulnerable. In parallel, crowding, poor indoor environments and weak housing conditions can increase transmission of acute respiratory infections, even where the main project

exposure pathway is outdoor air pollution. The implication for this baseline is that the local communities are likely to enter the project with pre-existing respiratory vulnerability shaped by cumulative industrial air exposure, urban transport emissions and uneven social determinants of health.

For the cHIA, the baseline chapter should therefore record that the primary respiratory concern is not simply project emissions in isolation, but the existing cumulative burden within Richards Bay. The project area includes schools, clinics and residential areas within plausible influence range of both industrial and traffic-related emissions, meaning that respiratory health must be read against an already sensitive receptor landscape.

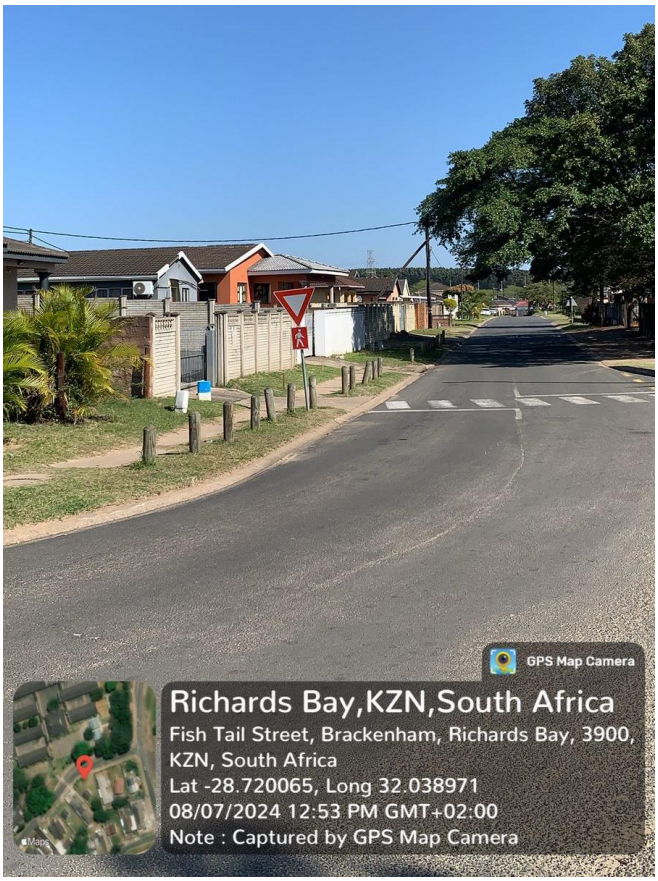


Figure: 14-4: Housing structures in Brackenham community

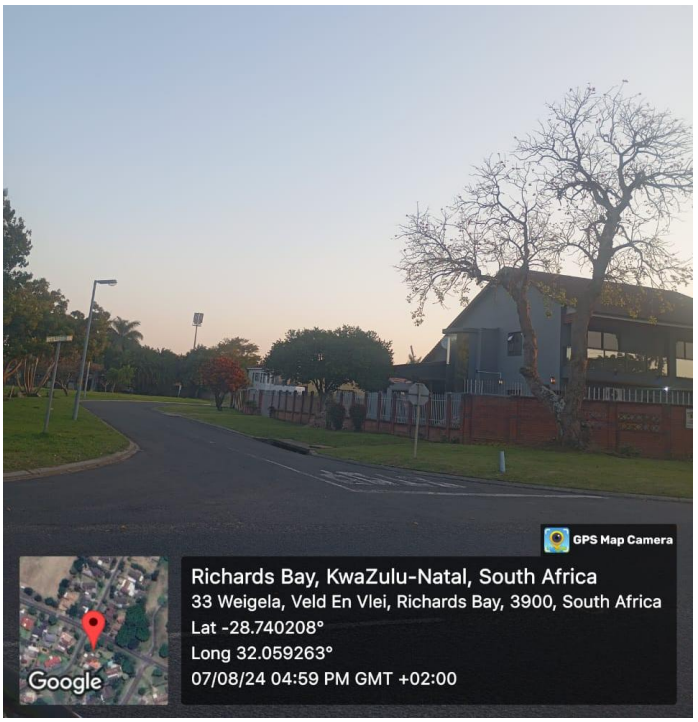


Figure 14-5: Housing structures in Veld en Vlei Community

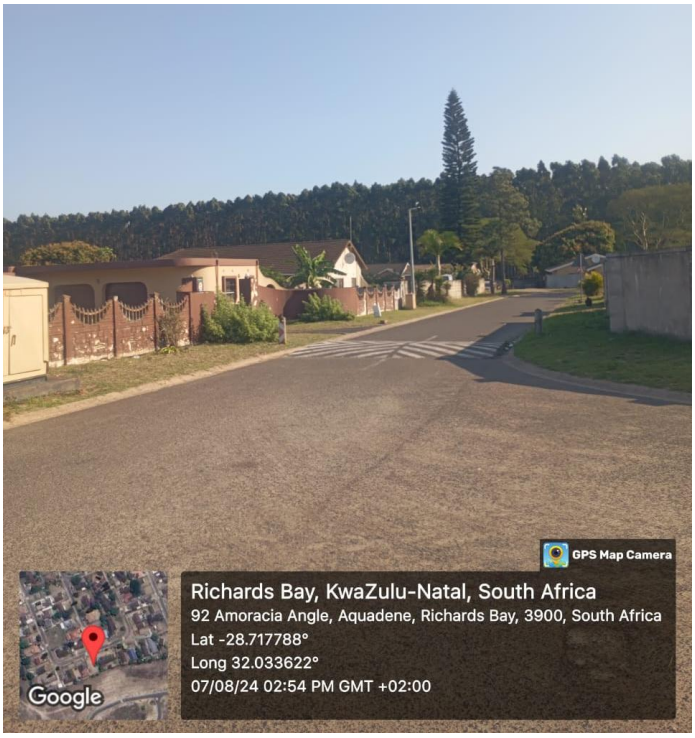


Figure 14-6: Housing structures in Aquadene Community

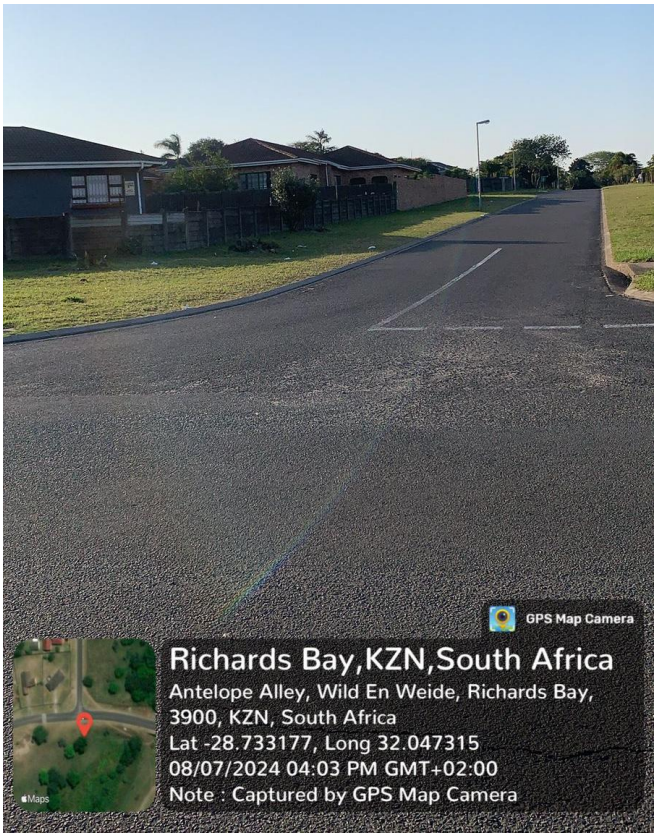


Figure 14-7: Housing structures in Wild en Weide Community



Figure 14-8: Housing structures in Birdswood community

14.3 EHA #3 Veterinary Medicine and Zoonotic Issues

This EHA refers to diseases affecting animals (e.g., bovine tuberculosis, swinepox, avian influenza) or that can be transmitted from animal to human (e.g., rabies, brucellosis, Rift Valley fever, Lassa fever, leptospirosis, etc.). A zoonotic disease is a disease that can be passed between animals and humans. Zoonotic diseases can be caused by viruses, bacteria, parasites, and fungi. These infectious diseases of animals have different modes of transmission. In direct zoonosis the disease is directly transmitted from animals to humans through media such as air (influenza) or through bites and saliva (Rabies). In contrast, transmission can also occur via an intermediate species (referred to as a vector), which carry the disease pathogen without getting infected.

There is limited direct evidence in the specialist studies that zoonotic disease is currently a major defining health issue for the immediate project footprint. The site lies within an industrial zone rather than an agricultural interface, and the visual and hydrology studies describe a landscape of disturbed wooded grassland, canalised wetland features, industrial infrastructure and nearby conservation areas rather than intensive livestock activity. Even so, the presence of wetlands, surface water, disturbed edge habitats, rodents associated with industrial areas, and the proximity of people, domestic animals, wildlife and modified ecosystems means that zoonotic considerations cannot be excluded from the baseline.

WHO defines zoonoses as infectious diseases transmitted between animals and humans through direct contact or indirectly via food, water or the environment. Current international guidance also emphasises a One Health framing, recognising that disease risk emerges at the human-animal-environment interface rather than from any one sector alone. In this context, the project baseline is best characterised as low to moderate zoonotic sensitivity, driven not by known endemic site-specific outbreaks, but by the fact that the area contains ecological receptors, domestic settlement patterns and altered wetland systems that can support rodents, birds, insects and other species relevant to spillover pathways if food waste, water contamination or poor housekeeping occur.

The baseline narrative should therefore note that zoonotic disease is not presently evidenced as a dominant community health burden in the specialist reports, but the surrounding ecology and industrial-residential interface create a setting in which secondary risks from rodents, stray animals, contaminated runoff and human-wildlife contact remain relevant. This is especially so in a region where surface water channels, waste handling and peri-urban settlement dynamics may affect animal movement and environmental contamination pathways.

No zoonotic issues were identified during either the KII or the and FGD. It is however, important to remain cognisant that an increase in domestic animals may increase the risk for zoonotic diseases. Mabasa Energy and fuels (Pty) Ltd would have to implement mitigation measures if these arose due to the Project.

14.4 EHA #4 Sexually-Transmitted Infections, Including HIV/AIDS

Sexually-transmitted infections such as syphilis, gonorrhoea, chlamydia, hepatitis B and, most importantly, HIV/AIDS. Linkages of TB will be discussed where relevant under HIV, but often linked to EHA1.

This EHA is highly material in the KwaZulu-Natal context. The socio-economic study identifies unemployment, uneven incomes, labour market vulnerability and a likely expectation that the project will generate short-term and longer-term employment opportunities. That matters because project-related labour influx, temporary worker accommodation, commuting patterns and transactional economic activity can alter sexual networks and increase demand for health services. The study area includes both

relatively affluent urban suburbs and more economically vulnerable communities in the wider municipal and district area, creating the classic socio-economic gradients through which project-related STI and HIV risks can be amplified if worker management is weak.

Publicly available evidence confirms that KwaZulu-Natal continues to carry one of the highest HIV burdens in South Africa. The HSRC's provincial findings for the 2022 SABSSM survey indicate that KwaZulu-Natal remains among the provinces with the highest HIV prevalence, while WHO continues to identify sub-Saharan Africa as the global epicentre of HIV-associated TB and HIV vulnerability. The project does not create that burden, but it enters an environment where the background prevalence is already high and where health system strain, social vulnerability and mobility patterns are important determinants of transmission risk.

For the baseline chapter, the correct interpretation is that the project area is socially and epidemiologically sensitive to STI and HIV-related change. The risk is not because the site itself contains a pre-existing STI hotspot identified by the specialist studies, but because it sits within a province with a high background HIV burden and within a local economy characterised by unemployment, labour mobility and anticipated in-migration linked to development opportunities. That makes EHA 4 a baseline vulnerability issue that must be addressed proactively in later impact and mitigation chapters.

14.5 EHA #5 Soil-, Water- and Waste-Related Diseases

Safe drinking water and adequate sanitation is a necessity for good health, as households without safe water and proper sanitation systems are more vulnerable to water borne diseases. The majority of homes in the local study area receive piped water from government water schemes; however, this study revealed that many residents of the surrounding communities claim the municipal water is unfit for human consumption because of its taste and odour, forcing them to purchase their own drinking water from local grocery stores and water companies.

The availability of sanitation facilities not only improves the dignity of people, but also promotes their health. Areas without proper sanitation systems give rise to water-borne diseases like cholera and diarrhoea. The field visit indicated that the majority of households have access to adequate sanitation services. Majority of the communities presented to have flush toilets within their homes, there was also access to public toilets in community centres and shopping complexes nearby.

The hydrology report is central to this baseline. It records that the site drains toward a canal on the western boundary with wetland-like characteristics, that baseline surface water quality sampling upstream, midstream and downstream was generally within DWAF target ranges for domestic use, and that the area is vulnerable to flood-related impacts in low-lying areas, particularly within the 1:100-year floodline. The same study identifies contamination risks from runoff, hydrocarbons, sediment mobilisation and poor stormwater separation if controls are not maintained.

This is important because water- and sanitation-related disease risk is often governed by infrastructure performance rather than only by baseline chemistry. WHO notes that microbiologically contaminated drinking water and poor sanitation remain major causes of diarrhoeal disease, and that safe water, hygiene and sanitation are among the most effective protections against faecal-oral disease pathways. The baseline specialist evidence is somewhat reassuring in that current water quality appears acceptable, but the system remains environmentally sensitive because of the canal-wetland interface, flood susceptibility, and the fact that industrial hardening of the site will increase local runoff unless stormwater is carefully designed and maintained.

The baseline for EHA 5 should therefore be described as environmentally sensitive but presently functional. There is no evidence in the specialist studies of a currently degraded domestic water environment at the receiving canal, yet the health vulnerability lies in

how easily this condition could change under poor stormwater management, flooding, sediment release or cross-contamination between clean and dirty water. In practical cHIA terms, the baseline is one in which water-related disease risk is not currently dominant, but the system has a low margin for mismanagement because surface water features are close to the development footprint and already hydrologically constrained.

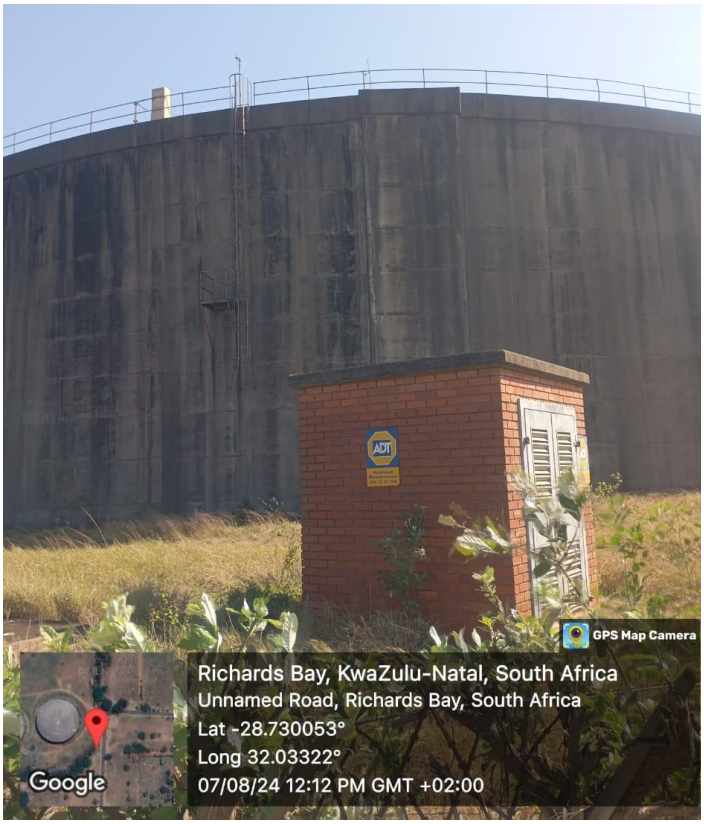


Figure 14-9: Water reservoir near project site

The photographed water reservoir located near the project site represents an important baseline environmental health feature within the study area. From an EHA #5 perspective, this structure is indicative of engineered water storage and distribution infrastructure within an otherwise industrial and semi-transformed landscape. Its presence suggests that water supply in the area is at least partially controlled, stored and redistributed, rather than being entirely reliant on natural surface water systems. This has both protective and risk-related implications for human health.

From a protective standpoint, such infrastructure typically supports regulated water supply systems, which, when properly maintained, reduce the likelihood of direct exposure to contaminated surface water sources. This is important in limiting the transmission of waterborne diseases, particularly those associated with untreated or poorly managed water systems, such as gastrointestinal infections (WHO, 2017). The presence of a formal reservoir also indicates that the area is not dependent on informal or unprotected water sources, which is a positive baseline condition.

However, the reservoir also introduces potential environmental health risks under failure or poor management conditions. Large, open or semi-enclosed water storage structures can become points of concern where:

- water quality is not adequately monitored or treated;
- structural integrity is compromised, leading to leaks or contamination pathways;
- stagnant or slow-moving water creates conditions conducive to microbial growth or vector breeding;
- surrounding land use (including industrial activity) introduces contaminants via runoff, seepage or atmospheric deposition.

The surrounding environment in the image, characterised by unmanaged vegetation and proximity to industrial infrastructure, suggests that there is potential for external contamination pathways, particularly during rainfall events. Surface runoff from nearby disturbed or industrial areas may carry sediments, hydrocarbons or other pollutants into the vicinity of the reservoir, depending on drainage patterns and containment systems. This aligns with broader findings from the hydrological assessment, which identifies risks related to stormwater contamination and sediment mobilisation in the area.

From a human health perspective, the key issue is not the reservoir itself, but the integrity of the water management system as a whole. If properly maintained, monitored and protected, the reservoir contributes positively to environmental health by supporting safe water storage. If not, it may act as a node within a larger contamination pathway, particularly in a cumulatively industrial setting such as Richards Bay.

Importantly, the presence of this infrastructure reinforces that the baseline risk profile for EHA #5 is conditional rather than inherently high. There is no immediate evidence of uncontrolled exposure or widespread contamination. However, the system is dependent on effective management, and the introduction of additional industrial activity, such as the proposed Project, places greater importance on:

- maintaining strict stormwater separation and containment;
- preventing hydrocarbon and chemical contamination;
- ensuring that water storage and conveyance systems remain protected from cumulative impacts.

In summary, the reservoir reflects a managed but sensitive water environment, where health risks are primarily associated with system failure, cumulative contamination and poor maintenance, rather than baseline conditions. This supports the broader conclusion for EHA #5 that health risks in the study area are event-driven and infrastructure-dependent, requiring strong operational controls rather than remedial intervention at baseline.

14.6 EHA #6 Food- and Nutrition-Related Issues

Food security includes a variety of aspects such as stability of the availability of food, as well as stability of access to and utilisation of food (SAHR, 2008). Nutritional status is determined by the degree of nourishment. Under-nourishment, an indicator of food security, means consumption is continuously below. Approximately 52% of South African households experienced hunger in 2009 (WHO, 2010). Therefore, food security is an important consideration in understanding potential health impact of development Projects. This EHA is affected by influx of people resulting in increased demand for food which is not anticipated. Based on the key informant interviews, food shortage is not a serious problem in the area. Malnutrition is linked to poverty and food security issues, as the population cannot afford basic foodstuffs. Poor feeding practices related to poor education and illiteracy can further exacerbate this.

The proposed CCGT Power Plant may attract migratory labour force, which may result in it becoming a prime contributor to the nutrition status of its labour force. However, it is worth noting that the envisioned labour force for the project would be low which would result in an overall low impact to EHA #6

The specialist reports do not identify a food security crisis specific to the immediate project footprint, nor is the site situated within an agricultural landscape where direct loss of subsistence production is a dominant baseline issue. However, the socio-economic study does show meaningful income inequality across Richards Bay, the City of uMhlathuze and the King Cetshwayo District, with a materially larger proportion of households in the municipality and district occupying lower income categories than in Richards Bay proper. That matters for nutrition because food access in urban and peri-urban settings is frequently mediated by income rather than food production. Households with lower and unstable incomes are more exposed to food price shocks, transport costs and interrupted livelihoods.

The broader literature supports this framing. WHO states that healthy diets protect against malnutrition in all its forms as well as NCDs, while the FAO/IFAD/UNICEF/WFP/WHO State of Food Security and Nutrition reports continue to emphasise that food insecurity and inability to afford healthy diets remain major health concerns globally and regionally. In the study area, the baseline should therefore not be framed as famine or agricultural dispossession, but rather as a socially differentiated urban nutrition environment in which lower-income households may be nutritionally vulnerable even where municipal service levels are relatively better than district averages.

The practical implication for the baseline chapter is that food and nutrition risk is likely to be experienced unequally. Higher-income suburbs in Richards Bay are more likely to have stable dietary access, whereas lower-income households in the broader municipal and district context may already be managing precarious food budgets. That makes nutrition a relevant baseline determinant, especially because projects of this nature may create both positive effects through income generation and negative effects through inflationary pressure, labour migration and uneven local benefit capture.

14.7 EHA #7: Accidents/Injuries

The accidents and injuries health effect category describe changes to fatal and non-fatal injury statistics that can be either intentional (e.g., suicide, homicide, assault, and self-harm) or unintentional (e.g., motor vehicle crashes and falls).

The photographic evidence of roads leading to, surrounding and within the RBIDZ provides a clear and useful baseline for understanding accident and injury risk (EHA #7) within the project area. The road network is characterised by wide carriageways, relatively low traffic volumes at the time of observation, formalised intersections, pedestrian walkways in some sections, and good visibility conditions. This reflects a planned industrial transport environment rather than an informal or congested urban system.

From a baseline perspective, this suggests that current road safety risk is moderate but controlled, rather than inherently high. The road geometry, wide lanes, turning space, and separation of carriageways, supports safer vehicle movement, particularly for heavy vehicles. Adequate sightlines and relatively low congestion reduce the likelihood of collision under normal operating conditions. The presence of sidewalks and road markings in certain sections also indicates some level of pedestrian consideration, although this appears inconsistent across the broader area.

However, the images also highlight several important latent and cumulative risk factors that are directly relevant to the proposed Project. Firstly, the road network is clearly designed to accommodate industrial-scale transport, including heavy vehicles, abnormal loads and logistics traffic. While this is appropriate for the RBIDZ, it inherently increases the severity of potential accidents. Global evidence shows that collisions involving heavy vehicles are significantly more likely to result in severe injury or fatality compared to light vehicle incidents (WHO, 2018). The baseline risk is therefore not defined solely by traffic volume, but by the type of vehicles using the network.

Secondly, the relatively low traffic density observed in the images may create a false sense of safety, leading to higher vehicle speeds. Wide, open roads with limited congestion are commonly associated with speeding behaviour, which increases both the likelihood and severity of accidents. This is particularly relevant in areas where industrial traffic intersects with public road users, including pedestrians, cyclists and informal transport.

Thirdly, while pedestrian infrastructure is present in some locations, the broader setting reflects an industrial–peri-urban interface, where pedestrian movement may not be fully controlled or predictable. Workers, community members and informal road users may move through the area, particularly along transport corridors. The lack of consistent pedestrian separation, crossings or traffic calming measures increases the risk of vehicle–pedestrian interaction, which is a major contributor to road traffic injuries globally (WHO, 2018).

Fourthly, the images show long, straight road sections with limited traffic control features beyond basic intersections. While this supports efficient movement, it also means that risk is highly sensitive to changes in traffic volume and composition. The introduction of construction traffic, increased heavy vehicle movement and operational logistics associated with the proposed CCGT plant will alter baseline conditions. Even if the road infrastructure is adequate, the incremental increase in traffic intensity and complexity may elevate accident risk.

The baseline can therefore be summarised as follows: the RBIDZ road network is structurally adequate and designed for industrial use, which is a positive condition. However, it operates within a risk profile defined by heavy vehicle interaction, speed potential, variable pedestrian presence and sensitivity to increased traffic loads.

In terms of human health implications, the key baseline risk is not current accident frequency, but the potential for high-severity incidents under changing traffic conditions. This is particularly relevant for:

- construction-phase traffic surges;
- heavy vehicle routing and turning movements;
- interaction with public roads and transport users;
- early morning and late evening worker movement periods;
- emergency vehicle access and response times.

The baseline for EHA #7 reflects a managed but inherently high-consequence transport environment, where accident risk is currently moderated by low traffic volumes and good infrastructure, but remains highly sensitive to increased industrial activity. The introduction of the proposed Project will not create a new risk pathway, but it will intensify an existing one, making traffic and injury risk a critical area for ongoing management and monitoring.

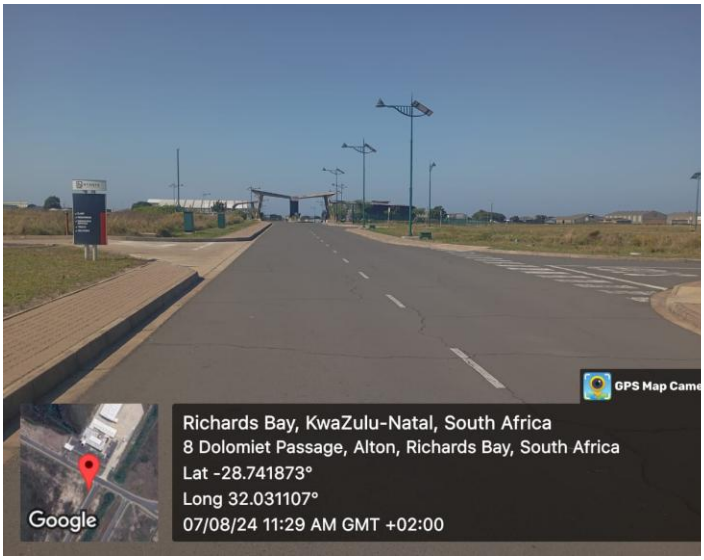


Figure 14-10: Roads leading to RBIDZ

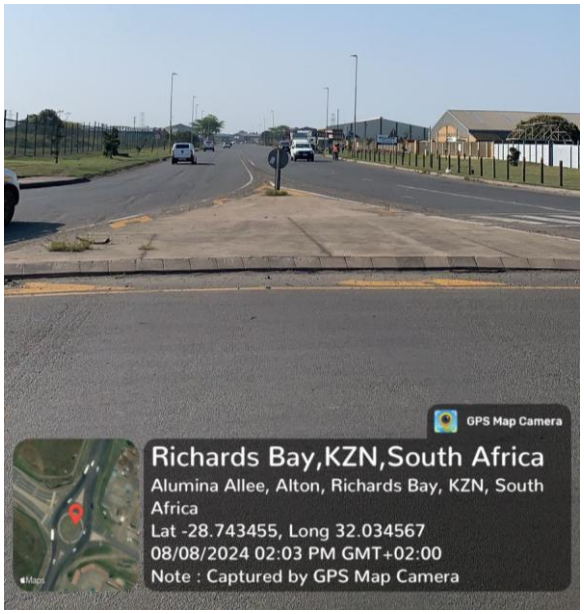


Figure 14-11: Roads around RIBDZ

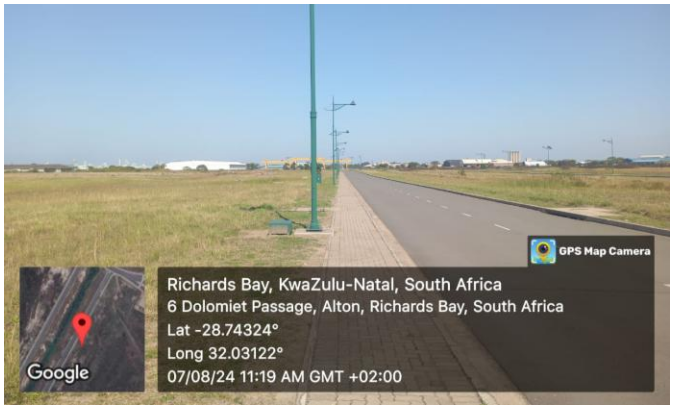


Figure 14-12: Roads within RIBDZ

The traffic and noise studies indicate that the proposed development sits within a road network already shaped by heavy industrial movement. The R619 is described as a major arterial linking residential areas, the CBD and industrial regions and is heavily used by both heavy and light vehicles, while Alumina Allee carries high volumes of heavy vehicle traffic. The traffic assessment further concludes that, as Phase 1F develops, certain intersections will experience congestion and require upgrades, and explicitly recommends monitoring road safety conditions as pedestrian activity increases.

This means the baseline is already one of transport-related injury exposure, even before the project-specific increment is added. WHO identifies road traffic injury as a major public health issue, with pedestrians and road users in low- and middle-income settings facing disproportionately high risk. South Africa's own road safety reporting further points to a major pedestrian burden in national crash patterns. In an industrial-port city such as Richards Bay, where worker movements, public transport nodes, heavy vehicles and arterial roads intersect with residential areas, the baseline must therefore recognise not merely future construction traffic, but a pre-existing injury risk environment shaped by freight mobility and growing pedestrian exposure.

In addition to traffic, the baseline should acknowledge the industrial character of the area as relevant to occupational and community safety more broadly. The site lies within an established industrial precinct surrounded by heavy industry, logistics infrastructure and

worker activity. Even where the project has not yet commenced, surrounding communities and workers are already embedded in an environment in which vehicle incidents, industrial accidents and emergency access issues are materially relevant health determinants.

14.8 EHA #8 Exposure to Potentially Hazardous Materials, Noise and Malodours

The baseline for EHA #8 is defined by an established industrial environment within the RBIDZ, where exposure to hazardous materials, environmental noise and industrial odours is already structurally possible but currently controlled. The site and its surrounds are not greenfield or pristine. They form part of a broader industrial-port system that includes logistics infrastructure, heavy vehicle movement, existing industrial operations and areas of open, undeveloped land earmarked for industrial expansion. As such, baseline conditions must be understood as managed industrial exposure conditions, rather than absence of exposure.

From a hazardous materials perspective, there is no evidence at baseline of uncontrolled contamination or direct public exposure to toxic substances within the immediate project footprint. However, the surrounding land use and industrial zoning indicate that the area is designed to accommodate activities involving fuels, chemicals, lubricants, electrical infrastructure and industrial processes. This creates a baseline condition where hazardous materials are not currently dominant within the immediate site, but the potential for exposure is embedded in the land use context. In such environments, risk is typically associated with storage, handling and accidental release, rather than continuous exposure. The World Health Organization recognises that industrial chemical exposure risks are often event-driven, linked to spills, leaks or failures in containment systems rather than routine conditions (WHO, 2010).

Noise conditions at baseline are relatively low to moderate, reflecting the current level of activity within the RBIDZ expansion area. The Noise Impact Assessment confirms that measured baseline levels at nearby sensitive receptors are approximately 48.8 dBA during the day and 44.2 dBA at night, which are within acceptable ambient ranges for peri-urban environments. This suggests that, at present, the acoustic environment is not dominated by continuous industrial noise. However, the broader setting, characterised by wide transport corridors, industrial land use and proximity to existing facilities,indicates that the area is acoustically transitional. Noise exposure is therefore expected to increase over time as additional developments are commissioned, even in the absence of the proposed Project.

Importantly, the baseline noise environment must be interpreted in relation to sensitivity of receptors rather than absolute levels alone. Nearby residential areas, including Wild en Weide and surrounding settlements, represent receptors where even moderate increases in noise may result in sleep disturbance, annoyance and reduced quality of life. The WHO identifies environmental noise as a significant public health concern, particularly where it interferes with sleep or contributes to chronic stress (WHO, 2018). While current levels are acceptable, the baseline is not robust against cumulative increases, and therefore requires careful consideration.

Malodour conditions at baseline are not prominent within the immediate project area. There is no indication of persistent or acute odour sources within the footprint of the proposed development. However, the broader Richards Bay industrial environment includes activities such as chemical processing, fertiliser production, port operations and waste handling, all of which have the potential to generate odours under certain conditions. As a result, the baseline condition can be described as generally low odour intensity, but with intermittent and source-dependent variability.

From a health perspective, odour is less often associated with direct toxic effects and more commonly linked to nuisance, irritation and psychosocial stress, particularly where it is persistent or unpredictable. Odour perception is also strongly influenced by community awareness and sensitivity to industrial activity. In cumulative industrial environments, even low-level odours can contribute to perceived environmental degradation and reduced wellbeing, particularly when combined with other stressors such as noise and visible emissions (Schiffman et al., 2001).

The baseline for EHA #8 is therefore best understood as a low to moderate exposure environment with embedded industrial risk potential. There is no evidence of significant current health burden arising from hazardous materials, noise or odours within the immediate site. However, the receiving environment is not neutral. It is already shaped by industrial land use, existing infrastructure and proximity to emission sources, and is therefore sensitive to incremental change.

A critical characteristic of the baseline is that risk is largely conditional and cumulative, rather than continuous. Hazardous material exposure is dependent on containment integrity and incident prevention. Noise exposure is currently acceptable but sensitive to increases in activity and traffic. Odour is minimal but may fluctuate depending on surrounding operations and atmospheric conditions. These factors indicate that the baseline condition is stable under current activity levels, but not inherently resilient to increased industrialisation.

In conclusion, the baseline conditions for EHA #8 reflect a managed industrial setting with controlled exposure levels, where current risks are low but the potential for increased exposure exists. The introduction of the proposed CCGT Power Plant will not create new exposure pathways in isolation, but it will contribute to cumulative industrial intensity, making the management of hazardous materials, noise and odour a critical component of overall health risk control.

14.8.1 Noise Impact Assessment Findings and Health Relevance

Environmental noise is recognised as an environmental determinant of health and wellbeing. The health effects of noise depend on sound level, frequency characteristics, duration and timing of exposure, as well as the sensitivity of the exposed population. The distinction between community and occupational exposure is important because the intensity, duration and mechanisms of exposure differ substantially between these receptor groups.

The WHO Environmental Noise Guidelines identify annoyance and sleep disturbance as established community-health outcomes associated with environmental noise and recognise evidence linking prolonged environmental-noise exposure with cardiovascular and metabolic effects, cognitive impairment and reduced wellbeing (WHO, 2018). The proposed biological pathway for certain non-auditory effects involves repeated activation of physiological stress responses, particularly where noise disrupts sleep or produces chronic annoyance.

These associations should, however, be interpreted in relation to the actual exposure predicted for the Project. The Noise Impact Assessment indicates that measured baseline noise levels at nearby sensitive receptors are approximately 48.8 dBA during daytime and 44.2 dBA during nighttime conditions. The assessment further indicates that predicted Project-related community noise remains within applicable criteria and is not expected to materially alter the surrounding acoustic environment.

Accordingly, although sleep disturbance, annoyance and stress constitute scientifically plausible health pathways associated with environmental noise generally, the Project-specific exposure assessment does not indicate a magnitude of community exposure sufficient to elevate this pathway above Low health significance. The health significance assessment is therefore based on predicted exposure rather than on the existence of the hazard alone.

The broader cumulative environment remains relevant. Richards Bay and the RBIDZ contain existing industrial activities, road freight and other transport-related noise sources. Additional industrial development may therefore contribute incrementally to the long-term acoustic environment. Maintenance of Project noise controls, equipment servicing, complaint investigation and periodic verification of noise performance remain appropriate to ensure that the predicted low community impact is maintained.

Occupational noise represents a separate and potentially more significant pathway. Workers may experience repeated or prolonged exposure in proximity to turbines, generators, mechanical equipment and maintenance activities. Excessive occupational noise exposure may result in noise-induced hearing loss and may also interfere with communication and recognition of warning signals. Occupational exposure must therefore be managed through the hierarchy of controls, including engineering and administrative controls, delineation of hearing-protection zones, appropriate personal protective equipment, audiometric surveillance and occupational hygiene monitoring in accordance with applicable occupational-health requirements.

uMoya-NILU Consulting (Pty) Ltd was appointed to conduct an Air Quality Impact Assessment for the proposed development of a 750 MW Combined Cycle Gas Turbine Power Plant by Mabasa Energy and Fuels (Pty) Ltd. The study found that the baseline conditions measured during the assessment of the site indicate that ambient air quality in Richards Bay is already influenced by existing industrial emissions, with monitoring data (2021–2023) showing relatively high sulphur dioxide (SO_2) and particulate matter (PM_{10}) concentrations, including exceedances of the 1-hour and 24-hour National Ambient Air Quality Standards (NAAQS).
Modelled ambient concentrations indicate that:

- Project-alone scenarios (single-cycle and combined-cycle operation) result in very low concentrations of SO_2, NO_2, PM_{10} and CO relative to the NAAQS, and are therefore considered low impact;
- Cumulative scenarios, incorporating existing industrial sources and approved future developments, predict exceedances of SO_2, NO_2 and PM_{10} standards, particularly for short-term averaging periods (1-hour and 24-hour concentrations);
- The relative contribution of the proposed CCGT plant to cumulative concentrations is low, with exceedances driven primarily by the broader industrial emissions profile of Richards Bay rather than the project in isolation; and
- Ambient air quality in the study area is therefore cumulatively constrained, with limited assimilative capacity under high-emission scenarios.

14.9 EHA #9 Social Determinants of Health

The social determinants of health refer to the conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels (WHO, 2013).
Substance misuse such as alcohol, tobacco or other drugs is not only an important health determinant but also closely linked to mental health (Prince et al., 2007). Several respondents admitted that most members of their communities drink a lot of alcohol,

especially during the weekends and at the end of the month when individuals have received their wages, salaries or social grants. People in the community generally drink and smoke socially, however there are those who drink as a means to relieve stress and forget problems related to unemployment and economic and social pressures. The KII revealed that drug use is prevalent in the community which result in a high number of cases of drug induced mental illnesses.

The socio-economic baseline points to a mixed but clearly unequal social landscape. Richards Bay itself is relatively more affluent, but the wider City of uMhlathuze and King Cetshwayo District contain higher shares of lower-income households, persistent unemployment and unequal access to economic opportunity. The SEIA notes that the labour absorption rate indicates that a substantial share of the working-age population remains outside employment, while income distributions show deeper vulnerability in the municipality and district than in Richards Bay proper. At the same time, basic service access is comparatively strong in the urban core, with high levels of electricity access and better water access than district-wide averages.

WHO defines social determinants of health as the conditions in which people are born, grow, live, work and age, including access to money, power and resources. By that definition, the project area baseline is one of relative urban advantage alongside significant underlying inequality. Communities closest to the site may have better infrastructure access than more remote or poorer settlements, but that does not remove social vulnerability. Income precarity, unemployment, differential educational opportunity and expectations around project benefits all shape health outcomes, health-seeking behaviour and social cohesion.

The baseline should therefore describe the study area as socially heterogeneous. Formal suburbs such as Arboretum, Meer en See and parts of Richards Bay differ markedly from more economically vulnerable parts of the municipality and district, including labour-sending communities that may not be geographically closest to the footprint but remain socially linked to the project through employment aspirations and mobility. In cHIA terms, these inequalities matter because they influence who can absorb environmental stress, who can access care, who may take on project-related jobs, and who may experience disappointment or social tension if opportunities are perceived to be inequitably distributed.

14.10 EHA #10 Cultural Health Practices

Culture and traditional values play a very important role in the local communities. The African people place a large emphasis on traditional values and practices, and this relates to health care and health-seeking behaviour. The community members' beliefs in their health as influenced by spiritual powers is an interesting notion of physical health and is quite different from the Western perception hereof. It cannot be exclusively said how the respondents perceive physical and spiritual purposes of using the plants.

In many Sub-Saharan African countries, medical pluralism, combining both biomedical and traditional medicine, is practiced. Biomedical systems are made up of government and private hospitals, clinics, etc. in which the medical personnel are trained in recognised medical schools. On the other hand, traditional medicine is usually not recognised by modern medicine. Local shamans and traditional medical practitioners (TMPs) are the providers in traditional medicine. In traditional medicine, knowledge is gained and passed on by family members who have learnt the art of treating various illnesses by using medicinal herbs and shrubs from the natural environment

In healthcare literature, religion and spirituality are most of the time used interchangeably, although they have quite different meanings (Miller & Thorensen, 2003). Spirituality is defined in individual terms, characterized by experiences involving meaning, connectedness, and transcendence, whereas religion is defined in communal terms, characterized by institutionalized practices and

beliefs, membership and modes of organization (Pesut, Fowler, Taylor, Reimer-Kirkham & Sawatzky, 2008; Miller & Thorensen, 2003). Thus, whereas spirituality is understood at the level of the individual, religion is more of a social phenomenon, and as such is included in the more overarching concept of spirituality.

14.10.1 Religion

The difficulty in conceptualizing spirituality/religion comes from the multi-dimensionality of these concepts (Miller & Thorensen, 2003) and extends to the problem of how exactly spirituality/religion influence health. This, in turn, emphasizes the fact that there are multiple interpretations of how spirituality/religion influences health and a number of pathways through which this happens. Four most prominent such pathways have been proposed: health behaviours (through prescribing a certain diet and/or discouraging the abuse of alcoholic beverages, smoking, etc., religion can protect and promote a healthy lifestyle), social support (people can experience social contact with co-religionists and have a web of social relations that can help and protect whenever the case), psychological states (religious people can experience a better mental health, more positive psychological states, more optimism and faith, which in turn can lead to a better physical state due to less stress) and 'psi' influences (supernatural laws that govern 'energies' not currently comprehended by science but possibly understandable at some point by science). It is because spirituality/religion influence health through these pathways, they act in an indirect way on health (Oman & Thorensen, 2002).

Religion plays a significant role in shaping health-seeking behaviour, especially in rural and peri-urban areas, such as those surrounding the NCP. In many communities, religious beliefs and practices influence how individuals perceive health, illness, and healing. For some, health is not solely a physical condition but is intertwined with spiritual well-being. Many people rely on prayer, faith healing, or religious rituals as a first step in addressing illness, before or alongside seeking conventional medical care. Religious leaders and healers, often regarded as community authorities, can play an influential role in guiding individuals' health decisions, especially in cases where modern healthcare services are perceived as insufficient, inaccessible, or incompatible with cultural beliefs. In the context of the proposed site, where the introduction of a CCGT Power Plant could contribute to significant health risks due to exposure to air pollution, noise pollution, and water contamination, religion may influence how the affected communities respond to these challenges. People who perceive illness as a spiritual affliction may prioritize consultations with religious leaders over visiting medical facilities, even in the face of tangible environmental health impacts. This could lead to delays in seeking proper healthcare, particularly in relation to chronic or environmental health conditions, which require early detection and intervention. Moreover, religious institutions often provide emotional and social support, helping individuals and communities cope with the psychological impacts of resettlement, economic displacement, or environmental changes. Religious gatherings may also serve as important platforms for sharing health-related information, particularly in contexts where trust in government or corporate entities is low. Incorporating the insights and influence of religious leaders into health education initiatives related to the project could enhance community engagement and foster a more holistic approach to health-seeking behaviour. By understanding and respecting these religious influences, health interventions related to the CCGT Power Plant can be tailored to better meet the needs and beliefs of the local population, encouraging timely and appropriate medical care while respecting spiritual practices.



Figure 14-13: A church in the vicinity of the proposed Project area

14.10.2 Traditional Medicine

Traditional medicine plays an integral role in health-seeking behaviour and also where choices are made as to preference for health care. Traditional medicine could be accessed either initially or even after seeking care for a more western medical source.

Cultural health practices in KwaZulu-Natal are deeply rooted in the region's diverse traditions, beliefs, and social structures. These cultural health practices are vital in shaping health behaviours and outcomes, highlighting the importance of culturally sensitive approaches in healthcare delivery. Notable practices Identified through FGD's include:

- **Traditional Healing**: Many communities rely on traditional healers, such as 'sangomas' and 'inyangas', who use herbal remedies, rituals, and spiritual guidance to treat illnesses
- **Herbal Medicine**: The use of indigenous plants and herbs for medicinal purposes is common. Remedies are often passed down through generations and are used for various ailments
- **Rituals and Ancestor Worship**: Many Zulu people believe that health is connected to ancestral spirits. Rituals to honour ancestors and seek their guidance are integral to maintaining health and wellness.
- **Community Support Systems**: Health practices often involve strong community networks, where families and community members support each other during illness through caregiving and emotional support.
- **Spiritual Healing**: Many individuals incorporate spiritual healing into their health practices, believing in the connection between physical health and spiritual well-being
- **Cultural Celebrations**: Festivals and cultural ceremonies can play a role in promoting health and well-being by fostering community bonds and shared identity.

- **Integration with Modern Medicine**: There is a growing recognition of the need to integrate traditional and modern healthcare practices, allowing individuals to access a broader range of treatments.

The number of traditional healers is unknown, however with community being diverse and different people having different belief systems. Some people prefer to go to traditional healers depending on the conditions being experienced. The vast majority sought help from healthcare facilities as their first option

14.10.3 Health Seeking Behaviour

In the proposed CCGT Power Plant context, individuals' health-seeking behaviour often reflects a blend of traditional and Western healthcare systems, driven by cultural beliefs, accessibility, and trust in different healing methods. Many people in this region may seek care from Western healthcare facilities, such as clinics or hospitals, particularly for acute medical conditions or when they perceive a serious threat to their health. These facilities are often valued for providing modern medical treatments, including access to diagnostic tools, pharmaceuticals, and specialized care. Western medicine is frequently seen as effective for treating infections, injuries, and chronic conditions that require precise medical interventions.

However, for many individuals, particularly in peri-urban and rural communities, traditional medical practitioners play an equally important role in health-seeking behaviour. Traditional healers, often trusted figures within the community, provide holistic treatments that incorporate spiritual, herbal, and psychological elements. Many people turn to traditional healers to address conditions they believe have spiritual or cultural origins, such as ailments linked to ancestral displeasure, curses, or other metaphysical causes. Traditional healing is often sought for chronic or unexplained illnesses, where the cause is perceived to go beyond physical symptoms.

In the Project area, the choice between Western healthcare and traditional medicine also depends on accessibility, with Western facilities sometimes being geographically or financially out of reach for some individuals. Traditional practitioners are often more accessible, both in terms of proximity and cultural understanding, which fosters trust among the community. As such, many people may use a combination of both systems, starting with traditional healers and only seeking Western healthcare if symptoms persist or worsen.

This dual approach to health-seeking behaviour highlights the importance of acknowledging both systems when considering public health strategies for the proposed Project. Understanding the cultural and logistical factors that influence healthcare choices can help bridge the gap between traditional and modern medical practices, promoting more comprehensive and accessible healthcare solutions for the PACs, and Mabasa Energy needs to be cognizant of this when relating to their employees and contractors.

Many communities use plural systems of care, drawing on biomedical services, traditional healers, spiritual support and complementary therapies in parallel rather than sequentially. The draft cHIA text notes that care-seeking may be influenced by whether illness is interpreted as “traditional” or “African,” whether home treatment has failed, and whether households believe formal clinics can address the perceived cause of illness. It also notes the coexistence of isiZulu cultural frames and long-established Indian communities in the wider coastal urban corridor, with evidence of concurrent use of complementary or traditional modalities and biomedical treatment.

That interpretation is consistent with the public literature. WHO’s Africa regional office notes that traditional medicine remains a major source of primary health care in the region, and South Africa’s Traditional Health Practitioners Act provides a regulatory basis for traditional practice and liaison with the wider health system. The baseline for EHA 10 should therefore not treat cultural health

practices as peripheral or anecdotal. They are part of the real health system interface through which symptoms are interpreted, decisions to seek care are made, and community trust in risk messaging is filtered.

For this project, the baseline implication is that health communication and referral assumptions cannot be narrowly biomedical. Communities in the project area may use plural and culturally layered care pathways, especially for chronic symptoms, psychosocial distress, reproductive health concerns and illnesses interpreted through spiritual or indigenous explanatory models. This has direct relevance to later mitigation design, but even at baseline it means the social fabric of care-seeking is culturally plural rather than institutionally uniform.

14.11 EHA #11 Health Systems Issues

This category considers health outcomes and determinants related to healthcare access and healthcare infrastructure. Important outcomes include the increase or decrease in the number of medical evacuations, clinics or hospital visit trends, health expenditures, and medication usage. Health determinants may include distance to health facilities, mobile clinics, the presence of community health workers, and the frequency of physician visits to the areas/ clinics.

Health systems issues related to industry encompass a range of challenges and considerations that impact the health and well-being of workers, their families, and communities living close to industrial areas.

Figure 14-14 shows some of the key issues pertaining to healthcare service delivery within the ULM identified during the KII's and FGD's, whilst Figure 14-15 to Figure 14-18 depict the different healthcare facilities in surrounding PAC's.

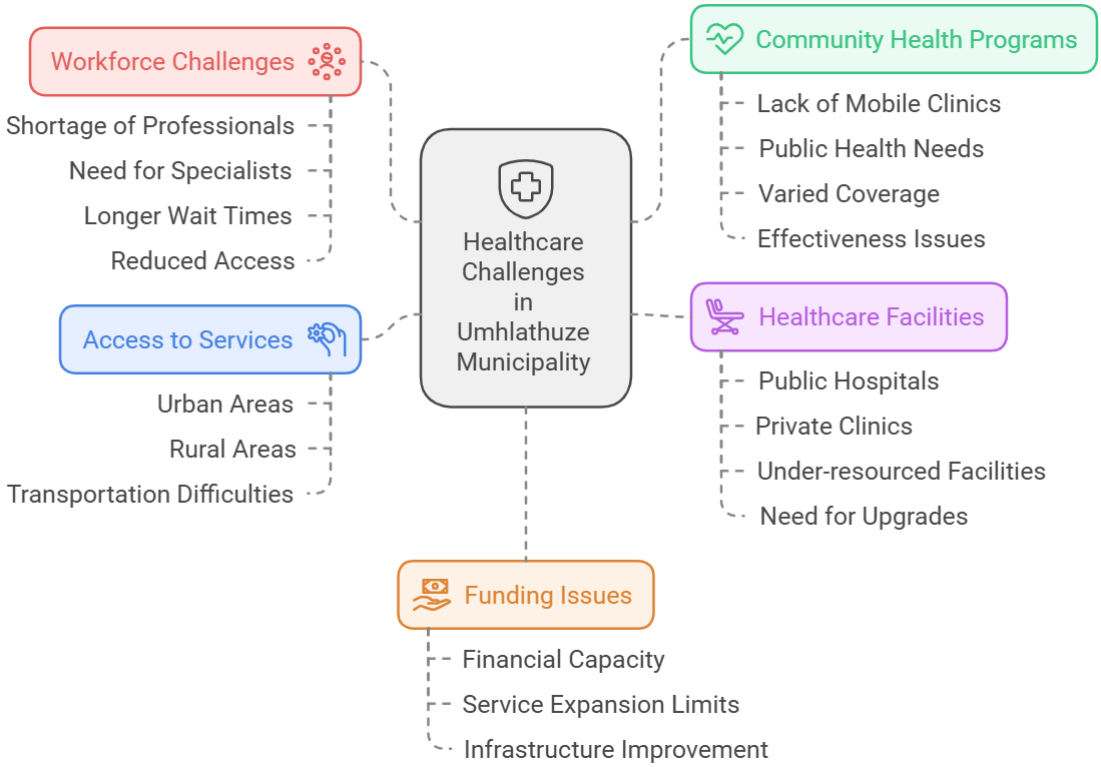


Figure 14-14: ULM healthcare service delivery capacity

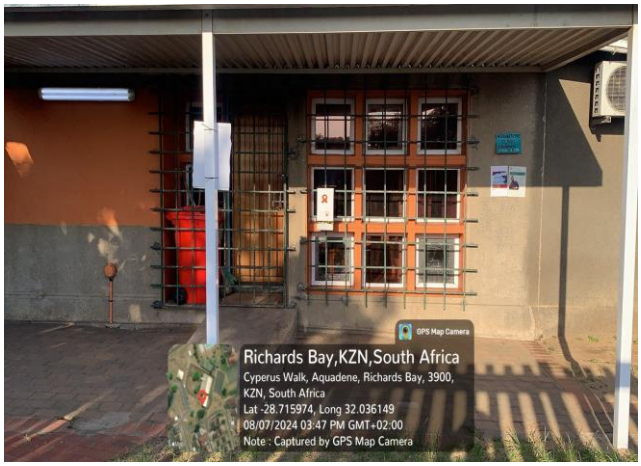


Figure 14-15: Public Clinic in Aquadene



Figure 14-17: Public Clinic in Brackenham



Figure 14-16: Pharmacy in Brackenham

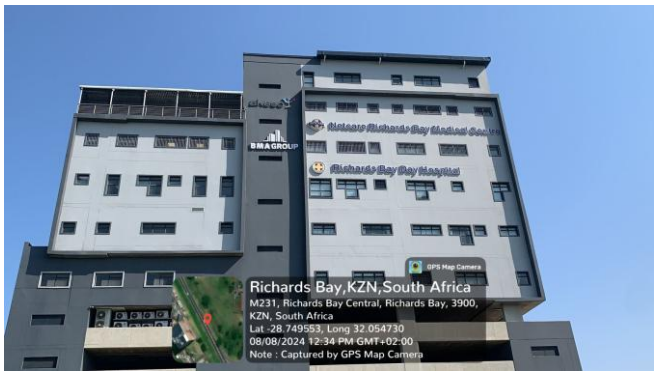


Figure 14-18: Netcare Private Hospital in Richards Bay Central

The project area contains multiple healthcare receptors, including Richards Bay Municipal Clinic, Civic Centre Clinic, Mandlazini Clinic, Medicross Medical Centre, Greenhill Medical Centre and CarePoint Industrial Health Services. The draft cHIA also notes the broader district context of King Cetshwayo and records that the district had an estimated population of 980 188 and over 225 000 households according to the District Health Barometer. This already signals that health system capacity needs to be understood at more than one scale: there is a local cluster of facilities in and around Richards Bay, but those facilities sit within a wider district and provincial system under pressure. Publicly available health system literature supports that interpretation. The Health Systems Trust District Health Barometer remains South Africa's principal public district-level health system resource and shows variation in district performance and service pressure across KwaZulu-Natal. The baseline issue for the present project is therefore not the absence of facilities, but the possibility that even a relatively service-rich urban node may depend on a broader provincial system that remains uneven in staffing, maternal-child health performance, screening, emergency care access and chronic disease management.

For the cHIA baseline chapter, EHA 11 should therefore be framed as mixed-capacity with existing service dependence and potential strain sensitivity. Richards Bay has clinics, hospitals and private facilities, but those services are not infinitely elastic. Increases in occupational incidents, traffic injuries, respiratory complaints or communicable disease demand could place pressure on the same facilities relied upon by surrounding communities. This is especially relevant in a district and province where public health systems already manage substantial burdens of HIV, TB, maternal and child health demand and growing chronic disease needs.

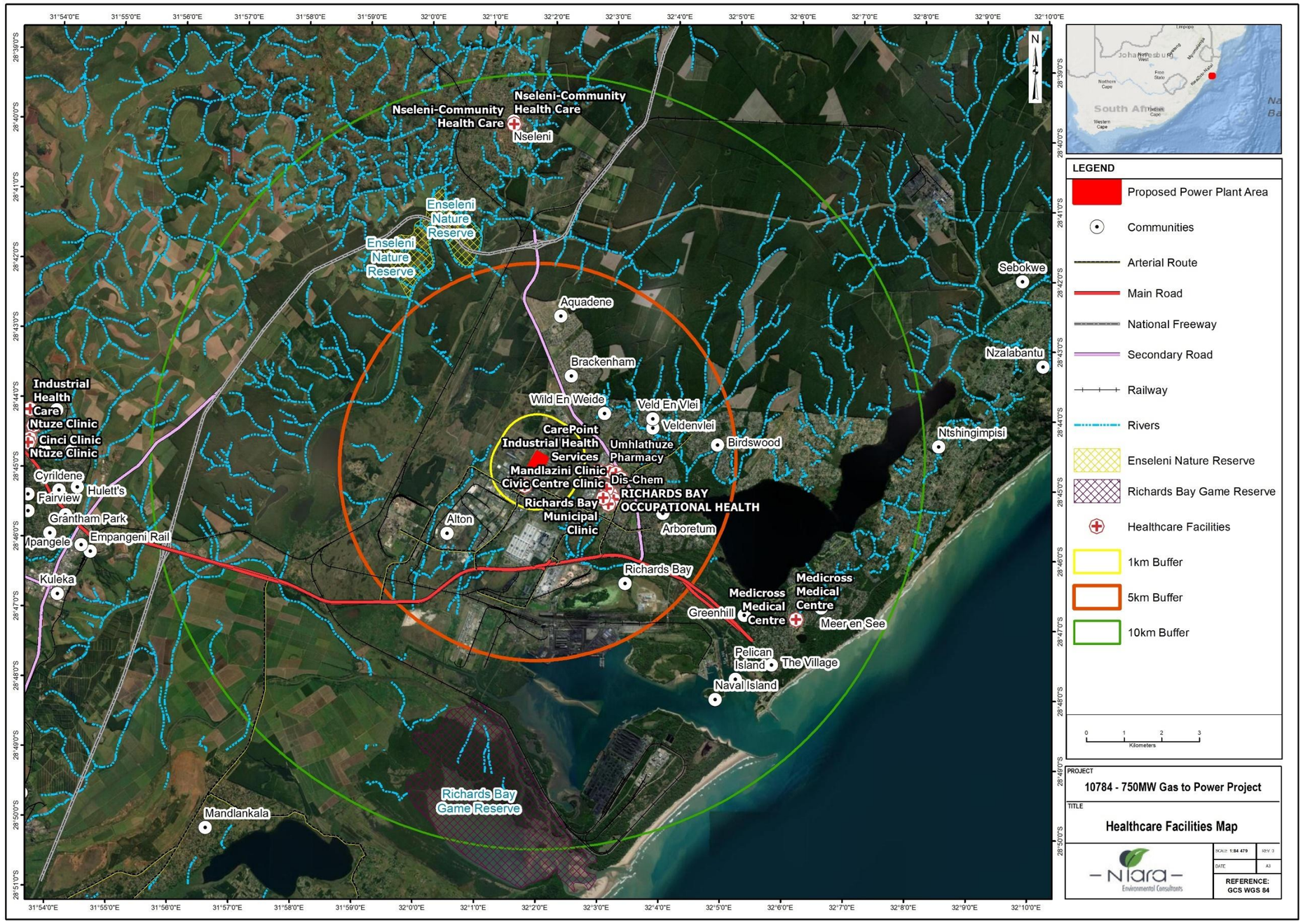


Figure 14-19: Healthcare facilities within the ZoI

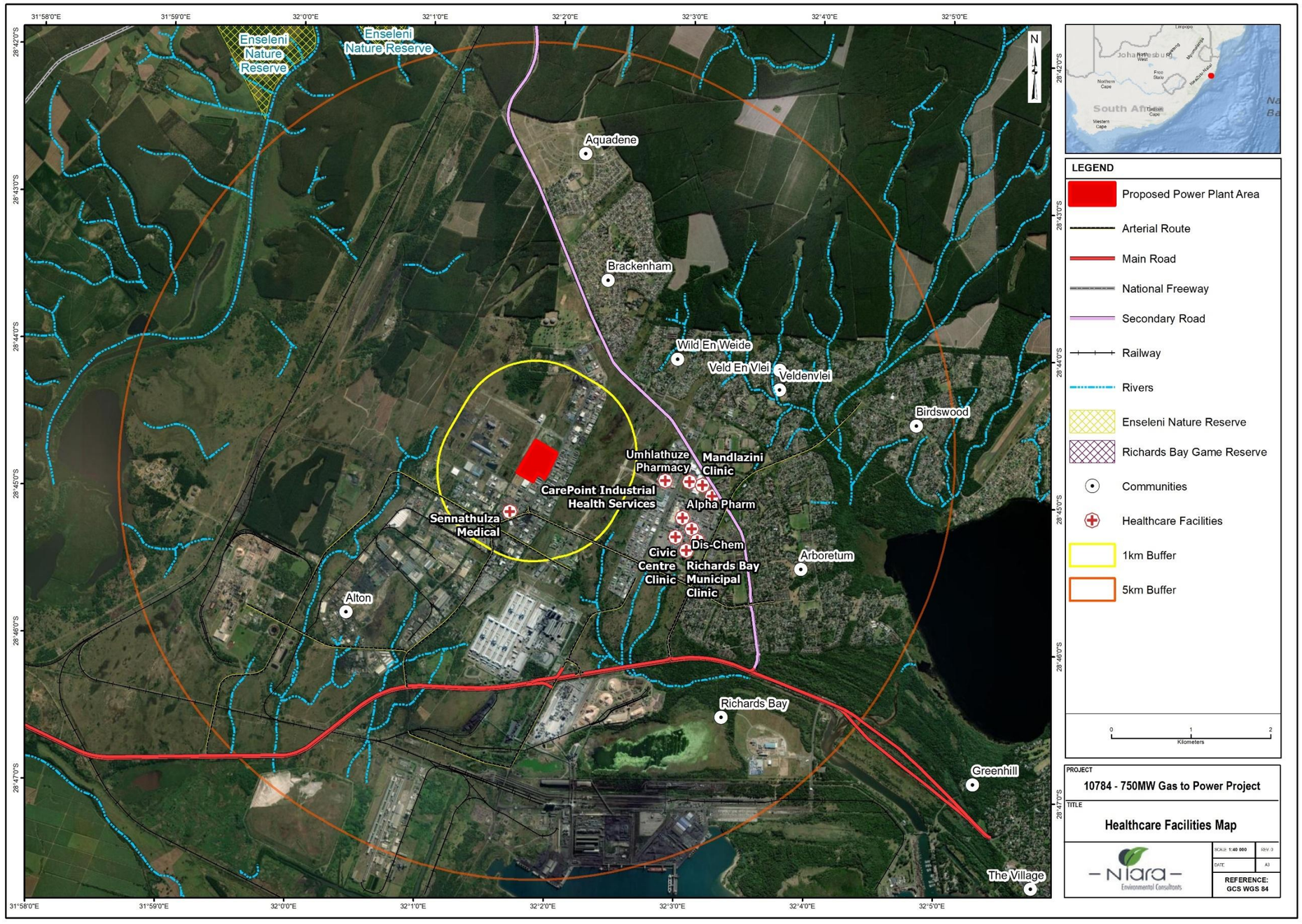


Figure 14-20: Healthcare facilities within the ZoI (zoom)

14.12 EHA #12 Non-Communicable Diseases

The term NCDs refers to a group of conditions that are not mainly caused by an acute infection, result in long-term health consequences and often create a need for long-term treatment and care. These conditions include cancers, cardiovascular disease, diabetes and chronic lung illnesses. Many NCDs can be prevented by reducing common risk factors such as tobacco use, harmful alcohol use, physical inactivity and eating unhealthy diets. Many other important conditions are also considered NCDs, including injuries and mental health disorders.

The baseline non-communicable disease context is strongly shaped by the project setting. The cHIA already recognises that communities in the Richards Bay area are influenced by urban lifestyle factors and the broader public health profile of KwaZulu-Natal, including a growing burden of non-communicable disease. This is important because the primary environmental stressors associated with the broader industrial setting, especially ambient air pollution, noise, psychosocial stress and unequal access to healthy living conditions, are also recognised NCD determinants.

WHO states that NCDs are the leading cause of death globally and identifies air pollution, unhealthy diets, physical inactivity, tobacco and harmful alcohol use among the major shared risk factors. WHO AFRO further notes that NCDs account for an increasing share of mortality in the African region. For this project, the baseline implication is straightforward: communities near the project do not enter the assessment as otherwise healthy populations to whom industrial exposures are newly introduced. They enter as urban and peri-urban populations already living within a national and provincial epidemiological transition in which chronic respiratory disease, cardiovascular disease, diabetes, cancer and mental health burdens are increasing.

The local specialist evidence reinforces the relevance of this EHA. The air quality report identifies existing pollutant burdens in Richards Bay; the noise studies confirm an existing industrial acoustic environment; the visual study points to an already industrialised landscape; and the socio-economic study identifies unemployment and inequality, both of which are linked to chronic stress and poorer long-term health outcomes. The baseline for EHA 12 should therefore be written as one of meaningful pre-existing chronic disease vulnerability, shaped by cumulative environmental exposures and broader social determinants rather than by any single local statistic alone.

14.12.1 Chief Chronic Conditions Identified

In the context of the proposed CCGT Power Plant, key informant interviews (KII) and available health data have identified several chronic conditions prevalent within the primary zone of influence. These conditions include

- **Diabetes:** A significant concern due to the long-term management it requires, diabetes affects individuals across various age groups in the local community.
- **Asthma:** Asthma, a chronic respiratory disease, has been highlighted as a common condition, with exacerbations potentially triggered by environmental factors such as air pollution.
- **Upper Respiratory Tract Infections (URTIs):** Recurring URTIs, while not chronic in nature, can lead to long-term respiratory issues and are often exacerbated by poor air quality, a concern in areas surrounding industrial activities.

14.12.2 Vulnerable Groups

Key Informant Interview (KII) findings, supported by the broader baseline assessment, indicate that certain population groups within the Richards Bay study area are more susceptible to the potential health impacts associated with industrial emissions, environmental exposure pathways and existing cumulative burdens within the airshed.

The most vulnerable groups identified include:

- Children: Children are particularly sensitive to air pollutants such as nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$), due to developing respiratory systems and higher breathing rates relative to body weight. In the context of the Richards Bay industrial environment, where baseline air quality is already elevated, additional exposure, even at low incremental levels, may contribute to the onset or exacerbation of respiratory conditions, including asthma and reduced lung function.
- Elderly Individuals: Older persons are more susceptible to both acute and chronic effects of air pollution, particularly in relation to cardio-respiratory health outcomes. Exposure to pollutants such as NO_2 and fine particulate matter is associated with increased risk of hospitalisation, cardiovascular stress and reduced physiological resilience in ageing populations.
- Individuals with Pre-existing Health Conditions: Persons living with non-communicable diseases (NCDs), including asthma, chronic obstructive pulmonary disease (COPD), cardiovascular disease and diabetes, are at increased risk of experiencing worsened symptoms and complications as a result of environmental stressors. Incremental increases in air pollutants, even within regulatory limits, may trigger acute episodes or disease progression, particularly under cumulative exposure conditions.
- Low-Income and Environmentally Exposed Communities: Communities located in closer proximity to industrial areas, transport corridors and emission sources, including parts of Wild en Weide, Brackenham and surrounding areas, may experience higher exposure levels and reduced adaptive capacity. Socio-economic constraints may limit access to healthcare, reduce resilience to environmental stressors and increase overall vulnerability to health impacts.
- Outdoor Workers and Occupationally Exposed Individuals: Individuals working outdoors or in proximity to industrial activities may experience elevated exposure to ambient pollutants, noise and heat, particularly during peak operational or climatic conditions. This includes both construction-phase workers and operational staff, where occupational exposure pathways must be actively managed.

14.12.3 Environmental and Health Concerns

The proposed CCGT Power Plant poses specific risks related to NCDs, especially those exacerbated by environmental degradation. Air pollution, including particulate matter from CCGT Power Plant activities, is a significant concern. Increased levels of dust and other airborne pollutants can negatively affect respiratory health, potentially increasing the prevalence and severity of conditions such as asthma and URTIs.

Additionally, indirect impacts such as reduced physical activity due to changes in the environment and limited access to healthy food options could further contribute to the growing burden of NCDs, particularly obesity and diabetes.

These could be as a result of poor air quality in the area resulting from the numerous industrial activities taking place in Richards Bay, see Figure 14-21 to Figure 14-22 below.

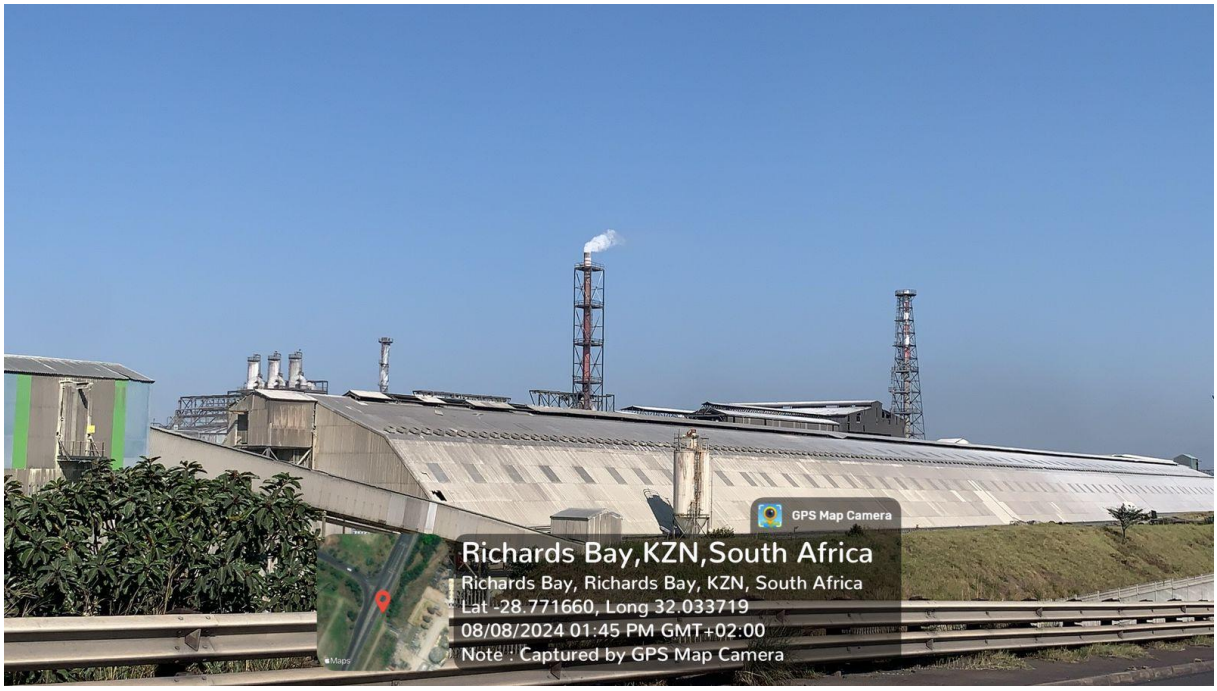


Figure 14-21 An industrial plant located in Richards Bay near PAC's & project area

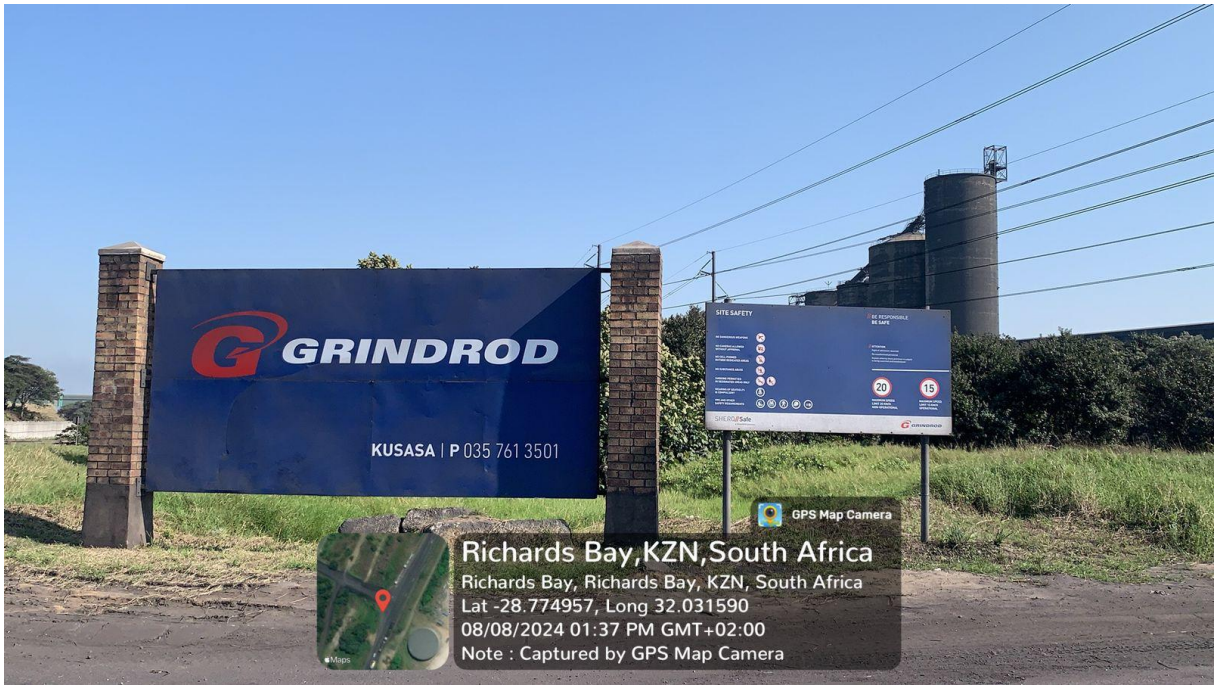


Figure 14-22 An industrial plant located in Richards Bay near PAC's & project area

14.13 Closing Baseline Synthesis

Taken together, the baseline health profile of the project area is not one of an undisturbed or medically neutral receiving environment. It is a mixed urban-industrial health landscape in which communities already experience cumulative environmental exposures, unequal socio-economic conditions, plural health-seeking systems and dependence on a finite local and district health service

platform. The most material baseline sensitivities for the present cHIA are respiratory health, hazardous exposure, accidents and injuries, social determinants of health, HIV/STI vulnerability and health system capacity, while vector, zoonotic, water-related, nutrition and cultural health practice issues remain important cross-cutting determinants that could become more significant if project-related stressors interact with existing vulnerabilities.

15 Toxicology Assessment and Human Health

The toxicological assessment evaluates the potential for adverse human health effects arising from chemical, physical and biological hazards associated with the construction, commissioning, operation and decommissioning of the proposed 750 MW CCGT Power Plant. Toxicological risk is determined by the interaction between hazard, exposure pathway, dose, duration and receptor susceptibility, and must therefore be interpreted within the context of both project-specific emissions and the cumulative environmental burden of the receiving environment (IFC, 2009).

The proposed facility will be located within Phase 1F of the RBIDZ and will comprise two gas turbines, HRSGs, a steam turbine, an induced draft cooling tower, condenser systems and associated balance-of-plant infrastructure, including transformers, fuel systems, chemical storage areas and stormwater management systems. The plant will operate primarily on natural gas, with provision for light distillate fuel under certain operational conditions.

In contrast to coal-fired generation, the toxicological profile of a gas-fired combined cycle plant is dominated by gaseous combustion products, trace organic compounds and operational chemicals, rather than ash, slag or high-volume heavy metal emissions. The Atmospheric Impact Report identifies sulphur dioxide (SO_2), oxides of nitrogen (NO_2/NOx), particulate matter (PM_{10}) and carbon monoxide (CO) as the principal pollutants associated with stack emissions from the proposed facility (uMoya-NILU, 2024).

From a human health perspective, the significance of these pollutants is strongly influenced by cumulative exposure. The WHO identifies ambient air pollution as a leading environmental cause of disease, contributing to cardiovascular disease, stroke, chronic obstructive pulmonary disease (COPD), lung cancer and acute respiratory infections (WHO, 2021). The toxicological relevance of the proposed Project therefore lies not only in its standalone emissions, but in its incremental contribution to an already industrialised airshed characterised by existing emissions, transport-related pollution and sensitive receptor populations.

15.1 Toxicological Framework and Receptor Sensitivity

Toxicological risk only materialises where a credible exposure pathway exists between a hazardous substance and a receptor population. In this case, receptors include surrounding residential communities, schools, healthcare facilities, workers, contractors and emergency responders.

The Atmospheric Impact Report identifies high-sensitivity receptors within a 5 km radius of the proposed facility, including schools and healthcare facilities, and classifies surrounding residential areas as medium sensitivity due to prolonged occupancy (uMoya-NILU, 2024).

Receptor sensitivity is not uniform. Children exhibit increased vulnerability due to developing respiratory systems and higher inhalation rates per unit body mass, while elderly individuals and those with pre-existing respiratory or cardiovascular conditions

experience heightened susceptibility to pollutant exposure (WHO, 2021). Socio-economic determinants, including access to healthcare, baseline disease burden and living conditions, further influence health outcomes.

The toxicological profile of the project therefore distinguishes between chronic, low-dose community exposure, primarily via inhalation, and acute or higher-intensity occupational exposure occurring within the plant environment.

15.2 Combustion-Related Toxicants

The Atmospheric Impact Report identifies the principal operational pollutants associated with the CCGT plant as sulphur dioxide (SO_2), oxides of nitrogen (NO_2/NOx), particulate matter (PM_{10}) and carbon monoxide (CO), generated through the combustion of natural gas for electricity production (uMoya-NILU, 2024). Although natural gas combustion produces significantly lower particulate emissions than coal combustion, the scale of the proposed 750 MW facility means that stack emissions remain toxicologically significant, particularly when considered cumulatively with surrounding industrial sources.

Sulphur dioxide is a well-established respiratory irritant that causes bronchoconstriction, airway inflammation and acute exacerbation of asthma, particularly in sensitive individuals exposed during short-term peak events. Nitrogen dioxide contributes to pulmonary inflammation, reduced lung function, increased susceptibility to respiratory infections and long-term cardiopulmonary disease. Fine and inhalable particulate matter, including PM_{10}, is associated with deep respiratory penetration, systemic inflammation, cardiovascular disease, stroke, chronic obstructive pulmonary disease (COPD), lung cancer and increased all-cause mortality (WHO, 2021). Carbon monoxide presents acute toxicological risk because it binds to haemoglobin with a significantly greater affinity than oxygen, reducing oxygen transport and causing tissue hypoxia, particularly affecting the cardiovascular and nervous systems during high-concentration exposure events (WHO, 2024a).

The World Health Organization identifies ambient air pollution as one of the leading environmental causes of disease globally, estimating that millions of premature deaths annually are attributable to air pollution-related stroke, ischaemic heart disease, COPD, lower respiratory infections and lung cancer (WHO, 2024b). In the Richards Bay context, where baseline industrial emissions are already elevated, the toxicological significance of these pollutants is amplified by cumulative exposure rather than standalone project contribution.

15.2.1 Nitrogen Oxides (NOx) and Nitrogen Dioxide (NO_2)

Nitrogen oxides are generated through high-temperature combustion within the gas turbines, where atmospheric nitrogen reacts with oxygen. The Atmospheric Impact Report identifies NOx, expressed as NO_2, as a key regulated emission associated with the proposed facility (uMoya-NILU, 2024).

Nitrogen dioxide is a well-characterised respiratory toxicant. Acute exposure is associated with airway inflammation, increased bronchial reactivity and exacerbation of asthma, while chronic exposure contributes to reduced lung function, increased respiratory infections and long-term cardiopulmonary disease (WHO, 2021). Epidemiological evidence also links NO_2 exposure to impaired lung development in children.

For the proposed Project, NO_2 exposure occurs primarily through inhalation of dispersed stack emissions. Although modelled concentrations for the plant operating in isolation may remain within regulatory limits, the cumulative context of Richards Bay—characterised by existing industrial emissions and transport-related pollution—elevates the toxicological significance of incremental NO_2 loading.

15.2.2 Sulphur Dioxide (SO_2)

Sulphur dioxide emissions are dependent on fuel sulphur content and combustion efficiency. While natural gas combustion typically results in relatively low SO_2 emissions, the Atmospheric Impact Report confirms that SO_2 remains a relevant pollutant within the emissions inventory and that baseline concentrations in Richards Bay are already elevated, with recorded exceedances of short-term ambient standards (uMoya-NILU, 2024).

SO_2 is highly water soluble and primarily affects the upper respiratory tract, causing bronchoconstriction, mucosal irritation and acute asthma exacerbation. Short-term peak exposures are particularly important, as sensitive individuals may experience rapid onset of symptoms even at relatively low concentrations (WHO, 2021).

The toxicological significance of SO_2 in this context is therefore cumulative. The proposed plant contributes additional emissions to an already burdened airshed, increasing the likelihood of adverse respiratory outcomes in sensitive populations.

15.2.3 Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter represents one of the most significant toxicological pathways due to its ability to penetrate the respiratory system and induce systemic effects. The Atmospheric Impact Report includes PM_{10} as a modelled pollutant associated with combustion and operational activities (uMoya-NILU, 2024). Although $PM_{2.5}$ was not explicitly modelled, it is widely recognised as the more hazardous fraction due to its capacity to penetrate the alveolar region and enter systemic circulation. Exposure to $PM_{2.5}$ is associated with cardiovascular disease, stroke, chronic respiratory disease, lung cancer and premature mortality (WHO, 2021). For this project, particulate exposure arises from a combination of combustion emissions, construction dust, vehicle exhaust and cumulative industrial sources within the RBIDZ. The health significance is driven by cumulative exposure, particularly for vulnerable receptors such as children, elderly individuals and those with pre-existing disease.

15.2.4 Carbon Monoxide (CO)

Carbon monoxide is produced through incomplete combustion and has been included in the emissions inventory for the proposed plant (uMoya-NILU, 2024). CO is a systemic toxicant that binds to haemoglobin to form carboxyhaemoglobin, thereby reducing oxygen delivery to tissues. Acute exposure may result in headache, dizziness, confusion, cardiovascular stress and, at high concentrations, fatal hypoxia (ATSDR, 2016). Under normal operating conditions, community exposure is expected to be low due to atmospheric dispersion. However, occupational exposure remains relevant, particularly in confined spaces, poorly ventilated environments and during abnormal operating conditions.

15.2.5 Volatile Organic Compounds (VOCs) and Formaldehyde

VOCs may arise from fuel handling, maintenance activities, solvents and incomplete combustion. While not a primary pollutant of concern in the Atmospheric Impact Report, VOCs contribute to respiratory irritation and secondary pollutant formation.

Formaldehyde, a potential by-product of incomplete combustion, is classified as carcinogenic and is associated with respiratory and mucous membrane irritation (IARC, 2012). Although expected concentrations are low, occupational exposure may occur during maintenance or abnormal combustion events.

15.2.6 Ammonia Slip

Ammonia slip is relevant where selective catalytic reduction systems are used for NOx control. The current project design does not confirm the use of ammonia-based systems; however, if introduced, ammonia exposure would present an additional respiratory irritant pathway requiring management.

15.2.7 Hydrocarbons, Oils and Chemical Handling

Construction and operational activities require the storage, handling and transfer of fuels, lubricants, hydraulic oils, transformer oils, maintenance chemicals, cleaning agents and emergency backup fuel systems. Although these substances are not continuously released into the environment under normal operating conditions, accidental spills, leaks and poor containment remain credible exposure scenarios with both acute and chronic toxicological implications.

The hydrological assessment confirms that the project site drains toward a man-made canal along the western boundary that exhibits wetland-like characteristics and forms part of the local receiving environment. While baseline water quality sampling indicates generally acceptable conditions, the study identifies hydrocarbon contamination, poor stormwater separation, sediment mobilisation and flood-related transport of contaminants as significant environmental risks if operational controls fail (GCS, 2026).

Hydrocarbon exposure may occur through dermal contact during handling, inhalation of vapours during spill events or confined maintenance activities, and indirect exposure through contaminated runoff entering receiving water systems. Petroleum hydrocarbons contain compounds such as benzene, toluene, ethylbenzene and xylene (BTEX), many of which are associated with neurological effects, skin irritation, haematological toxicity and, in the case of benzene, carcinogenicity with prolonged exposure (ATSDR, 2007). Although routine community exposure is expected to remain low, accidental releases can create localised toxicological events with both occupational and downstream environmental health implications.

Lubricating oils, hydraulic fluids, transformer oils and maintenance chemicals represent secondary toxicological hazards. Exposure pathways include dermal contact, inhalation of vapours and environmental contamination through spills.

The hydrological assessment confirms that the site drains toward a canal system with wetland characteristics, and identifies hydrocarbon contamination as a risk if stormwater controls fail (GCS, 2026).

Diesel and light distillate fuels may be used during construction or as backup fuel. Diesel exhaust is classified as carcinogenic and contributes to particulate exposure and respiratory risk (IARC, 2012).

15.3 Cooling Tower Drift and Biological Exposure

The induced draft cooling tower presents a potential pathway for aerosolised water droplets (drift), which may contain dissolved chemicals and microorganisms. Of particular concern is *Legionella*, which can proliferate in poorly maintained water systems and cause Legionnaires' disease through inhalation exposure (WHO, 2022).

The risk is operational rather than inherent and is dependent on water treatment, maintenance and monitoring.

15.4 Wastewater, Stormwater and Environmental Exposure

Stormwater and wastewater represent conditional toxicological pathways. The hydrological assessment identifies risks associated with contaminated runoff, flooding and hydrocarbon transport (GCS, 2026). Exposure may occur through dermal contact, ingestion or ecological pathways, particularly during system failure events.

15.4.1 Occupational Chemical Exposure

Occupational exposure represents the highest-intensity toxicological pathway. Workers may be exposed to combustion gases, chemicals, heat, noise and confined-space hazards. Occupational toxicology is particularly important for operations personnel, maintenance teams, contractors and construction workers who experience direct proximity to plant processes and therefore higher-intensity exposure than surrounding communities. Worker exposure may occur through inhalation of combustion gases, welding fumes, cleaning agents, maintenance chemicals, confined-space emissions, heat stress interactions, and dermal contact with fuels and oils.

Occupational exposure differs fundamentally from community exposure because it involves greater concentration, duration and frequency. Repeated inhalation of combustion gases and maintenance-related particulates may contribute to chronic respiratory disease, while exposure to solvents and hydrocarbons may produce acute irritation, dermatitis, chemical burns and systemic toxicity. Confined-space work presents additional acute toxicological risk where gases may accumulate rapidly and oxygen displacement or toxic vapour exposure may occur.

Heat stress is associated with physiological strain and increased injury risk (NIOSH, 2016). Confined spaces present risks of toxic gas accumulation and oxygen deficiency. These pathways require strict occupational health controls. The interaction between occupational chemical exposure, fatigue, heat stress and environmental noise may also increase the likelihood of secondary safety incidents, reducing situational awareness and increasing injury risk. Occupational toxicology therefore represents one of the most immediate and operationally significant health pathways associated with the project.

15.5 Quantitative Risk Assessment Integration

The Draft Scoping Report identifies the need for a Quantitative Risk Assessment (QRA) to evaluate major hazard scenarios (Nemai, 2026). The toxicological assessment addresses chronic exposure pathways, while the QRA addresses acute event-based risks. Together, they provide a comprehensive risk profile.

15.6 Overall Toxicological Significance

The dominant toxicological pathway is inhalation exposure to combustion-related pollutants within a cumulative industrial airshed. Secondary pathways include occupational exposure, hydrocarbon contamination, cooling tower aerosols and accidental release scenarios.

Community exposure is primarily chronic and cumulative, while occupational exposure is more acute and concentrated. The project is acceptable from a toxicological perspective where emissions, occupational exposure and environmental controls are effectively managed, and where cumulative exposure remains the central consideration.

15.7 Exposure Pathways

15.7.1 Community Exposure Pathways

Human health risk depends on both the presence of a hazardous substance and the existence of a credible exposure pathway between the source and the receptor. For surrounding communities, the dominant toxicological pathway is inhalation of ambient air pollutants resulting from operational stack emissions and cumulative industrial air quality conditions within the Richards Bay airshed.

The Atmospheric Impact Report confirms that while the project operating in isolation contributes relatively low ambient concentrations, cumulative scenarios involving existing and future industrial sources predict exceedances of short-term SO_2, NO_2 and PM_{10} concentrations (uMoya-NILU, 2024). This means that receptor vulnerability is driven by cumulative industrial exposure rather than by the plant alone. Communities most likely to be affected include Wild en Weide, Brackenham, Veldenvlei, Birdswood, Aquadene, Arboretum and nearby schools and healthcare facilities located within the broader zone of influence.

Secondary community exposure pathways include contact with contaminated stormwater or surface water following accidental spills, indirect food chain exposure through environmental contamination, and localised traffic-related emissions associated with construction and logistics. Psychosocial exposure also plays an important role where visible industrial infrastructure reinforces perceptions of pollution and environmental decline, contributing indirectly to stress-related health outcomes.

Children, elderly persons, pregnant women and individuals with pre-existing respiratory or cardiovascular disease remain the most vulnerable receptors because of their increased physiological sensitivity to toxic exposure.

15.7.2 Occupational Exposure Pathways

Occupational exposure occurs primarily through direct inhalation of gases, vapours and particulates within the plant environment, as well as dermal contact with fuels, oils, cleaning chemicals and maintenance substances. Confined-space maintenance work, welding activities, accidental releases and emergency shutdown scenarios represent the highest acute exposure situations.

Unlike community exposure, which is typically low-intensity and chronic, occupational exposure may involve short-duration, high-concentration events with immediate health consequences. Acute exposure to carbon monoxide, solvent vapours or confined-space emissions may result in dizziness, respiratory distress, hypoxia or acute poisoning, while long-term exposure contributes to chronic respiratory disease, dermatitis and systemic toxicological burden.

Workers therefore represent the highest toxicological risk receptor group associated with the project, and occupational health management is central to overall toxicological risk reduction.

15.8 Toxicological Health Outcomes

15.8.1 Respiratory and Cardiovascular Effects

The dominant toxicological health outcome associated with the proposed CCGT plant is respiratory and cardio-respiratory disease resulting from cumulative exposure to combustion-related air pollutants. Even where emissions remain within regulated standards under standalone modelling scenarios, health risk remains significant because communities are already exposed to multiple industrial pollution sources within the Richards Bay airshed.

The AQIA confirms that cumulative modelling predicts exceedances for short-term SO_2, NO_2 and PM_{10} concentrations when the project is assessed together with existing industrial sources and approved future developments (uMoya-NILU, 2024). The toxicological importance of short-term peak exposure is particularly relevant for sulphur dioxide and nitrogen dioxide because acute spikes may trigger severe respiratory symptoms even where annual averages remain compliant.

Likely health outcomes include asthma attacks, bronchitis, respiratory irritation, chronic cough, worsening COPD, increased respiratory infections, reduced lung function and cardiovascular stress associated with particulate exposure. Fine particulate matter is also associated with endothelial dysfunction, increased blood pressure, stroke risk and myocardial infarction (WHO, 2021). These effects are amplified among vulnerable receptors, particularly children with developing lungs, elderly persons, and individuals with pre-existing respiratory or cardiac disease.

15.8.2 Water-related Toxicological Risk

Although baseline water quality is currently acceptable, accidental hydrocarbon spills and contaminated runoff remain toxicologically relevant because of the hydrological sensitivity of the receiving environment. Exposure may occur through direct contact, accidental ingestion, or ecological contamination affecting downstream users and aquatic systems.

Hydrocarbon contamination may cause skin irritation, gastrointestinal effects, neurological symptoms and longer-term ecological toxicity depending on the chemical composition and duration of exposure. Flooding events may increase the likelihood of contaminant transport by mobilising stored pollutants into surface water systems and increasing community contact with contaminated water.

The toxicological significance of this pathway is therefore conditional rather than constant. Under normal operations, risk remains relatively low; however, during failure events the severity of exposure may increase rapidly.

15.8.3 Occupational Health Outcomes

Occupational toxicological outcomes include acute inhalation exposure, chemical burns, acute poisoning, solvent irritation, chronic respiratory illness and secondary injury caused by fatigue, heat stress and chemical interaction. Workers exposed to maintenance chemicals, confined spaces and combustion systems may experience immediate health effects if exposure controls are inadequate.

Noise exposure also interacts with toxicological stress pathways by increasing fatigue and physiological strain, particularly where high-temperature operational environments are combined with chemical exposure and physically demanding work. Long-term

occupational exposure without adequate monitoring may contribute to chronic respiratory illness, hearing loss, reduced work capacity and psychological stress.

The occupational pathway therefore remains the highest-intensity toxicological exposure pathway within the project.

15.9 Cumulative Toxicological Context

The toxicological significance of the project cannot be interpreted in isolation because the facility is located within an established industrial zone already characterised by existing atmospheric emissions, freight logistics, industrial traffic and visible industrial infrastructure. Communities in Richards Bay do not enter the project as unexposed receptors; they already experience cumulative environmental and psychosocial stress associated with industrial living.

The air quality report confirms that cumulative scenarios are materially more significant than standalone project emissions, while the visual and socio-economic studies indicate that pollution perception and environmental fatigue already shape community wellbeing. Chronic exposure to low-level pollutants over time may contribute to non-communicable disease burden, particularly cardiovascular disease, stroke and chronic respiratory illness.

The toxicological importance of the project therefore lies in incremental loading within an already burdened receiving environment. Even individually compliant emissions may be materially relevant when added to pre-existing industrial exposure and socially vulnerable receptors.

15.10 Overall Toxicological Significance

The toxicological assessment confirms that the most significant health pathway associated with the proposed Project is air quality-related respiratory and cardiovascular exposure resulting from cumulative industrial emissions. This pathway carries the greatest long-term significance because it affects large receptor populations and interacts directly with pre-existing disease vulnerability within surrounding communities.

Secondary toxicological pathways include hydrocarbon spills and stormwater contamination, occupational chemical exposure, accidental release scenarios and psychosocial responses to visible industrial expansion and perceived pollution risk. Community toxicological exposure is primarily chronic and cumulative, while occupational exposure is more direct, concentrated and acute.

Overall significance is highest for cumulative respiratory exposure affecting vulnerable community receptors, moderate for occupational chemical exposure and accidental release scenarios, and low to moderate for water-related toxicological exposure under normal operating conditions. The project remains acceptable from a toxicological health perspective where emissions control, stormwater protection, occupational health management and emergency response systems are maintained to a high operational standard and where cumulative exposure remains the primary lens through which significance is interpreted.

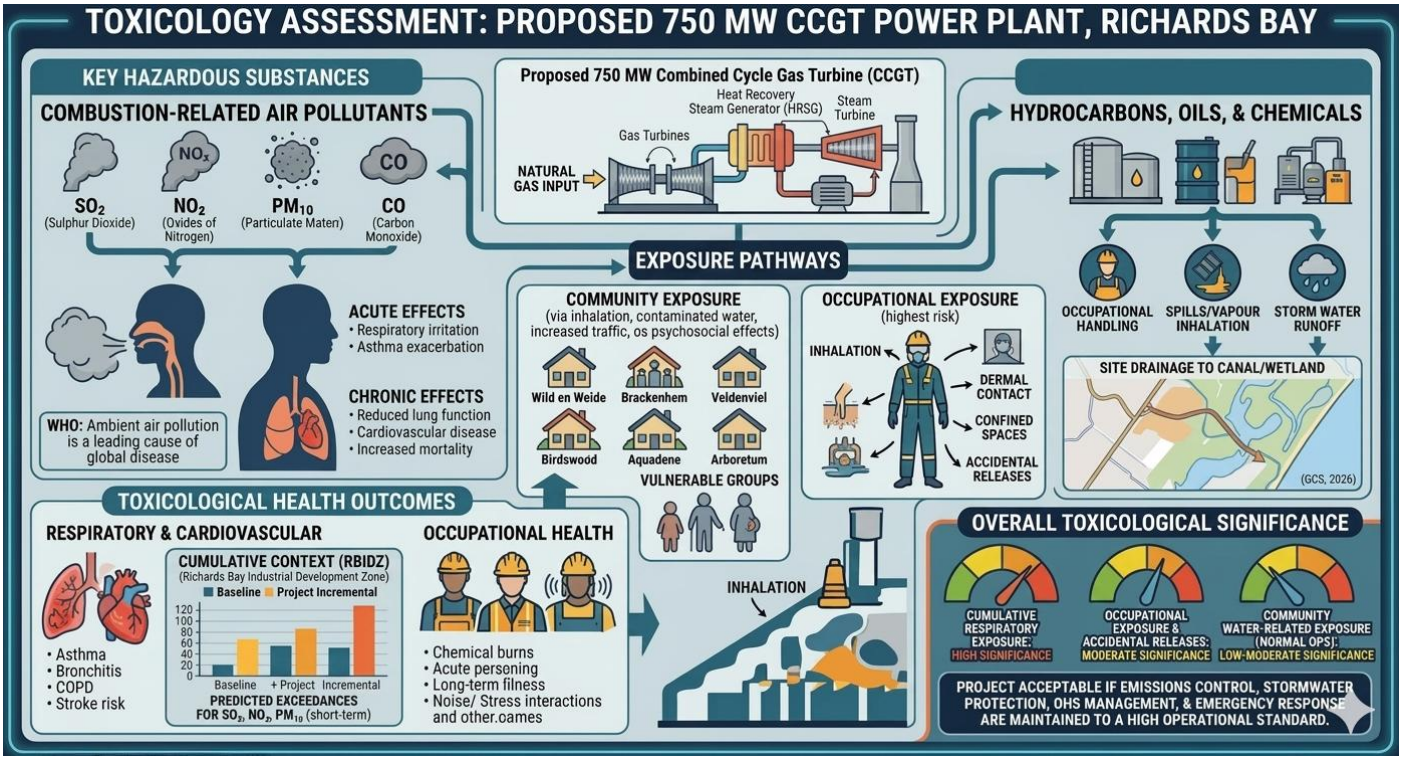


Figure 15-1: Toxicology assessment

16 Potential Health Impact Assessment

The purpose of this chapter is to evaluate the potential positive and negative health impacts associated with the construction, commissioning, operation, maintenance and decommissioning of the proposed 750 MW CCGT Power Plant within Phase 1F of the RBIDZ. The assessment is structured according to the 12 EHAs applied in the IFC health impact assessment framework and is informed by the project description, baseline health profile, specialist studies and the plant's actual process flow.

The proposed facility is not a generic industrial development. It is a gas-fired power generation facility comprising natural gas receipt and supply infrastructure, GE 9FA combustion turbines, HRSGs, a steam turbine, condenser system, induced draft cooling tower, cooling water and blowdown systems, transformers, switchyard infrastructure, emergency systems, maintenance chemicals, lube oils, fire suppression systems, stormwater systems, wastewater handling and stack emissions. Each of these components creates specific health exposure pathways. The Draft Scoping Report identifies health-related risks associated with construction work, occupational injuries, dust, noise, water contamination, hazardous components, communicable disease, psychosocial effects, safety and security, and pressure on health services.

The impact assessment therefore considers health effects arising from:

- stack emissions and cumulative airshed exposure;
- construction dust, diesel exhaust and vehicle emissions;
- cooling tower drift and biological aerosol risk;
- stormwater and wastewater contamination pathways;

- occupational hazards linked to combustion turbines, HRSGs, steam systems, electrical infrastructure, confined spaces and heat load;
- project-related traffic and heavy vehicle movement;
- labour influx and changes in social determinants of health;
- health system pressure;
- psychosocial risk perception associated with visible industrial expansion.

The assessment distinguishes between community health impacts and occupational health impacts. Community impacts are typically lower-dose, longer-duration and cumulative, while occupational exposures may be higher intensity and more immediate. The project is located in an already industrialised area where surrounding communities are exposed to existing air emissions, industrial traffic, port-related activity and socio-economic vulnerability. For this reason, several impact ratings are driven by cumulative exposure rather than project emissions or activities in isolation.

16.1 EHA #1: Vector-related Diseases

Vector-related disease risk is not expected to be a dominant health impact of the proposed CCGT Power Plant under normal operating conditions. The project site is situated within an industrial estate and the baseline studies do not indicate an established vector-borne disease hotspot at the site. However, the hydrological assessment confirms that the site drains toward a man-made canal along the western boundary, which has developed wetland-like characteristics. The same assessment identifies flood-sensitive areas, stormwater management requirements and the need to manage runoff, sediment and potential contamination.

The project-specific vector pathway is therefore linked to standing water and poor housekeeping, not to the combustion process itself. Potential breeding environments may be created if construction materials, tyres, drums, open containers, poorly drained excavations, blocked drains, stormwater ponds or stagnant water around cooling and wastewater systems are not managed. During operation, cooling water infrastructure, drainage channels, sumps and stormwater retention structures must be designed and maintained to avoid stagnation and mosquito breeding.

The principal health outcomes would be nuisance vector proliferation, increased mosquito breeding, rodent attraction and secondary disease risk. Given the industrial context, formal stormwater design and manageable nature of the pathway, the impact is rated as negligible before mitigation and remains negligible after mitigation.

Table 16-1: EHA #1 Impact Evaluation

EHA #1: Vector-related Diseases	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Site or Local (2)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Low (2)	Very Low (1)
Probability (Definite, Possible, Unlikely)	Possible (2)	Unlikely (1)

EHA #1: Vector-related Diseases	Impact Rating Without Mitigation	Impact Rating With Mitigation
Reversibility: (Reversible, Recoverable or Irreversible)	Reversible (1)	Reversible (1)
Calculated Significance Rating (Low, Medium, High)	Negligible (-18)	Negligible (-8)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Localised mosquito or nuisance vector breeding may occur in poorly drained stormwater areas, open containers, construction laydown areas, sumps or stagnant water bodies.
- Rodent attraction may occur where food waste and general waste are poorly managed.
- Residual risk is expected to remain negligible if drainage, waste management and cooling water systems are properly maintained.

Mitigation measures

- Design stormwater infrastructure to prevent stagnant water accumulation.
- Inspect and maintain drains, sumps, culverts, stormwater channels and retention structures.
- Remove standing water from construction areas, laydown yards and excavations.
- Store tyres, drums and containers under cover or upside down to prevent water accumulation.
- Implement strict waste management and housekeeping controls.
- Include vector monitoring in environmental inspections during construction and early operation.
- Maintain cooling water systems in accordance with Legionella and biological risk management requirements.

16.2 EHA #2: Acute Respiratory Infections and Respiratory Effects

Respiratory health is one of the most material health pathways for the proposed Project. The CCGT plant's combustion turbines will generate stack emissions containing NOx/NO_2, SO_2, PM_{10} and CO. Although the Atmospheric Impact Report indicates that project-alone concentrations are predicted to remain relatively low compared to National Ambient Air Quality Standards, cumulative scenarios with existing and approved future industrial sources predict exceedances for short-term SO_2, NO_2 and PM_{10}. Existing Richards Bay monitoring also indicates elevated baseline SO_2 conditions.

The health concern is therefore not the plant in isolation, but incremental emissions entering an already burdened airshed. The main exposure pathway is inhalation of pollutants from stack emissions, construction dust, diesel-powered construction equipment, vehicle emissions and cumulative industrial sources. Sensitive receptors include nearby residential areas, schools, clinics, children, elderly persons and individuals with pre-existing asthma, COPD, cardiovascular disease or other chronic illness.

Construction-phase respiratory impacts will be driven primarily by dust from site clearance, earthworks, haul roads and diesel exhaust. Operational impacts will be driven by stack emissions from combustion turbines and cumulative airshed exposure. Cooling tower visible plumes are primarily water vapour and do not, on their own, constitute air pollution; however, they may heighten community perception of air quality risk.

With strict emissions control, compliance with the Atmospheric Emission Licence, dust management and air quality monitoring, the residual respiratory health impact is reduced but not eliminated because cumulative airshed stress remains present.

Table 16-2: 16-2: Impact Evaluation – EHA #2

EHA #2: Acute Respiratory Infections and Respiratory Effects	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Regional (3)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Low (-39)	Low (-24)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	Yes – severe respiratory events may result in irreversible morbidity or mortality among vulnerable receptors	Yes – residual risk remains for vulnerable receptors
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Residual respiratory risk remains for vulnerable groups due to cumulative airshed exposure.
- Short-term pollution peaks may still trigger asthma or COPD symptoms in sensitive individuals.
- Construction dust may cause localised irritation if controls lapse.
- Occupational respiratory exposures remain possible during maintenance, confined-space work and abnormal combustion conditions.

Mitigation measures

- Implement all AQIA and AEL emission controls.
- Maintain combustion efficiency and turbine tuning to minimise NOx and CO.
- Implement continuous or periodic stack emissions monitoring as required by the AEL.

- Monitor ambient air quality and complaints linked to odour, plume perception or respiratory symptoms.
- Implement dust suppression during construction, including water carts, speed control and covering of loose materials.
- Maintain haul roads and minimise exposed surfaces.
- Avoid unnecessary idling of construction equipment and heavy vehicles.
- Provide occupational respiratory protection where task-based exposure assessments indicate need.
- Include respiratory health awareness in worker and community health communication.

The health outcomes associated with the identified pollutants are supported by established dose-response relationships, with epidemiological evidence demonstrating that incremental increases in pollutants such as $PM_{2.5}$, NO_2 and SO_2 are associated with measurable increases in morbidity and mortality, even at low concentrations (WHO, 2021; Burnett et al., 2018). This reinforces the importance of controlling incremental emissions within an already burdened airshed.

These health outcomes are supported by well-established dose-response relationships, confirming that even incremental increases in pollutants such as $PM_{2.5}$ and NO_2 are associated with measurable increases in morbidity and mortality, particularly in already burdened environments.

16.3 EHA #3: Veterinary Medicine and Zoonotic Diseases

Zoonotic disease is not expected to be a material project-related health impact. The site is located within an industrial estate rather than an agricultural or livestock interface, and no evidence has been identified of active zoonotic disease risk linked to the project footprint. The possible pathway is indirect and limited: labour influx, informal food vending, waste mismanagement or increased stray animals around worker areas could attract rodents, dogs or other animals.

Given the absence of a clear project-specific zoonotic pathway and the lack of baseline evidence indicating a zoonotic disease hotspot, this EHA is discussed but not formally rated. The risk is managed through waste control, worker accommodation standards, pest control and prohibition of animals in construction camps or operational areas.

Mitigation measures

- Prohibit animals in construction camps, laydown areas and operational areas.
- Implement rodent and pest control.
- Ensure food waste is stored in sealed containers and removed regularly.
- Manage informal food vending around site access points through site rules and municipal liaison.
- Include rabies awareness and bite reporting in worker induction where relevant.

16.4 EHA #4: Sexually Transmitted Infections, including HIV/AIDS

HIV and STI risk is a relevant social health pathway for large infrastructure projects in KwaZulu-Natal. The proposed Project will generate construction employment and may attract job seekers, contractors, transport workers and service providers into the Richards Bay area. The SEIA identifies employment creation and economic benefits, but also notes existing unemployment, labour market vulnerability and socio-economic inequality in the broader area.

The pathway is not linked to the CCGT technology itself. It is linked to labour influx, temporary workforce arrangements, increased disposable income, mobility, transactional relationships, alcohol use and unequal economic benefit distribution. The risk is highest during the construction phase, when the workforce is larger and more transient. Operational-phase risk is lower due to a smaller permanent workforce but may persist through contractors and maintenance shutdowns.

With a workplace and community HIV/STI programme, local recruitment, worker code of conduct and referral to existing health services, the residual impact is expected to be negligible.

Table 16-3: EHA #4 Impact Evaluation

EHA #4: Sexually Transmitted Infections, including HIV/AIDS	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Site or Local (2)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Low (2)	Very Low (1)
Probability (Definite, Possible, Unlikely)	Possible (2)	Unlikely (1)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Reversible (1)
Calculated Significance Rating (Low, Medium, High)	Low (-22)	Negligible (-8)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	Yes – unmanaged HIV infection may result in long-term morbidity and mortality	No, with effective prevention and treatment referral
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Possible increase in STI exposure linked to workforce mobility and transactional relationships.
- Possible increase in demand for HIV testing, condoms and PHC services.
- Residual risk remains during peak construction and major maintenance shutdown periods.

Mitigation measures

- Develop and implement a workplace HIV/AIDS and STI prevention programme.
- Provide voluntary counselling and testing referral information.
- Provide condoms and sexual health information at worker facilities.
- Implement a worker code of conduct addressing sexual exploitation, harassment and gender-based violence.
- Prioritise local employment where feasible to reduce influx-related risk.
- Engage local clinics and NGOs for referral pathways.

- Provide targeted education during induction and toolbox talks.
- Monitor worker accommodation, transport and camp conditions.

16.5 EHA #5: Soil-, Water- and Waste-related Diseases

Soil-, water- and waste-related disease risk is linked to the project's stormwater, wastewater, cooling water, fuel handling and waste management systems. The hydrological assessment confirms that the site drains toward a canal with wetland-like characteristics and that baseline water quality is generally acceptable. However, it also identifies flood risk, stormwater contamination, hydrocarbon contamination, sediment mobilisation and the need for clean/dirty water separation.

This impact is therefore not based on existing poor water quality. It is based on the potential for project-related failure events. Credible pathways include contaminated runoff from maintenance areas, transformer oil leaks, fuel or lube oil spills, cooling tower blowdown mismanagement, contaminated firewater, sewage mismanagement, waste storage failure and flooding that mobilises pollutants into receiving water systems.

Potential health outcomes include dermal irritation, gastrointestinal illness, nuisance odours, vector breeding, indirect ecological impacts and downstream environmental health effects. With proper stormwater engineering, wastewater handling, bunding, spill response and monitoring, the residual risk is negligible.

Table 16-4: Impact Evaluation – EHA #5

EHA #5: Soil-, Water- and Waste-related Diseases	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Site or Local (2)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Possible (2)	Unlikely (1)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Reversible (1)
Calculated Significance Rating (Low, Medium, High)	Low (-24)	Negligible (-9)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Localised contamination may occur if spill control, bunding or stormwater separation fails.
- Flooding may mobilise contaminants if storage areas are not designed above flood-sensitive zones.
- Cooling tower blowdown and wastewater mismanagement may affect receiving water quality.

- Poor waste handling may attract pests and contribute to nuisance conditions.

Mitigation measures

- Implement the stormwater management plan and maintain clean/dirty water separation.
- Bund all fuel, oil, chemical and transformer areas.
- Provide oil-water separators where hydrocarbon contamination is credible.
- Develop and implement a spill prevention and response plan.
- Store hazardous waste in designated, covered, bunded areas.
- Manage cooling tower blowdown according to authorised discharge or disposal requirements.
- Ensure sewage and ablution systems are adequate during construction.
- Undertake surface water monitoring upstream and downstream of the site.
- Prohibit washing, refuelling or maintenance outside designated controlled areas.
- Ensure firewater containment capacity for credible fire scenarios.

16.6 EHA #6: Food and Nutrition-related Issues

The proposed Project will not directly remove agricultural land or disrupt subsistence farming, as the site is within an industrial development zone. Food and nutrition impacts are therefore indirect and socio-economic. The SEIA indicates that the project is expected to generate employment and household income benefits during construction, although local benefit capture will depend on procurement, recruitment and skills availability.

Positive nutrition-related outcomes may arise where local workers and suppliers benefit from income, improving household food security. Negative outcomes may occur if labour influx and increased demand place pressure on housing, food prices or essential services, particularly for low-income households. These effects are most likely during construction and are expected to be limited if local procurement, local employment and worker accommodation are managed.

Table 16-5: Impact Evaluation – EHA #6

EHA #6: Food and Nutrition-related Issues	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Short-Medium Term (2)	Short-Medium Term (2)
Magnitude (Major, Moderate, Minor)	Low (2)	Very Low (1)
Probability (Definite, Possible, Unlikely)	Possible (2)	Unlikely (1)
Reversibility: (Reversible, Recoverable or Irreversible)	Reversible (1)	Reversible (1)
Calculated Significance Rating (Low, Medium, High)	Negligible (-16)	Negligible (-6)

EHA #6: Food and Nutrition-related Issues	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes – positive income and local procurement benefits can be enhanced	Yes

Residual impacts

- Temporary pressure on local food prices, rentals and basic goods may occur during peak construction.
- Lower-income households may be more sensitive to price increases.
- Positive nutrition benefits may occur where local households receive employment or supplier income.

Mitigation measures

- Prioritise local recruitment and procurement where feasible.
- Avoid unmanaged worker accommodation that increases pressure on local housing.
- Support local catering and food suppliers where safe and compliant.
- Prevent informal, unhygienic food vending at site access points.
- Include worker nutrition, hydration and heat stress prevention in occupational health programmes.
- Communicate employment processes clearly to reduce unrealistic expectations.

16.7 EHA #7: Accidents and Injuries

Accidents and injuries represent a material health pathway for the proposed CCGT project. The pathway is driven by construction activities, heavy vehicle movement, abnormal loads, road traffic, working at heights, lifting operations, pressurised steam systems, gas systems, electrical infrastructure, confined spaces, cooling water systems and maintenance activities.

The Traffic Impact Assessment confirms that the project is located within an existing industrial transport network where roads such as the R619 and Alumina Allee already support industrial movement. Increased construction traffic, worker transport, deliveries and operational logistics may increase road safety risk, particularly where heavy vehicles interact with public roads, pedestrians, public transport users and nearby communities.

Occupational injury risks include falls, burns, electrocution, confined-space exposure, mechanical injury, steam release, heat stress, chemical exposure and emergency incidents. Without mitigation, the significance is moderate due to the potential for severe injury or fatality. With strict implementation of occupational health and safety systems, traffic management and emergency response controls, residual significance is reduced to low.

Table 16-6: Impact Evaluation – EHA #7

EHA #7: Accidents/Injuries	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Regional (3)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Irreversible (5)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Moderate (-45)	Low (-24)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	Yes – severe incidents may result in loss of life	Yes – residual fatality risk remains but is materially reduced
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Residual road accident risk from heavy vehicles and abnormal loads.
- Residual occupational injury risk during maintenance, shutdowns and confined-space work.
- Residual emergency response risk associated with fire, gas release, steam release or electrical faults.

Mitigation measures

- Develop and implement a construction traffic management plan.
- Separate pedestrian, light vehicle and heavy vehicle routes where feasible.
- Enforce speed limits and driver fitness requirements.
- Schedule abnormal loads outside peak traffic periods where possible.
- Implement road signage, flagging and traffic control at access points.
- Apply the Occupational Health and Safety Act and project-specific OHS management system.
- Implement permit-to-work systems for hot work, confined spaces, electrical isolation and work at heights.
- Undertake emergency drills for gas release, fire, electrical incident and medical response.
- Maintain first aid, emergency transport and referral arrangements with local health facilities.
- Ensure contractor safety management and incident reporting.

16.8 EHA #8: Exposure to Potentially Hazardous Materials, Noise and Malodours

EHA #8 is directly linked to the technical process flow of the CCGT plant. Relevant sources include stack emissions, gas supply interface, combustion turbines, HRSGs, cooling tower drift, transformer oils, lube oils, hydraulic fluids, maintenance chemicals, diesel backup systems, fire suppression systems, wastewater systems and hazardous waste storage.

The AQIA identifies NOx, SO_2, PM_{10} and CO as the principal operational pollutants. The noise assessment found low community noise significance, although Wild en Weide and nearby hostels were identified as noise-sensitive receptors and occupational noise compliance remains required. The hydrology study identifies hydrocarbon contamination and stormwater failure as potential risks.

Community exposure is expected to be mainly chronic and cumulative through air emissions and perception of industrial risk. Occupational exposure is more direct and includes chemicals, fumes, heat, noise, confined spaces and electrical hazards. Malodour is not expected to be a dominant routine impact, but abnormal events, poor waste management, fuel spills or wastewater issues could create nuisance and health concern.

Table 16-7: Impact Evaluation – EHA #8

EHA #8: Exposure to Potentially Hazardous Materials, Noise and Malodours	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Low (-39)	Low (-22)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	Yes – acute hazardous incidents may cause serious injury or mortality	Yes – low residual risk remains
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Residual cumulative air emissions exposure.
- Occupational exposure to maintenance chemicals, lube oils, transformer oils, heat, noise and confined-space hazards.
- Potential cooling tower drift and Legionella risk if water systems are poorly managed.
- Potential nuisance or perceived risk from visible plumes, odours or abnormal events.
- Low residual community noise exposure.

Mitigation measures

- Implement hazardous chemical substance risk assessments.
- Maintain updated Safety Data Sheets and chemical inventories.
- Store chemicals, oils and fuels in bunded, labelled, controlled areas.
- Implement occupational hygiene monitoring for noise, heat, fumes and chemicals.
- Implement hearing conservation for relevant workers.
- Maintain cooling tower water treatment and Legionella monitoring programme.
- Maintain transformer bunding, firewater containment and spill response capability.
- Monitor and investigate odour, plume and health-related complaints.
- Ensure noise controls are applied to plant equipment and worker exposure areas.
- Include hazardous material and emergency response training in induction.

16.9 EHA #9: Social Determinants of Health

16.9.1 Negative Pathways

The project may influence social determinants of health through labour influx, employment expectations, local procurement, income distribution, pressure on housing, pressure on services, perceptions of unequal benefit, social tension, gendered vulnerability and psychosocial stress. These impacts are particularly relevant in the City of uMhlathuze and King Cetshwayo District, where unemployment and inequality remain material baseline vulnerabilities.

Negative impacts may arise if communities perceive employment opportunities as unfair, if non-local workers dominate employment, if temporary workers increase pressure on housing and services, or if increased disposable income contributes to alcohol use, substance use, transactional relationships or gender-based violence. These impacts are not caused by combustion technology itself but by the social dynamics associated with large infrastructure projects.

Table 16-8: Impact Evaluation – EHA #9

EHA #9: Social Determinants of Health – Negative Pathways	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Regional (3)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Low (-39)	Low (-24)
Impact Status: (positive or negative)	Negative	Negative

EHA #9: Social Determinants of Health – Negative Pathways	Impact Rating Without Mitigation	Impact Rating With Mitigation
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	No	No

Residual impacts

- Continued expectation pressure around employment and procurement.
- Possible psychosocial stress, community tension or grievance escalation.
- Possible pressure on housing, transport and services during construction.
- Possible gendered vulnerability and substance-related harms.

Mitigation measures

- Develop a transparent local employment and procurement plan.
- Communicate recruitment criteria clearly through recognised channels.
- Establish a grievance mechanism accessible to workers and communities.
- Implement worker code of conduct.
- Provide GBV, harassment, substance abuse and community conduct training.
- Manage worker accommodation to avoid pressure on local housing.
- Monitor social grievances, protest risk and community perceptions.
- Coordinate with local government and community structures on development expectations.

16.9.2 Positive Pathways

The proposed Project may generate positive health outcomes through employment, household income, skills development, local procurement and improved regional energy security. The SEIA indicates that construction will generate employment and household income effects, including direct, indirect and induced economic benefits.

Positive health outcomes may include improved household resilience, improved food security, improved access to healthcare, better educational continuity and reduced economic stress among beneficiary households. These benefits are most significant during construction but may also persist through operational employment, local supplier development and improved industrial energy reliability.

Table 16-9: Impact Evaluation – EHA #9

EHA #9: Social Determinants of Health – Positive Pathways	Impact Rating Without Enhancement	Impact Rating With Enhancement
Extent (Local, Regional, International)	National (4)	National (4)
Duration (Short term, Medium term, Long term)	Short-Medium Term (2)	Short-Medium Term (2)

EHA #9: Social Determinants of Health – Positive Pathways	Impact Rating Without Enhancement	Impact Rating With Enhancement
Magnitude (Major, Moderate, Minor)	Medium (3)	Medium (3)
Probability (Definite, Possible, Unlikely)	Definite (5)	Definite (5)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Moderate (+60)	Moderate (+60)
Impact Status: (positive or negative)	Positive	Positive
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes	Yes

Residual positive impacts

- Temporary household income increase.
- Local employment and supplier opportunities.
- Skills development and work experience.
- Improved household resilience among beneficiaries.
- Contribution to regional energy security and industrial stability.

Enhancement measures

- Prioritise local employment where skills are available.
- Develop skills development and training programmes.
- Use local subcontractors and suppliers where feasible.
- Provide transparent procurement processes.
- Track local employment, gender participation and supplier spend.
- Support youth and semi-skilled labour participation.
- Align social investment with health, skills and community resilience priorities.

16.10 EHA #10: Cultural Health Practices

The project area lies within a culturally diverse KwaZulu-Natal context where health-seeking behaviour may include biomedical care, traditional medicine, spiritual care and complementary practices. Project-related health concerns such as respiratory symptoms, stress, perceived pollution, chronic illness or psychosocial distress may therefore not always be interpreted through biomedical frameworks alone.

The impact pathway is primarily linked to communication, trust and care-seeking behaviour. If project health communication is poorly designed, communities may delay formal care, misunderstand exposure risks or rely solely on informal channels. Conversely, culturally competent engagement can strengthen referral, early symptom recognition and community trust.

Table 16-10: Impact Evaluation – EHA #10

EHA #10: Cultural Health Practices	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Site or Local (2)	Site or Local (2)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Possible (2)	Unlikely (1)
Reversibility: (Reversible, Recoverable or Irreversible)	Reversible (1)	Reversible (1)
Calculated Significance Rating (Low, Medium, High)	Negligible (-20)	Negligible (-9)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes – culturally appropriate health communication may improve care-seeking	Yes

Residual impacts

- Some community members may interpret project-related symptoms through cultural or spiritual frameworks.
- Delay in formal health-seeking may occur where symptoms are not recognised as requiring clinical care.
- Mistrust may persist if health messaging is not culturally appropriate.

Mitigation measures

- Develop culturally appropriate health communication material.
- Use isiZulu and English communication where appropriate.
- Engage community leaders, health workers and recognised local structures.
- Encourage early referral to clinics for respiratory symptoms, persistent cough, chest tightness, fever or acute illness.
- Avoid dismissing traditional health systems; instead, promote safe referral and complementary communication.
- Include project health information in stakeholder engagement and grievance processes.

16.11 EHA #11: Health Systems Issues

Health system impacts may occur through increased demand for PHC services, emergency care, occupational injury response, respiratory complaints, STI/HIV services and health surveillance. The report baseline identifies several healthcare facilities within the zone of influence, including public clinics, private facilities and hospitals, but also recognises capacity constraints within the broader municipal and district health system.

Project-related pressure is most likely during construction, when workforce numbers, traffic, injury risk and labour influx are highest. Operational demand may be lower but more specialised, involving occupational health, emergency preparedness, respiratory surveillance and potential industrial incident response.

The project also creates an opportunity to strengthen health systems through referral planning, occupational health services, emergency response coordination and data-sharing mechanisms.

Table 16-11: Impact Evaluation – EHA #11

EHA #11: Health Systems Issues	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Regional (3)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Recoverable (3)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Low (-39)	Low (-24)
Impact Status: (positive or negative)	Negative	Negative
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes – referral and emergency systems can be strengthened	Yes

Residual impacts

- Increased demand for clinics and emergency services during construction.
- Residual risk of delayed emergency response if coordination is weak.
- Increased need for respiratory, STI/HIV and occupational health services.
- Potential health system pressure during major incidents.

Mitigation measures

- Develop a project health management plan.
- Establish referral arrangements with nearby clinics and hospitals.
- Maintain on-site first aid and occupational health capacity.
- Develop emergency medical response procedures.
- Coordinate with local EMS, fire services and healthcare providers.
- Conduct drills for gas release, fire, electrocution, heat illness and mass casualty scenarios.
- Maintain occupational health records and report notifiable incidents.
- Monitor health complaints and referral patterns during construction and operation.

16.12 EHA #12: Non-Communicable Diseases

Non-communicable disease impacts are linked to cumulative environmental exposure, psychosocial stress and socio-economic determinants. The most relevant project-related pathways are air emissions, particulate exposure, noise, stress, heat exposure and indirect changes in income and access to care.

The AQIA confirms that cumulative scenarios are more significant than project-alone emissions. Long-term exposure to PM, NO_2 and SO_2 is associated with respiratory and cardiovascular disease. Noise exposure is predicted to be low for communities, but occupational noise and cumulative industrial stress remain relevant. The noise study identifies low environmental significance overall, but recognises existing industrial and traffic noise conditions.

NCD risk is not expected to be caused by the project alone. Rather, the project may contribute incrementally to pre-existing chronic disease vulnerability in an industrial airshed. Vulnerable groups include people with asthma, COPD, cardiovascular disease, diabetes, elderly persons and children.

Table 16-12: Impact Evaluation – EHA #12

EHA #12: Non-Communicable Diseases	Impact Rating Without Mitigation	Impact Rating With Mitigation
Extent (Local, Regional, International)	Regional (3)	Regional (3)
Duration (Short term, Medium term, Long term)	Long Term > 5 years (4)	Long Term > 5 years (4)
Magnitude (Major, Moderate, Minor)	Medium (3)	Low (2)
Probability (Definite, Possible, Unlikely)	Likely (3)	Possible (2)
Reversibility: (Reversible, Recoverable or Irreversible)	Irreversible (5)	Recoverable (3)
Calculated Significance Rating (Low, Medium, High)	Moderate (-45)	Low (-24)
Impact Status: (positive or negative)	Negative	Negative

EHA #12: Non-Communicable Diseases	Impact Rating Without Mitigation	Impact Rating With Mitigation
Irreplaceable loss of resources: (Yes or No)	Yes – chronic disease outcomes may be irreversible	Yes – residual risk remains for vulnerable receptors
Can impacts be enhanced: (Yes or No)	Yes – positive socio-economic determinants can indirectly improve NCD resilience	Yes

Residual impacts

- Residual cumulative respiratory and cardiovascular disease risk.
- Vulnerable individuals may experience worsening symptoms during pollution episodes.
- Occupational heat, noise and chemical exposure may contribute to chronic worker health risks.
- Psychosocial stress and perceived pollution risk may contribute to chronic stress burden.

Mitigation measures

- Implement air quality mitigation and monitoring required by the AQIA and AEL.
- Track respiratory and environmental health complaints.
- Provide worker medical surveillance for respiratory, hearing, heat stress and chemical exposure risks.
- Maintain occupational hygiene monitoring.
- Include NCD risk messaging in worker wellness programmes.
- Encourage early healthcare seeking for asthma, chest pain, shortness of breath, chronic cough and heat illness.
- Coordinate with local health facilities on referral pathways where appropriate.
- Maintain transparent communication on emissions, complaints and corrective actions.

16.13 Integrated Health Impact Significance

The impact assessment confirms that the proposed CCGT Power Plant is not associated with a single dominant disease pathway, but with a set of interacting environmental, occupational and social determinants of health. The most significant adverse impacts are associated with:

- cumulative respiratory and cardiovascular exposure linked to stack emissions and existing industrial airshed burden;
- occupational health and safety risks associated with combustion turbines, HRSGs, steam systems, electrical infrastructure, confined spaces, cooling systems and hazardous substances;
- road traffic accidents and construction-related injuries;
- social determinants of health, including labour influx, employment expectations, inequality and psychosocial stress;
- health system pressure during construction and emergency scenarios.

The most important positive impacts are associated with employment, household income, skills transfer, supplier development and improved social determinants of health among beneficiary households.

After mitigation, no health impact is assessed as a fatal flaw. Residual risks remain most important for cumulative respiratory exposure, NCD vulnerability, occupational health and road safety. These risks require active management through the EMPr, AEL conditions, occupational health and safety system, traffic management plan, stormwater management plan, emergency response plan and health monitoring programme.

The mitigation measures identified in this chapter are not standalone recommendations but form part of an integrated impact management and enforcement system. Each mitigation measure presented in the impact assessment tables is directly linked to the Monitoring and Enforcement Framework outlined in Chapter 20.

This linkage ensures that all identified impacts are:

- Actively monitored through defined environmental and health indicators;
- Controlled through measurable thresholds, aligned with regulatory standards and licence conditions;
- Managed through predefined corrective actions, triggered when thresholds are approached or exceeded; and
- Subject to formal reporting and escalation, ensuring accountability and regulatory compliance.

In this regard, the impact assessment follows a structured pathway:

Project Activity → Exposure Pathway → Impact → Mitigation → Monitoring Indicator → Trigger Level → Corrective Action

This approach ensures that mitigation measures are not conceptual, but operational, enforceable and auditable, forming part of the Environmental Management Programme (EMPr) and overall project management system.

17 Summary of Specialist Findings

The cHIA for the proposed 750 MW CCGT Power Plant in Richards Bay is supported by a suite of specialist studies undertaken as part of the broader EIA process. These specialist studies provide the technical basis for understanding existing environmental and social conditions, identifying project-related exposure pathways, and evaluating the significance of potential health outcomes for surrounding communities and workers.

The project is located within Phase 1F of the RBIDZ, an already industrialised landscape characterised by heavy industry, transport corridors, logistics infrastructure and mixed residential receptors within the broader zone of influence. This context is critical, as the health significance of the project is driven less by isolated project impacts and more by the cumulative interaction between the proposed facility and an already environmentally burdened receiving environment.

The specialist findings therefore confirm that the primary health issue is not whether the project alone causes substantial exceedances of environmental thresholds, but whether incremental project contributions, particularly in relation to air quality, traffic, labour influx and cumulative environmental exposure, materially increase health risk within an already sensitive socio-environmental system.

The proposed plant is not being introduced into a neutral receiving environment. It is being introduced into an already industrialised airshed and transport corridor, within Phase 1F of the RBIDZ, near residential receptors including Wild en Weide, Brackenham, Veld en Vlei and Aquadene, with broader receptors extending to Arboretum, Birdswood, Richards Bay Central, Nseleni and Empangeni.

Your cHIA already defines the health exposure zones around construction disturbance, industrial noise, air emissions, traffic, labour influx and cumulative industrial emissions.

17.1 Air Quality Impact Assessment

The Atmospheric Impact Report undertaken by uMoya-NILU Consulting assessed the potential air quality implications associated with the proposed combustion of natural gas for electricity generation. The study focused on key pollutants associated with gas-fired power generation, namely sulphur dioxide (SO_2), oxides of nitrogen (NO_2/NOx), particulate matter (PM_{10}) and carbon monoxide (CO), and utilised CALPUFF dispersion modelling across multiple operational scenarios, including standalone and cumulative industrial scenarios (uMoya-NILU, 2024).

The findings indicate that when the proposed CCGT plant is assessed in isolation, predicted ambient concentrations remain relatively low and generally within the National Ambient Air Quality Standards (NAAQS). However, under cumulative modelling scenarios incorporating existing industrial sources and approved future developments within Richards Bay, exceedances are predicted for short-term SO_2, NO_2 and PM_{10} concentrations, particularly within an airshed already characterised by elevated baseline SO_2 levels (uMoya-NILU, 2024). Monitoring data for 2021–2023 further confirms that ambient SO_2 concentrations in Richards Bay are already relatively high, with multiple exceedances of the 1-hour and 24-hour standards recorded.

From a human health perspective, this is the most significant specialist finding in the cHIA. The health concern is not simply emissions from the project itself, but the cumulative respiratory burden placed on surrounding communities living within an existing industrial pollution environment. Sensitive receptors include schools, clinics and residential communities in Wild en Weide, Brackenham, Veldenvlei, Birdswood, Arboretum and Aquadene, with vulnerable groups including children, the elderly and individuals with pre-existing respiratory or cardiovascular disease.

The AQIA therefore establishes respiratory health, cardio-respiratory morbidity and cumulative exposure risk as the principal health pathway for the project.

While cumulative modelling indicates exceedances of ambient air quality standards within the Richards Bay airshed, these exceedances are not driven by the proposed Project in isolation. The Project is designed to comply with all applicable Atmospheric Emission Licence limits and represents a relatively small incremental contribution to the overall pollutant load. As such, the Project remains compliant from a regulatory perspective, with cumulative exceedances reflecting broader regional air quality constraints rather than project-specific non-compliance.

17.2 Hydrological Assessment

The hydrological assessment confirms that the site drains toward a man-made canal located along the western boundary, which exhibits wetland-like characteristics and forms part of the broader surface water system within the RBIDZ. Baseline water quality sampling upstream, midstream and downstream indicates that existing water quality is generally within acceptable limits for domestic use, with no evidence of significant current contamination (GCS, 2026).

However, the study identifies several critical hydrological sensitivities, including portions of the site located within the 1:100-year floodline, increased runoff associated with impermeable industrial surfaces, and the risk of contamination through hydrocarbons, sediments and poor separation of clean and dirty stormwater systems. The study emphasises the need for strict stormwater management, flood protection and pollution prevention measures.

The human health implication is therefore not current water quality degradation, but rather the potential health consequences of infrastructure failure or poor environmental management. This includes water contamination, vector breeding through stagnant water, flood-related injury, sanitation disruption and indirect downstream exposure pathways affecting surrounding communities and ecological systems.

The hydrological findings position water-related disease risk as a conditional but important pathway, with risk becoming significant primarily if mitigation systems fail.

17.3 Noise Impact Assessment

The environmental noise study identified Wild en Weide and nearby hostel developments as the primary noise-sensitive receptors within the study area. Baseline environmental noise measurements recorded arithmetic average levels of approximately 48.8 dBA during the day and 44.2 dBA at night, reflecting an environment already influenced by industrial activity and transport corridors (Enviro-Acoustic Research, 2024).

The assessment concluded that both construction and operational noise impacts are likely to be of low environmental significance, with no major exceedances predicted and no significant off-site community impacts anticipated. As a result, no specific environmental noise mitigation was recommended for surrounding communities.

However, the study distinguishes clearly between community noise exposure and occupational noise exposure. While community health impacts such as annoyance, sleep disturbance and psychosocial stress are expected to remain low, worker exposure within the plant environment presents a more material risk, particularly in relation to long-term occupational hearing loss and compliance with occupational health standards. The cHIA therefore interprets community noise risk as low, but occupational noise exposure as a moderate and operationally significant worker health issue.

17.4 Traffic Impact Assessment

The Traffic Impact Assessment confirms that the project is located within an existing industrial transport network characterised by heavy vehicle movement, freight logistics and arterial road infrastructure. Key routes include the R619 and Alumina Allee, both of which already support significant industrial traffic volumes and serve as major links between residential areas, the CBD and industrial zones (Zutari, 2024).

The study identifies increased traffic volumes during construction and operation, particularly associated with workforce movement, deliveries and operational logistics. It further notes that certain intersections will require upgrades and access management to maintain functionality and recommends ongoing road safety monitoring.

The primary human health pathway associated with traffic is not congestion itself, but injury risk. Increased heavy vehicle movement raises the likelihood of vehicle collisions, pedestrian accidents, transport-related injuries and potential delays in emergency access. This is particularly relevant where industrial roads intersect with residential areas and public transport routes. Traffic therefore drives EHA 7 (Accidents and Injuries) and must be considered a moderate significance health pathway, particularly during the construction phase.

17.5 Socio-Economic Impact Assessment

The Socio-Economic Impact Assessment identifies the proposed development as a strategically significant energy project with the potential to contribute positively to employment creation, economic growth, infrastructure investment and regional energy security (Urban-Econ, 2026). At the same time, the study highlights existing unemployment, income inequality and labour market vulnerability across the City of uMhlathuze and the broader King Cetshwayo District. The project is therefore introduced into a socially unequal environment where expectations around employment and local benefit are high.

From a health perspective, socio-economic impacts operate through the social determinants of health. Positive outcomes include improved income security, household resilience, access to food and improved wellbeing. Negative outcomes may arise through labour influx, temporary accommodation pressure, HIV/STI transmission risk, increased pressure on clinics, substance abuse, gender-based vulnerability and psychosocial stress linked to unmet expectations or unequal benefit distribution. The SEIA therefore establishes EHA 4 (HIV/STIs), EHA 9 (Social Determinants of Health) and EHA 11 (Health Systems) as critical health pathways, and confirms that social impacts are likely to be among the most significant determinants of long-term community wellbeing.

17.6 Visual Impact Assessment

The visual assessment confirms that the project is located within an already industrialised visual landscape where surrounding industrial infrastructure forms part of the existing sense of place (SAS, 2025). While the visual sensitivity of the immediate area is therefore reduced, receptors remain within the broader 3 km zone of influence. Visual impacts do not generally create direct disease pathways, but they are relevant to psychosocial wellbeing, community perception of risk and sense of place. In industrial projects, visible infrastructure often contributes to community anxiety regarding pollution, environmental degradation and long-term quality of life, even where direct physical exposures remain limited. The cHIA therefore recognises visual exposure primarily as a psychosocial determinant linked to stress, risk perception and cumulative industrial fatigue.

17.7 Integrated Interpretation of Specialist Findings

Taken together, the specialist studies confirm that the proposed Project should not be interpreted through isolated discipline-specific risks, but through cumulative health exposure within an existing industrial setting. The most important conclusion is that the project is being introduced into a receiving environment that already experiences elevated environmental stressors, including industrial air pollution, transport-related exposure, noise, socio-economic inequality and dependence on finite health system capacity. The principal health concern is therefore cumulative exposure rather than singular exceedance.

The highest significance pathways are:

- respiratory health and air quality exposure;
- social determinants of health and labour influx;
- accidents and injuries associated with traffic and industrial movement;
- HIV/STI vulnerability linked to mobility and economic change; and
- health system pressure associated with increased demand.

Lower significance but still relevant pathways include water-related disease risk, vector conditions, visual and psychosocial stress, and occupational noise exposure. The specialist findings collectively support the conclusion that the project is potentially acceptable from a health perspective, provided that mitigation measures are designed around cumulative exposure management rather than isolated compliance thresholds.

Table 17-1: Other Specialist studies and linkages to human health

Specialist Input	Specialist Findings	Human Health Implications
Air Quality / Atmospheric Impact Report	The Atmospheric Impact Report assessed emissions associated with the proposed 750 MW CCGT plant, focusing on SO_2, NO_2/NOx, PM_{10} and CO. Dispersion modelling confirmed that the project operating in isolation is predicted to result in relatively low ambient concentrations that generally remain within National Ambient Air Quality Standards (NAAQS). However, when cumulative scenarios were modelled with existing industrial emissions and approved future developments in Richards Bay, exceedances were predicted for short-term SO_2, NO_2 and PM_{10} concentrations. Existing ambient monitoring data already indicates elevated SO_2 levels and multiple exceedances of the 1-hour and 24-hour standards, confirming that the Richards Bay airshed is already environmentally stressed. Sensitive receptors include schools, clinics and residential communities such as Wild en Weide, Brackenham, Veldenvlei, Birdswood, Arboretum and Aquadene.	The primary health issue is not whether the project alone exceeds standards, but whether incremental emissions worsen an already burdened industrial airshed. Communities are already exposed to cumulative industrial pollution, and even small additional pollutant loads increase health vulnerability where baseline respiratory burden already exists. Likely health outcomes include asthma exacerbation, bronchitis, reduced lung function, respiratory infections, chronic obstructive pulmonary disease (COPD), cardiovascular disease and increased hospital admissions during peak pollution events. Children, the elderly, pregnant women, and individuals with pre-existing respiratory or cardiac illness are the most vulnerable receptors. Respiratory and cardio-respiratory health therefore represent the principal health pathway, with significance driven by cumulative exposure rather than project emissions in isolation.
Hydrology	The hydrological study confirms that the site drains toward a man-made canal with wetland-like characteristics along the western boundary. Baseline water quality sampling upstream, midstream and downstream indicates generally acceptable conditions with no major existing contamination. However, portions of the site fall within the 1:100-year floodline, and the study identifies key risks including increased runoff from impervious surfaces, stormwater contamination, hydrocarbon spills, sediment mobilisation, poor separation of clean and dirty water systems, and flood-related infrastructure vulnerability. The receiving environment is therefore sensitive despite acceptable baseline water quality.	The primary health risk is not current poor water quality, but the consequences of stormwater system failure, flooding, or poor pollution control during construction and operation. If mitigation fails, health outcomes may include direct contact exposure to contaminated water, waterborne disease risk, sanitation disruption, mosquito breeding through standing water, vector proliferation, flood-related injuries, and downstream ecological degradation affecting community wellbeing. Informal users of nearby water systems and environmentally dependent receptors are particularly vulnerable. This is therefore a conditional but important health pathway, where significance increases sharply if operational controls are poorly implemented.

Specialist Input	Specialist Findings	Human Health Implications
Noise Impact Assessment	The environmental noise study identified Wild en Weide and nearby hostels as the primary noise-sensitive receptors. Baseline noise levels were measured at approximately 48.8 dBA during the day and 44.2 dBA at night, reflecting an environment already influenced by industrial activity and road traffic. Modelled construction and operational noise impacts were found to be of low significance, with no major exceedances predicted and no additional environmental mitigation recommended for surrounding communities. However, occupational exposure within the plant environment remains subject to workplace compliance requirements.	Community noise health risk is relatively low, but not insignificant. For nearby residents, the main health pathways include sleep disturbance, annoyance, chronic stress, reduced quality of life and cumulative industrial fatigue rather than severe direct health outcomes. For workers, prolonged exposure to plant machinery and operational processes presents a more significant occupational health risk, particularly Noise-Induced Hearing Loss (NIHL), fatigue and psychological stress. Workers therefore represent the more material receptor group, with occupational hearing conservation and workplace exposure management carrying greater significance than off-site community noise impacts.
Socio-Economic Assessment	The SEIA identifies the project as a major strategic energy investment within the City of uMhlathuze and the wider King Cetshwayo District, with potential positive impacts including employment creation, economic stimulation, infrastructure investment and improved regional energy security. At the same time, the study confirms high unemployment, labour-market vulnerability, income inequality and strong community expectations around local benefit. The project is therefore introduced into a socially unequal environment where labour influx and competition for opportunities may create social pressure.	The health effect is strongly dual in nature. Positive outcomes include improved household income, food security, access to healthcare, educational stability and improved resilience through stronger social determinants of health. Negative outcomes may arise through labour influx, temporary worker accommodation, unequal benefit distribution and unmet expectations, leading to increased HIV/STI transmission risk, pressure on local clinics, alcohol and substance abuse, gender-based violence, transactional sex, community conflict, protest action, psychosocial stress and mental health strain. Women, youth, low-income households and migrant workers are often the most vulnerable groups. Social determinants of health, HIV/STI vulnerability and health system pressure therefore emerge as some of the most significant long-term health pathways.
Traffic Impact Assessment	The project is located within an existing industrial transport corridor where the road network is already heavily influenced by freight and industrial movement. Key routes include the R619 and Alumina Allee, both of which support high heavy vehicle volumes	The dominant health pathway is injury rather than congestion. Increased construction and operational traffic raises the risk of vehicle collisions, pedestrian injuries, transport-related fatalities, delayed emergency access and secondary stress associated with traffic

Specialist Input	Specialist Findings	Human Health Implications
	and link industrial zones with residential communities and the CBD. The study identifies additional traffic associated with construction workforce movement, deliveries and operational logistics, and notes that certain intersections will require upgrades, access management and monitoring as Phase 1F develops.	pressure. Heavy vehicles moving through mixed-use environments create particular risks for pedestrians, school children, public transport users and cyclists. Construction phases present the highest short-term risk. Traffic also contributes indirectly to localised air pollution and environmental noise exposure. Accidents and injuries therefore represent the primary health outcome associated with this specialist input.
Visual Compliance Statement	The visual assessment confirms that the site is already located within an industrial landscape where surrounding infrastructure forms part of the existing visual character. Visual sensitivity is therefore lower than in rural or high-amenity environments. However, residential and community receptors remain present within the broader zone of influence, and the project contributes to the continued industrialisation of the landscape.	Visual impact is not a major direct disease pathway, but it remains important for psychosocial wellbeing and community perception of health risk. Communities often associate visible industrial infrastructure with pollution, environmental decline and declining quality of life, even where measured physical exposure remains limited. This may result in chronic stress, anxiety, loss of place attachment, reduced amenity value and cumulative industrial fatigue. In a project already associated with air quality concerns, visible industrial expansion can reinforce fear, mistrust and perceived health risk. Visual impacts therefore contribute primarily to psychosocial wellbeing and community quality of life rather than direct physical health outcomes.

18 Cumulative Impacts

Cumulative impacts refer to the combined effects of the proposed Project when added to existing, approved and reasonably foreseeable developments, activities and environmental stressors within the receiving environment. In a Community Health Impact Assessment, cumulative impacts are particularly important because population health outcomes are seldom caused by one project or one exposure pathway in isolation. Rather, health outcomes are shaped by repeated and overlapping exposures occurring over time, including air emissions, transport-related risks, industrial activity, socio-economic vulnerability, psychosocial stress and health system capacity.

The IFC defines cumulative impacts as those that result from the incremental impact of a project when added to other existing, planned and reasonably foreseeable future developments. IFC guidance further states that cumulative assessment should focus on valued environmental and social components that are already stressed, vulnerable or important to affected communities (IFC, 2013).

For the proposed 750 MW CCGT Power Plant, cumulative impacts are central to the health assessment because the project is located within Phase 1F of the RBIDZ, within an existing industrial and logistics landscape influenced by the Port of Richards Bay, heavy haul transport corridors, bulk material handling, mineral processing, smelting, fertiliser and chemical industries, existing industrial combustion sources, road freight and shipping-related emissions.

The Draft Scoping Report recognises that cumulative impacts must consider industrial developments and operations, Port of Richards Bay operations and expansion, urban-related development, agricultural and mining activities in the region, and land-use change from agricultural or natural areas to development uses. It further identifies health-related risks linked to gaseous emissions, hazardous plant components, traffic, water contamination, noise, communicable diseases, psychosocial disorders and pressure on health services.

The cumulative health question is therefore not whether the proposed CCGT plant alone creates all relevant impacts. The critical question is whether the proposed facility adds an incremental health burden to an airshed, transport network, social environment and health system that are already under pressure.

18.1 Cumulative Setting: Richards Bay as an Industrial Health Context

Cumulative health impacts arise where project-related exposures interact with existing environmental, social and health stressors or with the effects of other existing, approved or reasonably foreseeable developments. This is particularly important because most environmental health outcomes are multifactorial. Respiratory disease, cardiovascular disease, injury, psychosocial stress and other adverse health outcomes rarely arise from a single environmental or social determinant operating in isolation. Instead, health is influenced by the combined effect of environmental exposures, underlying disease, socio-economic conditions, individual susceptibility, access to healthcare and other determinants operating over time.

The IFC defines cumulative impacts as impacts resulting from the incremental effects of a project when added to other existing, planned and reasonably foreseeable developments and external stressors. Cumulative assessment should therefore consider not only the magnitude of the project's individual contribution, but also the existing condition, sensitivity and resilience of affected

receptors (IFC, 2013). This distinction is particularly important where a receiving environment is already subject to material environmental or social pressure.

For the proposed 750 MW CCGT Power Plant, cumulative health assessment is particularly relevant because the Project is located within Phase 1F of the RBIDZ and forms part of the wider Richards Bay industrial-port environment. Existing stressors include industrial combustion sources, mineral processing and smelting, fertiliser and chemical industries, bulk material handling, port and shipping activities, road and rail freight, heavy vehicle movement, existing RBIDZ industries and continuing industrial and urban development.

The health significance of an incremental project contribution must therefore be interpreted against this receiving environment. A relatively small incremental exposure does not necessarily constitute a significant health impact when considered independently. However, the same incremental exposure may warrant greater health consideration where it occurs in a population already exposed to multiple environmental stressors, where baseline pollutant concentrations are elevated, or where susceptible groups have reduced physiological or socio-economic capacity to absorb additional exposure.

The cHIA therefore applies an exposure–susceptibility–outcome framework to cumulative health effects. Under this framework, cumulative significance is informed by:

- the existing environmental and social exposure burden;
- the magnitude and duration of the additional project-related exposure;
- the extent to which exposure pathways overlap spatially and temporally;
- the presence of susceptible or vulnerable population groups;
- the strength of epidemiological or toxicological evidence linking the exposure to an adverse health outcome;
- the reversibility and severity of the potential health outcome; and
- the extent to which exposure can be prevented, reduced, monitored or managed.

This approach does not assume that the Project will independently cause measurable population-level morbidity. Rather, it considers whether the Project could incrementally alter an existing exposure pathway or contribute to a cumulative burden of sufficient magnitude to warrant health-protective management.

The Atmospheric Impact Report is particularly important in this regard. Project-alone modelling predicts relatively low concentrations when compared with the applicable National Ambient Air Quality Standards (NAAQS). In contrast, cumulative modelling incorporating existing industrial sources and approved future developments predicts exceedances for certain short-term sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and particulate matter (PM_{10}) concentrations. Ambient monitoring considered in the air quality assessment also identifies existing periods of elevated SO_2 concentrations within the Richards Bay airshed.

The cumulative air-quality pathway is therefore supported by ambient monitoring and dispersion-modelling evidence rather than being merely hypothetical. This does not establish that the proposed Project will independently cause measurable increases in population-level disease. It does, however, demonstrate that the Project will introduce an additional emission source into an airshed in which existing and cumulative pollutant concentrations already warrant health-protective management.

18.2 Cumulative Air Quality and Respiratory and Cardiovascular Health

Air quality represents the principal cumulative environmental-health pathway identified for the proposed CCGT Power Plant. The health relevance of atmospheric emissions is determined not only by the quantity emitted by the Project, but by the resulting ambient concentration, duration and frequency of exposure, the contribution of other emission sources and the susceptibility of the exposed population.

The Atmospheric Impact Report assessed emissions associated with the proposed combustion of natural gas, including oxides of nitrogen (NOx/NO_2), SO_2, particulate matter (PM_{10}) and carbon monoxide (CO). Project-alone modelling indicates relatively low incremental concentrations in comparison with the applicable NAAQS. Cumulative modelling, however, predicts exceedances of certain short-term SO_2, NO_2 and PM_{10} standards when existing industrial sources and approved future developments are incorporated into the model. The distinction between project-alone and cumulative exposure is therefore fundamental to the interpretation of potential community health effects.

The WHO Global Air Quality Guidelines (AQGs) provide the principal international health-based reference for evaluating the health significance of ambient air pollutants. The 2021 AQGs were developed following systematic evaluation of epidemiological evidence relating exposure to $PM_{2.5}$, PM_{10}, NO_2, SO_2, ozone and CO to adverse health outcomes. The WHO concluded that adverse health effects occur at lower pollutant concentrations than previously recognised and consequently revised several guideline values downward (WHO, 2021).

It is important, however, to distinguish between the purpose of the South African NAAQS and that of the WHO AQGs. The NAAQS constitute the applicable regulatory ambient-air-quality standards against which statutory compliance is evaluated in South Africa. The WHO AQGs are not legally binding standards; rather, they represent health-based reference concentrations developed from epidemiological evidence and are intended to inform measures for the protection of public health (WHO, 2021). Compliance with the applicable NAAQS is therefore an important regulatory consideration, but should not be interpreted as demonstrating the complete absence of population-health risk. Conversely, exceedance of a WHO AQG does not establish that an individual or community will experience a specific adverse health outcome. The AQGs are appropriately used in this cHIA as health-based reference information alongside the legally applicable South African standards.

18.2.1 Particulate Matter

Particulate matter is among the ambient air pollutants for which the epidemiological evidence of adverse health effects is strongest. Particle size is important to toxicological behaviour. PM_{10} is capable of penetrating into the respiratory tract, while fine particulate matter ($PM_{2.5}$) can penetrate more deeply into the pulmonary system and, through particle constituents and associated inflammatory processes, contribute to systemic cardiovascular effects. Long-term particulate exposure is associated with increased cardiovascular and respiratory morbidity and mortality, while short-term increases in particulate concentrations are associated with exacerbation of respiratory and cardiovascular disease and increased healthcare utilisation (WHO, 2021).

The WHO identifies air pollution as a risk factor for major non-communicable diseases, including ischaemic heart disease, stroke, chronic obstructive pulmonary disease (COPD), asthma and cancer. The public-health relevance of particulate exposure is therefore

greatest among populations with existing respiratory or cardiovascular disease and among individuals whose physiological susceptibility increases the likelihood of an adverse response.

PM_{10} was assessed in the Atmospheric Impact Report. $PM_{2.5}$ was not separately modelled and the cHIA therefore does not quantify a project-specific $PM_{2.5}$ exposure concentration or attributable health burden. $PM_{2.5}$ nevertheless remains relevant to the cumulative health assessment because the wider Richards Bay industrial-port environment contains multiple combustion and transport-related particulate sources. Its inclusion in the health discussion should therefore be understood as a toxicologically relevant cumulative pathway rather than a quantitative prediction of Project-specific $PM_{2.5}$ exposure.

18.2.2 Nitrogen Dioxide

NO_2 is principally relevant as a combustion-related air pollutant affecting the respiratory system. Epidemiological evidence associates both short- and longer-term NO_2 exposure with adverse respiratory outcomes, with particular concern for people with asthma and other pre-existing respiratory conditions. NO_2 is also an important indicator of combustion-related pollution and may occur as part of a broader mixture of combustion products.

For this Project, the health assessment does not infer disease incidence directly from predicted NO_2 concentrations. Rather, the significance of NO_2 is considered in relation to the cumulative modelled concentrations, existing industrial and transport emissions, the duration of potential exposure and the presence of sensitive receptors.

18.2.3 Sulphur Dioxide

SO_2 is of particular relevance to short-term respiratory health. Exposure can produce bronchoconstriction and respiratory symptoms, including wheezing, coughing and chest tightness, particularly among people with asthma and other pre-existing respiratory disease. Consequently, short-term peak concentrations and the frequency of elevated exposure events are important considerations in assessing health significance.

The existing Richards Bay context is relevant because the Atmospheric Impact Report identifies relatively high ambient SO_2 concentrations and records exceedances of short-term NAAQS during the monitoring period assessed. The health question is therefore not limited to whether the Project, considered independently, exceeds an ambient standard. It also includes whether the Project contributes incrementally to the frequency, duration, magnitude or spatial extent of exposure within an airshed already experiencing elevated short-term concentrations.

18.2.4 Susceptible and Vulnerable Populations

Population-level risk is not distributed uniformly. Children, older persons and people with pre-existing asthma, COPD or cardiovascular disease are more susceptible to adverse effects from air pollution. Socio-economic conditions may further modify vulnerability where households have reduced access to healthcare, high existing disease burdens, poor housing conditions or simultaneous exposure to multiple environmental stressors.

The identification of these groups does not imply that adverse health outcomes will necessarily occur as a result of the Project. It recognises that, for a comparable environmental exposure, the probability or severity of an adverse response may be greater in susceptible individuals than in the general healthy adult population.

For the proposed Project, nearby residential communities and other receptors within the broader Richards Bay airshed must therefore be considered in conjunction with the dispersion modelling rather than solely by reference to the Project boundary.

18.2.5 Health Significance

Taken together, the available evidence supports a distinction between Project-attributable risk and cumulative airshed risk. Project-alone atmospheric concentrations are predicted to be comparatively low and are not expected to independently produce a substantial measurable change in population health. The cumulative airshed, however, already contains multiple industrial and transport-related emission sources and the cumulative modelling predicts exceedance conditions for certain pollutants and averaging periods.

The cHIA therefore considers the Project's incremental contribution to be health-relevant even where it is not the dominant contributor to ambient concentrations. The appropriate health-management response is consequently to minimise the Project's contribution as far as reasonably practicable, maintain compliance with applicable emission requirements, verify performance through appropriate monitoring and ensure that community complaints and abnormal emission events are investigated and responded to transparently.

18.3 Existing SO_2 Baseline Exceedances and Incremental Health Burden

SO_2 warrants specific consideration because the Atmospheric Impact Report identifies elevated baseline concentrations and records exceedances of the applicable short-term NAAQS during the monitoring period assessed. Cumulative modelled concentrations are also materially higher than those predicted for the Project in isolation.

This creates an important distinction between source-specific compliance and receiving-environment health risk. The relatively small contribution of the proposed Project does not mean that the Project is responsible for existing airshed exceedances. Equally, the existence of a small incremental contribution does not remove the need to consider that contribution within the cumulative exposure environment.

For health assessment purposes, the relevant question is therefore whether the Project materially alters the frequency, duration, magnitude or spatial distribution of population exposure to SO_2, particularly during short-term peak conditions. This approach is more appropriate than attributing the existing cumulative pollution burden to the Project or, conversely, disregarding the cumulative burden because Project-alone concentrations are comparatively low.

SO_2 acts predominantly as a respiratory irritant. Short-term exposure is of particular relevance to susceptible individuals, including persons with asthma, in whom exposure may precipitate bronchoconstriction, wheezing, coughing, chest tightness and reductions in pulmonary function. The health relevance of the existing short-term exceedances is therefore greater for susceptible receptors than for the general healthy population.

The Project's standalone SO_2 contribution is assessed as Low on the basis of the project-specific atmospheric modelling. Cumulative airshed significance is higher because existing short-term exceedances have been identified and cumulative modelling predicts

further exceedance conditions. The residual health significance is therefore dependent on effective emission control, compliance with the AEL, appropriate emission and ambient-air-quality monitoring, investigation of abnormal emission events and transparent response to community complaints.

Importantly, this finding does not establish that the Project will cause an identifiable increase in respiratory disease within surrounding communities. Such a conclusion would require population-specific exposure-response modelling and epidemiological analysis beyond the scope and available data of this cHIA. The finding instead recognises that additional emissions occur within an already stressed exposure environment and should therefore be minimised and monitored accordingly.

18.4 Cumulative PM_{10}, $PM_{2.5}$ and Transport-Related Particulate Exposure

Particulate exposure within the Richards Bay environment cannot be attributed to a single source. Potential sources include industrial combustion, road freight, shipping and port activities, bulk-material handling, coal and mineral logistics, construction activities, vehicle movement and regional background particulate concentrations.

PM_{10} was included in the Atmospheric Impact Report and is therefore supported by Project-specific dispersion modelling. $PM_{2.5}$ was not separately modelled. Accordingly, no quantitative conclusion regarding Project-specific $PM_{2.5}$ concentrations or population exposure is made in this cHIA. $PM_{2.5}$ is nevertheless considered qualitatively because it represents an important component of combustion- and transport-related particulate pollution and is recognised internationally as a major environmental-health pollutant.

The toxicological behaviour of particulate matter varies according to particle size and composition. Fine particles are capable of penetrating deeply into the respiratory system, while $PM_{2.5}$ and its constituents may contribute to systemic inflammatory and cardiovascular effects. Epidemiological evidence links long-term particulate exposure with cardiovascular and respiratory morbidity and mortality and short-term increases in exposure with exacerbation of existing respiratory and cardiovascular disease (WHO, 2021).

For the proposed Project, particulate exposure must therefore be considered across different phases and sources. Construction activities may generate fugitive dust from site clearance, exposed surfaces, earthworks and vehicle movement. Operational particulate emissions associated with natural-gas combustion are expected to be substantially lower than those typically associated with solid-fuel combustion; however, the Project will operate within a broader industrial and transport environment in which communities may already experience particulate exposure from multiple sources.

The health significance of this pathway is therefore primarily cumulative. The cHIA does not attribute existing particulate concentrations from port, road or industrial activities to the proposed Project. Rather, these sources define the receiving environment into which the Project's comparatively smaller incremental contribution will be introduced.

Particular attention should consequently be given to limiting construction dust, controlling Project-related vehicle emissions, maintaining combustion efficiency and integrating Project monitoring, where practicable, with broader ambient-air-quality information for the Richards Bay airshed.

18.5 Cumulative Port, Shipping, Road Freight and Heavy Haul Transport Impacts

The proposed Project will operate within a transport system already shaped by port activity, RBIDZ logistics, heavy haul movement, road freight and industrial supply chains. The Traffic Impact Assessment confirms that the development is located within an industrial transport network and that Phase 1F traffic growth will require access management and road upgrades.

From a health perspective, the cumulative transport pathway has two dimensions. The first is injury risk. Additional construction traffic, abnormal loads, worker transport, service vehicles and operational logistics add to an existing heavy vehicle environment. This increases exposure to road traffic accidents, pedestrian injuries, cyclist risk, public transport interface hazards and emergency response delays.

The second is emissions exposure. Road freight and diesel-powered transport contribute to NOx, particulate matter, diesel particulate matter and VOCs. Shipping and harbour activity also contribute to combustion-related emissions. Where these sources operate in proximity to industrial communities, schools and clinics, they contribute to cumulative respiratory and cardiovascular burden.

The proposed CCGT plant may not be the largest transport generator in Richards Bay, but its construction and operational logistics add to a transport network already under pressure. The cumulative injury and emissions burden is therefore health-relevant and must be actively managed through construction traffic planning, heavy vehicle route control, pedestrian safety, speed control, driver management and emergency access planning.

18.6 Cumulative Industrial Hazard and Major Incident Context

The broader Richards Bay industrial environment contains facilities and activities involving fuels, chemicals, high-voltage electrical infrastructure, bulk materials, high-temperature processes, combustion systems and hazardous substances. The proposed CCGT plant adds natural gas handling, combustion turbines, HRSGs, steam systems, transformer oils, cooling tower systems, emergency fuel systems, chemical dosing and fire suppression systems to this existing industrial risk context.

The Draft Scoping Report identifies risks posed by hazardous components of the plant and includes a Quantitative Risk Assessment as part of the EIA specialist investigations. This is relevant because cumulative health risk is not limited to chronic exposure. Low-probability, high-consequence events such as gas release, fire, explosion, transformer fire, contaminated firewater release, chemical spill or cooling system failure may also affect workers, emergency responders and, depending on consequence zones, nearby receptors.

The cumulative industrial hazard context requires alignment between the HIA, QRA, EMPr and emergency response planning. The project must not be assessed as a standalone island; it operates within a broader emergency response landscape that includes port, industrial and municipal response systems. The cumulative issue is whether existing emergency services and healthcare facilities can respond effectively if multiple industrial risks exist in the same area.

18.7 Cumulative Water, Stormwater, Wastewater and Flood-Related Health Risk

The Hydrological Assessment confirms that the site drains toward a canal along the western boundary that has developed wetland-like characteristics. Baseline water quality is generally acceptable, but flood risk, stormwater contamination, sediment mobilisation and hydrocarbon contamination are identified as potential risks if controls fail.

Cumulative water-related health risk arises because the proposed Project is added to an already developed industrial landscape where hard surfaces, stormwater infrastructure, historical land transformation and future IDZ development may increase runoff volumes and reduce natural attenuation capacity. Additional impervious surfaces associated with the CCGT plant may increase local runoff and contribute to cumulative stormwater pressure.

The primary health concern is not existing poor water quality, but the possibility that contaminated stormwater, wastewater, cooling tower blowdown, hydrocarbon spills or contaminated firewater may enter the receiving canal or downstream systems during failure events. Flooding may further mobilise contaminants and increase contact exposure.

Cumulative health outcomes include:

- dermal exposure to contaminated water;
- gastrointestinal illness risk if contaminated water is contacted or consumed;
- vector breeding where stagnant water accumulates;
- ecological degradation affecting downstream wellbeing;
- flood-related injury;
- increased nuisance and psychosocial concern where communities perceive water pollution.

This impact is manageable but must be assessed cumulatively because each additional industrial facility increases the importance of stormwater integrity within the RBIDZ.

18.8 Cumulative Social Vulnerability, Labour Influx and Inequality

The cumulative social health pathway is as important as the environmental pathway. Richards Bay and the broader City of uMhlathuze contain both formal urban areas and socio-economically vulnerable communities. The Socio-Economic Impact Assessment identifies employment and investment benefits, but also confirms unemployment, labour market vulnerability and inequality.

The proposed Project may create positive cumulative impacts through employment, household income, local procurement, skills development and energy security. However, it may also contribute to negative cumulative social impacts if labour influx, unmet employment expectations, unequal benefit distribution and pressure on services are not managed.

Cumulative social health risks include:

- increased STI and HIV vulnerability linked to labour mobility;
- pressure on housing and local services;

- gender-based vulnerability and transactional relationships;
- social tension over employment allocation;
- protest risk and psychosocial stress;
- increased alcohol and substance-related harms;
- strain on clinics and emergency services.

These impacts may not be caused by the CCGT project alone. However, they may be intensified where multiple industrial developments occur in the same region and compete for labour, accommodation, transport, services and community acceptance.

18.9 Cumulative Health System Pressure

The health system serving Richards Bay and the broader King Cetshwayo District already carries a burden of communicable disease, non-communicable disease, trauma, emergency response demand and primary healthcare pressure. The cHIA baseline identifies healthcare facilities within the Zone of Influence, including clinics, pharmacies and hospitals, but also recognises broader service delivery constraints and capacity sensitivity.

The cumulative health system issue is that multiple industrial projects may increase demand for the same local health services. The proposed CCGT plant may contribute to this demand through occupational injuries, traffic accidents, respiratory complaints, heat stress, chemical exposure, HIV/STI services, emergency incidents and psychosocial health needs.

This does not mean that the project will overwhelm the health system. However, it does mean that project health management must avoid transferring avoidable burden to public clinics and emergency services. On-site occupational health capability, first aid, emergency response planning, private medical arrangements for workers, referral protocols and coordination with local healthcare services are therefore critical cumulative impact controls.

18.10 Cumulative Psychosocial Stress, Risk Perception and Industrial Fatigue

Cumulative health impacts include psychosocial effects, particularly in communities that already live near heavy industry. The Visual Compliance Statement confirms that the project is located within an already industrialised visual environment, although receptors remain present within the broader area.

Visible industrial expansion, stack emissions, steam plumes, heavy vehicle movement, odour concerns, noise, pollution perception and uncertainty about long-term health effects may contribute to community stress and mistrust. Even where technical studies show compliance, communities may experience cumulative anxiety if they perceive each new project as another addition to an already polluted environment.

This is especially relevant in Richards Bay because air quality concerns are not abstract. The Atmospheric Impact Report confirms existing SO_2 exceedance conditions and cumulative exceedance scenarios. Therefore, psychosocial concern is not merely a perception issue; it is partly rooted in a real cumulative environmental context.

Health-related psychosocial outcomes may include:

- chronic stress;
- anxiety about pollution and disease;
- reduced trust in authorities and project proponents;
- lower perceived quality of life;
- reduced sense of environmental security;
- increased grievance and conflict risk.

This pathway must be managed through transparent communication, accessible complaints systems, public reporting of monitoring results and meaningful engagement with health concerns.

18.11 Incremental Burden Significance

The cumulative assessment confirms that the project's incremental burden is not uniform across all health pathways. Some incremental contributions are minor and readily manageable, while others are materially significant because they interact with already stressed systems. The incremental burden is assessed as follows:

Table 18-1: Incremental burden

Cumulative Pathway	Existing Cumulative Stressor	Project Increment	Incremental Health Significance
Air quality: SO_2, NO_2, PM_{10} and $PM_{2.5}$	Existing industrial emissions, port operations, smelters, fertiliser/chemical activities, heavy transport, shipping emissions and documented SO_2 exceedances	Combustion turbine stack emissions and construction/traffic emissions	Moderate to High for cumulative respiratory and cardiovascular vulnerability
Road safety and transport exposure	Heavy haul routes, road freight, port logistics, RBIDZ traffic and public transport interfaces	Construction traffic, abnormal loads, worker transport and operational logistics	Moderate for injury risk and localised emissions
Stormwater and water quality	Existing industrial hardening, canalised drainage, wetland-like receiving environment and flood sensitivity	Increased impervious surfaces, spill risk, blowdown/wastewater and contaminated firewater risk	Low to Moderate, increasing under failure events
Social determinants	Unemployment, inequality, labour market vulnerability and service pressure	Employment benefits, labour influx, procurement expectations and worker movement	Moderate, with both positive and negative pathways
Health systems	Existing PHC and emergency care demand	Occupational injuries, respiratory complaints, traffic injuries and emergency scenarios	Moderate during construction and abnormal events
Psychosocial wellbeing	Existing industrial fatigue, pollution concern and visual industrialisation	Additional visible infrastructure, steam plumes, emissions concerns and traffic	Low to Moderate, higher where trust is low

Cumulative Pathway	Existing Cumulative Stressor	Project Increment	Incremental Health Significance
Occupational health	Existing industrial workforce exposure in the region	Direct plant exposures: heat, chemicals, confined spaces, noise, combustion systems and electrical hazards	Moderate, managed through OHS systems

The highest cumulative significance is associated with air quality because the receiving environment already shows evidence of baseline stress and cumulative modelling predicts exceedances. The project's incremental emissions therefore cannot be dismissed as insignificant simply because project-alone concentrations are low.

18.12 Management of Cumulative Health Impacts

The management of cumulative health impacts requires a different approach from the management of a discrete Project-specific impact. Where cumulative exposure arises from multiple independent sources, the Applicant cannot reasonably be expected to control the entire receiving environment. The Applicant is, however, responsible for avoiding and minimising its own contribution, verifying the effectiveness of Project-specific controls and participating, where appropriate, in cooperative environmental and health management initiatives.

This approach is consistent with the IFC cumulative-impact framework, which recognises that management responsibility must reflect the extent to which a project contributes to and can practically influence a cumulative effect (IFC, 2013). It is also consistent with the World Bank Group General Environmental, Health and Safety Guidelines, which identify ambient air quality, noise, hazardous materials, traffic safety, disease prevention and emergency preparedness as relevant components of environmental and community-health management.

For this Project, cumulative health management should therefore be based on four principles: source control, exposure verification, protection of susceptible receptors and transparent response. Source control requires the Project's own emissions and other environmental releases to be maintained as low as reasonably practicable within applicable regulatory and technical requirements. Exposure verification requires monitoring sufficient to confirm that predicted Project performance is being achieved. Protection of susceptible receptors requires particular attention to circumstances in which children, older persons, persons with pre-existing disease or other vulnerable groups may experience disproportionate effects. Transparent response requires environmental monitoring results, complaints, abnormal events and corrective actions to be appropriately recorded, investigated and communicated.

The following cumulative management measures are required:

- strict compliance with AEL emission limits and monitoring requirements;
- optimisation of combustion efficiency to reduce NOx and CO;
- implementation of AQIA mitigation and monitoring recommendations;
- ambient air quality monitoring and transparent complaints response;
- engagement with relevant municipal air quality structures where available;
- construction traffic management and heavy vehicle route control;

- road safety measures at access points and pedestrian interface areas;
- stormwater and wastewater controls designed for flood-sensitive conditions;
- spill prevention, firewater containment and emergency response planning;
- Legionella and cooling tower water management;
- local employment and procurement planning to reduce unmanaged influx;
- worker code of conduct and HIV/STI prevention programme;
- on-site occupational health capacity to avoid unnecessary burden on public clinics;
- coordinated emergency medical response planning.

The cumulative assessment confirms that the proposed 750 MW CCGT Power Plant will be developed within an established industrial-port environment in which communities are already exposed to multiple environmental, social and health stressors. Project-alone impacts are generally Low to Moderate and are considered manageable with the identified mitigation. Cumulative significance is greater for air quality and respiratory and cardiovascular health, traffic safety, social determinants of health, health-system capacity and psychosocial wellbeing.

The principal cumulative health concern is atmospheric exposure because ambient monitoring and cumulative modelling indicate an airshed already subject to elevated pollutant concentrations and predicted exceedance conditions for certain pollutants and averaging periods. The Project is not identified as the dominant source of the existing cumulative pollution burden; however, its incremental contribution remains relevant because it is introduced into an already stressed receiving environment.

From a community-health perspective, the Project remains acceptable provided that its incremental contribution is effectively minimised, regulatory requirements are met, predicted environmental performance is verified through appropriate monitoring, abnormal events and complaints are investigated, and the specified community-health mitigation measures are implemented throughout construction and operation.

The residual cumulative health risk cannot be reduced to zero because a substantial component of the existing exposure burden originates outside the control of the Applicant. The appropriate health-protective objective is therefore to ensure that the Project does not make a disproportionate contribution to that burden and that Project-related exposures remain controlled, monitored and transparently managed.

The following cumulative impacts that can be expected with the proposed Project are described in Table 18-2 below.

Table 18-2 : Cumulative Impacts of the proposed Project

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
1	Vector-related diseases	The project may contribute cumulatively to local vector nuisance where stormwater infrastructure, cooling water systems, laydown areas, containers, waste storage areas, blocked drains or poorly maintained sumps create stagnant water. This impact must be read together with existing wetland-like drainage features, the canal along the western boundary, industrial hardstanding and waste accumulation pressures in the broader RBIDZ environment. The main cumulative pathway is increased mosquito and rodent habitat, particularly during construction and early operation if housekeeping and drainage controls are weak.	Low negative. The project is not located in a known vector-borne disease hotspot, but unmanaged standing water and waste could create localised breeding conditions.	Negligible negative. With engineered drainage, routine inspection, waste control, removal of stagnant water, cooling water maintenance and pest/vector monitoring, the cumulative contribution is expected to be minor and manageable.
2	Acute respiratory infections and respiratory effects from housing	The most material cumulative impact is the addition of stack emissions from the CCGT plant, construction dust, diesel exhaust, operational traffic emissions and possible backup fuel emissions to an already industrialised Richards Bay airshed. Existing cumulative sources include Port of Richards Bay operations, Richards Bay Coal Terminal activities, shipping emissions, heavy haul transport, road freight, smelters, fertiliser/chemical industries, existing IDZ industries, nearby combustion sources and proposed future IDZ projects. The AQIA indicates that the project-alone impact is low, but	Moderate to High negative. Significance is driven by cumulative airshed stress and existing SO_2 exceedances, not by the plant alone. Children, elderly persons, pregnant women and people with asthma, COPD or cardiovascular disease are most vulnerable.	Moderate negative. Emissions controls, AEL compliance, combustion optimisation, stack monitoring, dust suppression, traffic controls and transparent air quality monitoring will reduce the project's contribution, but residual cumulative risk remains because the broader airshed is already burdened.

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
		cumulative scenarios predict exceedances for SO_2, NO_2 and PM_{10}. This may worsen respiratory irritation, asthma, COPD symptoms and cardio-respiratory vulnerability in sensitive receptors.		
3	Veterinary medicine and zoonotic issues	Cumulative zoonotic risk is expected to be limited. The project is within an industrial estate and does not directly create an agricultural or livestock interface. Indirect cumulative risks may arise where labour influx, poor food waste control, informal vending, stray animals, rodents or unmanaged waste around worker areas increase human-animal contact. This risk may interact with existing urban/peri-urban animal movement and waste pressures.	Negligible to Low negative. The pathway is indirect and no site-specific zoonotic disease hotspot has been identified.	Negligible negative. Waste control, pest management, prohibition of animals in worker/site areas, food waste management and worker awareness will reduce the cumulative contribution to very low levels.
4	STIs, including HIV/AIDS	The project may contribute cumulatively to STI and HIV vulnerability through construction workforce mobilisation, labour influx, contractor movement, temporary accommodation, increased disposable income, transactional relationships and interaction with existing social vulnerabilities in KwaZulu-Natal. These pressures may combine with existing provincial HIV burden, unemployment, gendered vulnerability, mobility corridors and service demand. The risk is highest during peak construction and shutdown/maintenance periods.	Moderate negative. While the project alone will not determine HIV/STI prevalence, it may amplify existing risk factors if workforce behaviour, accommodation and community interface are poorly managed.	Low negative. Local recruitment, worker code of conduct, HIV/STI awareness, condom access, referral to testing/treatment, GBV prevention, accommodation controls and engagement with local health services materially reduce the project's cumulative contribution.

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
5	Soil-, water- and waste-related diseases	Cumulative impacts may arise where project-related stormwater, wastewater, cooling tower blowdown, hydrocarbon spills, transformer oil leaks, contaminated firewater, sewage or construction sediment add to existing industrial drainage pressures within the RBIDZ. The site drains toward a canal with wetland-like characteristics and is subject to flood-sensitive conditions. The cumulative health pathway is not current poor water quality, but failure of containment, clean/dirty water separation, spill response or flood protection, resulting in contact exposure, vector breeding, nuisance conditions or downstream contamination.	Moderate negative. Without controls, cumulative industrial hardening, flood risk and contaminant mobilisation could create meaningful local environmental health risk.	Low to Negligible negative. Proper stormwater design, bunding, oil-water separation, wastewater authorisation, blowdown management, spill response, firewater containment, surface water monitoring and flood-sensitive infrastructure placement reduce cumulative risk substantially.
6	Food- and nutrition-related issues	Cumulative food and nutrition impacts are indirect. Positive effects may arise from employment, supplier opportunities and improved household income. Negative cumulative effects may occur if labour influx and regional industrial growth increase pressure on housing, food prices, transport costs and basic services, affecting low-income households. No direct agricultural displacement is expected because the site is within the RBIDZ.	Low negative / Moderate positive. Negative effects are mainly affordability-related and indirect; positive effects depend on local benefit capture.	Negligible negative / Moderate positive. Local employment, local procurement, worker accommodation planning, transparent recruitment and support for local suppliers enhance positive food security outcomes while reducing inflationary and service-pressure effects.
7	Accidents/injuries	Cumulative injury risk arises from adding construction vehicles, abnormal loads, worker transport, operational logistics and maintenance traffic to an existing industrial transport network	Moderate to High negative. Without controls, severe injury or fatality risk is credible for workers, contractors, road	Low to Moderate negative. Construction traffic management, route planning, abnormal load controls, pedestrian safety, speed enforcement,

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
		shaped by Port operations, RBIDZ logistics, road freight, heavy haul transport and public transport interfaces. Additional occupational injury risks arise from gas systems, turbines, HRSGs, steam systems, high-voltage switchyard infrastructure, cooling systems, work at heights, lifting operations, confined spaces and heat load.	users, pedestrians and emergency responders.	driver induction, OHS systems, permit-to-work, emergency drills, confined-space controls and contractor management reduce risk, although residual industrial and road safety risk remains.
8	Exposure to potentially hazardous materials, noise and malodours	Cumulative hazardous exposure includes stack pollutants, fuel and gas handling, lube oils, transformer oils, maintenance chemicals, diesel backup systems, cooling tower drift, fire suppression residues, contaminated runoff, noise from industrial operations and traffic, and nuisance odours during abnormal events. These exposures interact with existing industrial emissions, port activity, smelters, fertiliser/chemical industries, nearby combustion sources, traffic noise and community concern about pollution.	Moderate negative. Community exposure is mainly chronic and cumulative; occupational exposure may be acute and higher intensity. Noise is expected to be low for communities but remains relevant for workers.	Low negative. Hazardous material controls, chemical inventories, bunding, SDS management, occupational hygiene monitoring, hearing conservation, cooling tower/Legionella control, spill response, noise controls, complaint response and emergency preparedness reduce cumulative exposure.
9	Social determinants of health	The project may contribute positively through employment, income, skills development, local procurement and energy security. Negative cumulative effects may arise where multiple industrial projects increase labour influx, competition for jobs, unmet expectations, housing pressure, inequality, community tension, GBV risk, alcohol/substance harms and psychosocial stress. The cumulative	Moderate negative / Moderate positive. Benefits are meaningful but uneven; unmanaged expectations and labour influx may create social stress.	Low negative / Moderate to High positive. Transparent recruitment, local procurement, skills development, grievance management, worker code of conduct, GBV prevention, stakeholder engagement and social investment improve benefit distribution and reduce adverse cumulative social impacts.

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
		social pathway is especially relevant in uMhlathuze and King Cetshwayo due to existing unemployment and inequality.		
10	Cultural health practices	Cumulative impacts may arise where project-related health concerns, perceived pollution, respiratory symptoms, stress or industrial anxiety are interpreted through plural health-seeking systems, including biomedical, traditional, spiritual and complementary care. Poor communication may delay formal care-seeking or increase mistrust. Conversely, culturally competent engagement may strengthen referral and early symptom recognition.	Low negative. The impact is indirect but relevant in KwaZulu-Natal's plural health system, particularly where risk communication is weak.	Negligible negative / Low positive. IsiZulu and English communication, culturally competent engagement, referral messaging, respect for traditional health practices and engagement through trusted local structures reduce misunderstanding and improve care-seeking behaviour.
11	Health systems issues	Cumulative pressure may arise from additional demand on clinics, hospitals, EMS and occupational health services due to construction injuries, traffic accidents, respiratory complaints, heat illness, chemical exposure, STI/HIV services and emergency incidents. This demand may combine with existing public health burdens in King Cetshwayo, including communicable disease, NCDs, trauma and primary healthcare constraints.	Moderate negative. The project alone is unlikely to overwhelm the system, but cumulative industrial and population pressures may strain PHC, emergency response and referral pathways.	Low negative. On-site first aid and occupational health capacity, private medical arrangements for workers, referral agreements, emergency response planning, EMS coordination, health surveillance and incident reporting reduce avoidable burden on public health facilities.
12	Non-communicable diseases	Cumulative NCD risk is linked to long-term exposure to air pollutants, particulate matter, industrial noise, psychosocial stress, heat exposure and socio-economic vulnerability. Existing industrial	Moderate to High negative. Significance is driven by chronic cumulative exposure and vulnerable receptors with asthma,	Moderate negative. Emissions controls, monitoring, occupational health surveillance, worker wellness, complaint tracking, transparent communication and

EHA #	EHAs	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
		emissions, road freight, shipping, port operations, smelters, fertiliser/chemical facilities and future IDZ developments contribute to cumulative respiratory and cardiovascular risk. The project adds incremental emissions and occupational exposures to this burden.	COPD, cardiovascular disease, diabetes or other pre-existing illness.	social benefit enhancement reduce project contribution, but residual cumulative NCD risk remains due to the broader industrial airshed.

19 Monitoring and Evaluation

Monitoring and evaluation for the proposed 750 MW CCGT Power Plant is positioned as a core risk verification mechanism within this Community Health Impact Assessment, rather than a procedural compliance exercise. Its purpose is to determine, with a high degree of confidence, whether the project is operating within its predicted impact envelope, whether mitigation measures are functioning effectively under real operating conditions, and whether the project is contributing to a material incremental health burden within the already industrially stressed Richards Bay environment.

This positioning is necessary given the cumulative context within which the project will operate. Richards Bay is characterised by a concentration of industrial activities, including port operations, bulk material handling, heavy haul transport, smelting, fertiliser and chemical processing, and existing and proposed IDZ industries. Monitoring must therefore move beyond confirming regulatory compliance and instead provide a defensible evidence base for assessing how the project interacts with existing environmental and social pressures to influence human health outcomes.

This approach aligns with international good practice. The IFC requires monitoring systems to be risk-based, outcome-oriented and capable of informing adaptive management, particularly in relation to community health and safety (IFC, 2009; IFC, 2012). Similarly, the WHO emphasises that environmental health monitoring must prioritise exposures that are demonstrably linked to disease burden, including air pollution, water contamination and social determinants of health (WHO, 2021).

19.1 Integration with Impact Assessment

The monitoring and enforcement framework presented in this chapter is directly linked to the impact assessment undertaken in Chapter 16. Each identified impact pathway and associated mitigation measure has been translated into a measurable monitoring indicator, defined trigger threshold and corresponding management response.

This ensures that the assessment is not limited to impact identification, but extends to active impact management, where:

- Monitoring serves as an early warning system;
- Trigger thresholds define acceptable limits of change; and
- Corrective actions provide clear operational responses to deviations.

The framework therefore provides a closed-loop system, linking prediction (Chapter 16) with control and enforcement (Chapter 19), ensuring that all residual impacts remain within acceptable and regulated limits.

19.2 Monitoring Approach

The monitoring framework adopted for this assessment is explicitly pathway-driven, meaning that monitoring activities are derived from the actual mechanisms through which the project may affect health. These pathways are defined by the operational components of the CCGT plant and include combustion turbine emissions, cooling system operation, stormwater and wastewater management, chemical storage and handling, construction activities, transport interfaces, occupational exposure environments and social interaction with surrounding communities.

This structure ensures that monitoring is causally linked to health outcomes, rather than being based on generic environmental indicators. It also allows monitoring data to be interpreted within the cumulative industrial context of Richards Bay, where existing baseline conditions already reflect multiple overlapping stressors.

The monitoring system is further designed to identify trend deviations, rather than relying solely on exceedances of regulatory thresholds. This is critical in a cumulative impact context, where health effects may arise from repeated or prolonged exposure at levels that are individually compliant but collectively significant. Monitoring is therefore intended to function as an early warning system, enabling timely intervention where emerging risks are identified.

19.3 Air Quality and Respiratory Health Monitoring

Air quality represents the most significant cumulative health pathway associated with the proposed Project. The Atmospheric Impact Assessment demonstrates that while the project-alone contribution is relatively low, cumulative scenarios involving existing and approved industrial sources may result in exceedances of SO_2, NO_2 and PM_{10} standards within the Richards Bay airshed.

From a public health perspective, this distinction is critical. The World Health Organization has confirmed that ambient air pollution is a major driver of global disease burden, contributing to cardiovascular disease, chronic respiratory conditions, lung cancer and acute respiratory infections (WHO, 2021). Furthermore, there is no clearly defined safe threshold for particulate matter exposure, meaning that even incremental increases in pollutant concentrations may have measurable health effects, particularly among vulnerable populations (Burnett et al., 2018).

Monitoring must therefore be designed to determine whether the project is contributing to cumulative exposure conditions that are relevant to health, rather than simply confirming compliance with emission limits. This requires a dual approach, incorporating both source-based and receptor-based monitoring.

At source level, monitoring will verify combustion efficiency and turbine performance through measurement of NOx, SO_2, CO and particulate emissions in accordance with Atmospheric Emission Licence requirements. At receptor level, monitoring will rely on existing ambient air quality networks, supplemented where necessary, to assess exposure conditions in areas where people live, work and access services. Construction-phase dust generation will also be monitored to ensure that short-term exposure risks are effectively controlled.

Importantly, monitoring results will be interpreted in relation to frequency and duration of pollution events, rather than isolated exceedances. Particular attention will be given to short-term SO_2 peaks, which are strongly associated with acute respiratory effects. Monitoring will also incorporate community complaint data, allowing for correlation between measured conditions and perceived health impacts.

19.4 Cooling Systems and Biological Risk

The cooling system introduces a specific but well-recognised health pathway associated with *Legionella* bacteria. While the risk is not continuous, it becomes significant under conditions of poor system management. Exposure occurs through inhalation of contaminated aerosols and can result in severe respiratory illness, including Legionnaires' disease (WHO, 2022).

Monitoring in this context is preventative and must ensure that conditions conducive to bacterial growth do not develop. This requires continuous control of water chemistry, routine microbiological testing, and strict adherence to maintenance and cleaning protocols. The performance of drift eliminators and system integrity must also be verified.

The importance of this monitoring lies in the fact that Legionella outbreaks are almost always associated with failures in system management rather than inherent design risks. Monitoring therefore serves as a critical control measure, ensuring that the pathway remains effectively managed at all times.

19.5 Stormwater, Wastewater and Environmental Health

Stormwater and wastewater systems represent conditional health pathways, with risk arising primarily from system failure rather than baseline conditions. The hydrological assessment confirms that the site drains toward a canal with wetland-like characteristics and is sensitive to contamination, sediment mobilisation and flood-related impacts.

Monitoring must therefore focus on ensuring that containment, separation and treatment systems are functioning as designed. This includes routine inspection of stormwater infrastructure, verification of oil-water separator performance, tracking of spills and leaks, and confirmation of appropriate wastewater and blowdown management.

From a health perspective, the primary concern is event-based exposure, such as contaminated runoff during rainfall events, flood-driven mobilisation of pollutants, or contact exposure to contaminated water. Monitoring must therefore be proactive and focused on system integrity, rather than reactive to contamination events after they occur. This approach is consistent with WHO guidance, which highlights that water-related health risks are often associated with infrastructure failure (WHO, 2017).

19.6 Occupational Health Monitoring

Occupational exposure represents the highest-intensity health risk associated with the project. Workers may be exposed to heat, noise, hazardous substances, confined spaces and mechanical hazards associated with plant operations. Monitoring must therefore be systematic and aligned with recognised occupational health practice.

This includes occupational hygiene monitoring, medical surveillance, incident reporting and verification of control measures such as permit-to-work systems and personal protective equipment. Monitoring must not only record incidents, but also identify conditions that may lead to incidents, allowing for preventative action.

This approach is consistent with occupational health guidance, which emphasises the integration of exposure assessment, health outcomes and control verification in monitoring systems (NIOSH, 2016).

19.7 Traffic and Injury Monitoring

The project will contribute to an existing industrial transport environment characterised by heavy vehicle movement and complex traffic interactions. Monitoring must therefore focus on actual safety outcomes, including incident frequency, near-miss events and high-risk locations.

This data must be used to inform traffic management measures, including route planning, speed control and interface management. Global evidence indicates that injury risk increases significantly in environments with high levels of heavy vehicle activity (WHO, 2018), making this a critical area for ongoing monitoring.

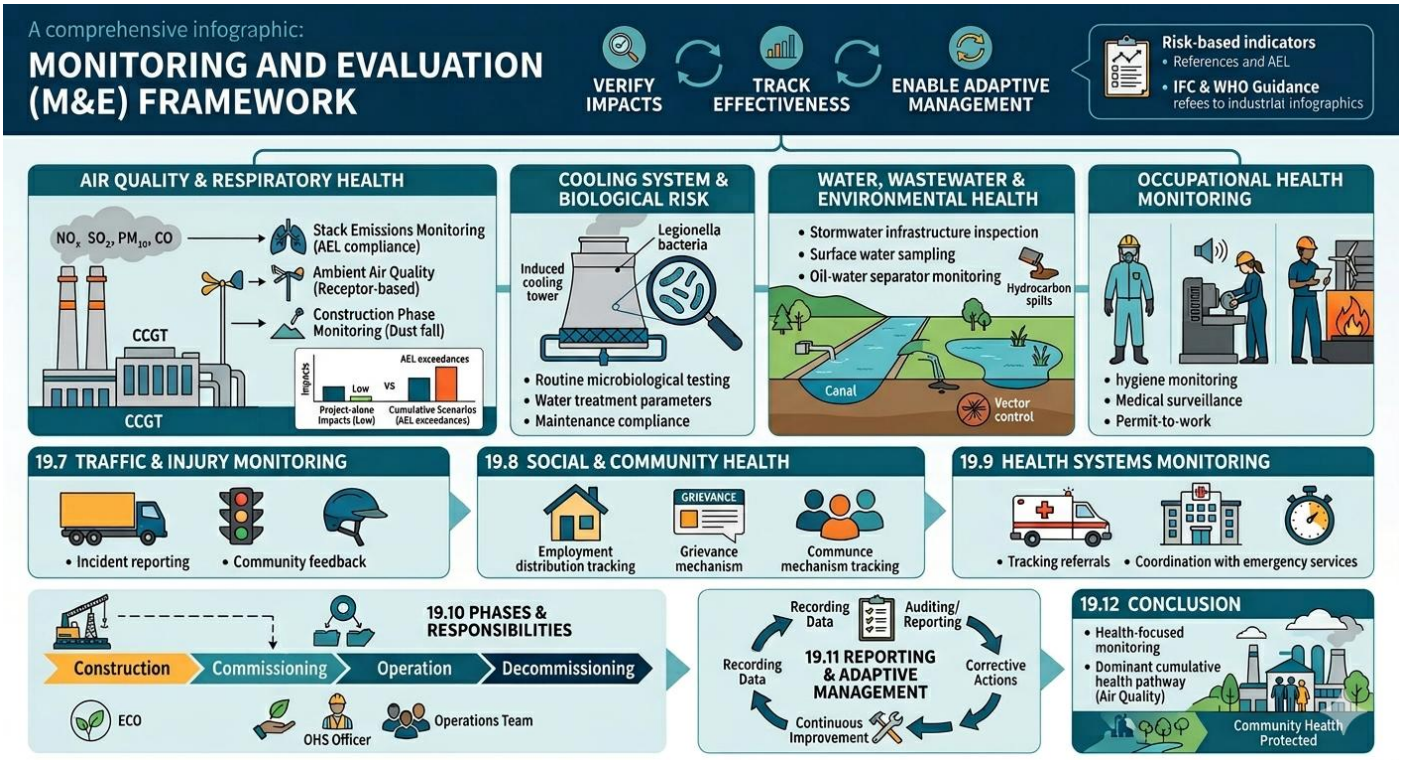


Figure 19-1: M&E Framework

19.8 Translation of Mitigation Measures into Enforceable Monitoring and Management Actions

The effectiveness of the mitigation measures identified in this cHIA is dependent on their translation into clear, enforceable and measurable management actions. While impact assessment identifies potential risks and associated mitigation, regulatory compliance requires that these measures be operationalised through structured monitoring, defined thresholds and responsive management systems.

Within the context of the proposed CCGT Power Plant, monitoring is not undertaken as a passive data collection exercise, but as an active control mechanism, linking environmental and health indicators to defined operational responses. This ensures that potential impacts are identified early, managed appropriately and prevented from escalating into unacceptable conditions.

To achieve this, mitigation measures have been translated into a framework that incorporates:

- Defined responsibilities, assigning accountability for implementation and oversight to specific roles (e.g. Environmental Manager, Health and Safety Officer, Plant Operator, Contractor);
- Measurable monitoring indicators, aligned with identified exposure pathways and health risks (e.g. air pollutant concentrations, water quality parameters, noise levels, incident rates);
- Trigger thresholds, based on regulatory standards, licence conditions or internal performance limits, which initiate a defined response; and

- Corrective and escalation actions, ensuring that deviations are addressed promptly and effectively; and
- Reporting requirements, including internal reporting, regulatory submissions and incident notification.

This structured approach ensures that mitigation is not aspirational, but binding, auditable and enforceable, forming an integral part of the project's environmental and health management system.

19.9 Health Monitoring and Enforcement Framework

The table below sets out the linkage between key health pathways, mitigation measures, monitoring indicators and corresponding management actions. This framework ensures that each identified risk is continuously managed through measurable controls and defined responses.

Table 19-1: EMPr Linked Health Management and Enforcement Framework

Health Pathway (EHA)	Mitigation Measure	Responsible Party	Monitoring Indicator	Trigger Threshold	Corrective Action	Reporting Requirement
Air Quality (EHA 2 & 12)	Control of stack emissions; optimisation of combustion	Environmental Manager / Plant Operator	NOx, SO_2, PM_{10} concentrations (stack and ambient)	Exceedance of AEL limits or ambient standards	Adjust load; optimise combustion; reduce output or shut down affected unit	Monthly reporting; immediate reporting of exceedances to authority
Stormwater & Water Quality (EHA 5)	Clean/dirty water separation; containment systems	Environmental Manager / Site Engineer	Water quality parameters; visual inspections	Detection of contamination or discharge failure	Contain spill; remediate source; stop contributing activity	Incident reporting within 24 hours; inclusion in compliance reports
Cooling Systems (EHA 2 & 8)	Water treatment and Legionella control	Maintenance Manager / H&S Officer	Microbiological counts; water chemistry	Elevated counts or detection above threshold	Increase dosing; isolate system; disinfect before restart	Internal reporting; escalation to management
Traffic & Safety (EHA 7)	Traffic management controls; route planning	Site Manager / Contractor	Incident rates; near misses	Recorded accident or increase in near misses	Implement corrective safety measures; revise traffic plan	Incident reporting; monthly safety reports
Occupational Health (EHA 7 & 8)	PPE; exposure control; training	Health and Safety Officer	Exposure levels; incident rates	Exposure above limits or recorded illness/injury	Adjust PPE; investigate; stop work if required	Health and safety reporting; regulatory reporting where applicable
Hazardous Materials (EHA 8)	Safe storage and handling procedures	Environmental Manager / H&S Officer	Spill incidents; inspection results	Leak or containment failure	Contain spill; remediate; suspend activity	Incident reporting; audit records
Noise (EHA 8)	Equipment maintenance; operational controls	Environmental Manager	Noise levels; complaints	Exceedance of guideline levels or increasing complaints	Implement attenuation; adjust operations	Monitoring reports; complaint register
Social & Community	Stakeholder engagement;	Community Liaison Officer	Grievances; community feedback	Increase in complaints or	Address concerns; adjust practices;	

Health Pathway (EHA)	Mitigation Measure	Responsible Party	Monitoring Indicator	Trigger Threshold	Corrective Action	Reporting Requirement
Health (EHA 9 & 11)	grievance mechanism			repeated grievances	escalate where required	

20 Conclusion

This cHIA has systematically evaluated the potential health impacts associated with the proposed 750 MW CCGT Power Plant within the Richards Bay Industrial Development Zone. The assessment has been undertaken using the Environmental Health Areas framework and informed by a comprehensive review of specialist studies, project design information and baseline environmental and socio-economic conditions.

The findings confirm that the receiving environment is not neutral. Richards Bay functions as a highly industrialised, cumulatively burdened system, where existing air emissions, transport activity, industrial operations and socio-economic pressures already influence health outcomes. The assessment therefore does not consider the project in isolation, but evaluates its incremental contribution to an already complex exposure environment.

From an environmental health perspective, the most material pathway identified is air quality, driven by emissions associated with gas turbine operation and their interaction with an already stressed airshed. While the project's standalone contribution is limited, cumulative modelling demonstrates that ambient standards may be exceeded when all sources are considered collectively. This establishes air quality as a cumulative and population-level health risk, particularly affecting sensitive receptors such as children, the elderly and individuals with pre-existing health conditions.

Other health pathways, including traffic and injury risk, stormwater and contamination, hazardous materials exposure, occupational health risks and social determinants of health, have been assessed in detail and found to be manageable through appropriate engineering design, operational controls and management systems. These pathways are either event-driven, contained within operational boundaries, or influenced by broader socio-economic dynamics that extend beyond the direct control of the project.

Importantly, the assessment confirms that the project does not introduce fundamentally new or unknown health risks. Rather, it intensifies existing pathways within a defined industrial context. This distinction is critical, as it shifts the focus from risk identification to risk management and control, particularly in relation to cumulative exposure and system performance.

The mitigation measures identified in this report are practical, enforceable and aligned with the actual process flow of the plant, including combustion systems, cooling infrastructure, fuel handling, stormwater management and operational activities. When implemented effectively, these measures reduce the likelihood and severity of impacts to levels that are consistent with international good practice and regulatory expectations.

A key strength of this assessment is the integration of a monitoring and enforcement framework, which ensures that health risks are not only identified but actively managed over time. The inclusion of defined trigger levels, escalation pathways and corrective actions provides a robust mechanism for adaptive management, enabling the project to respond to changing conditions and prevent the escalation of impacts.

Residual impacts, following mitigation, are predominantly low to moderate, with air quality and social determinants remaining the most sensitive due to their cumulative and systemic nature. These residual risks are not unexpected within an industrialised environment and are considered manageable within the context of ongoing monitoring and control.

Overall, the assessment demonstrates that the proposed development can be integrated into the existing environment without resulting in unacceptable health outcomes, provided that operational discipline, monitoring and management systems are maintained at a high standard. The conclusions reached are supported by the available data, specialist inputs and established scientific understanding of environmental health risk.

The following section presents the formal Health Acceptability Statement, which articulates the final position of this assessment in relation to the proposed Project.

21 Final Health Acceptability Statement

21.1 Overall Determination

Based on the findings of this Community Health Impact Assessment, the proposed 750 MW CCGT Power Plant is considered:

- ACCEPTABLE WITH CONDITIONS from a community health perspective.

This determination is made following a comprehensive evaluation of project-specific health risks, cumulative environmental conditions within the Richards Bay industrial area, and the effectiveness of proposed mitigation and monitoring measures.

21.2 Basis for Acceptability

The assessment confirms that the project does not introduce fundamentally new or unmanageable health risk pathways. Instead, it contributes to the incremental intensification of existing environmental and social pressures, particularly within a cumulatively stressed airshed and industrial system.

The most material health risk pathway identified is air quality, where the project contributes to cumulative exposure conditions involving SO_2, NO_2 and particulate matter. While the project's standalone contribution is limited, the receiving environment is already characterised by elevated baseline conditions. As such, health risk is driven by cumulative exposure, rather than isolated emissions.

Other identified health pathways, including traffic and injury risk, stormwater and contamination, hazardous materials, occupational exposure and social determinants of health, are assessed as manageable, provided that appropriate controls are implemented and maintained. These risks are either:

- event-driven (e.g. spills, flooding, system failure),
- operationally contained (e.g. occupational exposure), or
- influenced by broader socio-economic conditions beyond the direct control of the project.

21.3 Conditions of Acceptability

The acceptability of the project is contingent upon the full and sustained implementation of mitigation measures, monitoring systems and enforcement mechanisms as defined in this report. In particular, the following conditions are critical:

- Air Quality Management: Emissions must be strictly controlled in accordance with Atmospheric Emission Licence requirements, with continuous monitoring and operational optimisation to ensure that the project does not contribute disproportionately to cumulative exceedance conditions.
- Cumulative Impact Management: The project must operate within the capacity of the receiving environment, recognising that baseline conditions are already stressed. Monitoring data must be interpreted in a cumulative context, and operational adjustments must be made where necessary.
- Stormwater and Contamination Control: Robust stormwater separation, containment systems and spill prevention measures must be implemented and maintained to prevent event-driven exposure pathways.
- Traffic and Safety Management: Effective traffic management measures must be implemented to minimise accident risk, particularly during construction and at interfaces with public road networks.
- Occupational Health and Safety: Comprehensive occupational health systems must be maintained to manage exposure to noise, heat, hazardous materials and confined space conditions.
- Social Management and Community Health: Programmes must be implemented to address labour influx, service pressure, health awareness (including HIV/STIs) and equitable distribution of project benefits.
- Monitoring and Enforcement: The monitoring framework must be implemented with clearly defined trigger levels, escalation procedures and corrective actions, ensuring that deviations from acceptable conditions are identified and addressed in real time.

21.4 Residual Risk Position

Following the implementation of mitigation measures, residual health impacts are assessed as:

- Moderate for air quality and social determinants (due to cumulative and systemic factors);
- Low to Moderate for traffic, occupational exposure and health system interaction;
- Low for all other pathways.

These residual risks are considered acceptable within the context of the existing industrial environment, provided that they are actively managed and do not escalate beyond predicted conditions.

The proposed Project is acceptable from a community health perspective on condition that it is actively managed as part of a cumulative system, rather than treated as an isolated development. The key determinant of acceptability is not compliance alone, but the project's ability to:

- control its incremental contribution to existing environmental burdens;
- prevent system failures that may result in acute exposure; and
- respond effectively to emerging risks through monitoring and adaptive management.

Based on the findings of this assessment, the proposed 750 MW CCGT Power Plant is considered acceptable from a community health perspective, subject to strict implementation of mitigation measures, adherence to all regulatory requirements, and ongoing monitoring and adaptive management.

This acceptability is conditional on maintaining compliance with Atmospheric Emission Licence limits, effective management of cumulative air quality contributions, prevention of system failure (particularly in relation to stormwater and hazardous materials), and implementation of social management measures.

Failure to implement these controls may result in elevated health risks; however, with full compliance and enforcement, the Project is not expected to result in unacceptable community health outcomes.

22 References

Agency for Toxic Substances and Disease Registry (ATSDR), 2012. Toxicological Profile for Carbon Monoxide. Atlanta: U.S. Department of Health and Human Services.

Agency for Toxic Substances and Disease Registry (ATSDR), 2016. Carbon Monoxide ToxFAQs. Atlanta: U.S. Department of Health and Human Services.

Andersen, R.M., 1995. Revisiting the Behavioral Model and access to medical care: does it matter? Journal of Health and Social Behavior, 36(1), pp.1–10.

Bird, T. 2017. Air Quality Impact Assessment for the Proposed Richards Bay Combined Cycle Power Plant.

Centers for Disease Control and Prevention (CDC), 2025. How Legionella Spreads. Atlanta: CDC.

Chipps J, Oosthuizen F, Buthelezi MB, et al. 2015. Knowledge, beliefs and mental treatment seeking practices of Black African and Indian outpatients in Durban, South Africa. African Journal for Physical, Health Education, Recreation and Dance, Supplement 1(1): 186–196.

Department of Health South Africa. 2014. Environmental Health Impact Assessment Guidelines for Development Projects.

Department of Mineral Resources and Energy (DMRE). 2019. Integrated Resource Plan for Electricity 2019. Pretoria.

Department of Mineral Resources and Energy (DMRE). 2019. Integrated Resource Plan for Electricity 2019.

Department of Trade, Industry and Competition (DTIC). 2021. Special Economic Zones Programme Overview.

Enviro-Acoustic Research CC, 2026. Noise Study for Environmental Impact Assessment for the Proposed Development of a 750 MW Combined Cycle Gas Turbine Power Plant near Richards Bay, KwaZulu-Natal. Prepared for Nemai Consulting.

GCS Water and Environment (Pty) Ltd, 2026. Hydrological Assessment for the EIA of the Proposed 750 MW Combined Cycle Gas Turbine Power Plant in Richards Bay. Prepared for Nemai Consulting.

Haskins L, House M, Bergström A, et al. 2017. Insights into health care seeking behaviour for children in communities in KwaZulu-Natal, South Africa. African Journal of Primary Health Care & Family Medicine.

International Agency for Research on Cancer (IARC), 2012. Diesel Engine Exhaust Carcinogenic. Lyon: World Health Organization.

International Finance Corporation (IFC), 2009. Introduction to Health Impact Assessment. Washington, DC: IFC.

International Finance Corporation (IFC). 2007. Environmental, Health, and Safety General Guidelines. World Bank Group, Washington, DC.

International Finance Corporation (IFC). 2009. Good Practice Note: Health Impact Assessment. Washington DC.

International Finance Corporation (IFC). 2009. Good Practice Note: Health Impact Assessment. Washington DC.

International Finance Corporation (IFC). 2009. Good Practice Note: Health Impact Assessment.

International Finance Corporation (IFC). 2009. Good Practice Note: Health Impact Assessment.

International Finance Corporation (IFC). 2009. Introduction to Health Impact Assessment. International Finance Corporation, Washington, DC.

International Finance Corporation (IFC). 2012. Performance Standards on Environmental and Social Sustainability. Washington DC.

International Finance Corporation (IFC). 2012. Performance Standards on Environmental and Social Sustainability. Washington DC.

International Finance Corporation (IFC). 2013. Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. International Finance Corporation, Washington, DC.

International Labour Organization (ILO). 2019. Occupational Safety and Health in Energy Production.

IPCC. 2022. Climate Change 2022: Mitigation of Climate Change.

Moonsamy A, et al. 2024. Cultural perspectives and experiences of mental healthcare in KwaZulu-Natal, South Africa. South African Journal of Occupational Therapy.

Moshabela, M., Zuma, T. and Gaede, B., 2017. Bridging the gap between biomedical and traditional health practitioners in South Africa. South African Health Review, 2017(1), pp.83–92.

National Institute for Occupational Safety and Health (NIOSH), 2016. Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments. Cincinnati: NIOSH.

National Institute for Occupational Safety and Health (NIOSH), 2026. Heat Stress and Workers. Cincinnati: NIOSH.

Nxumalo, N., Alaba, O., Harris, B., Chersich, M. and Goudge, J., 2011. Utilization of traditional healers in South Africa and costs to patients: findings from a national household survey. Journal of Public Health Policy, 32(S1), pp.S124–S136.

Peltzer, K., Preez, N.F.D., Ramlagan, S. and Fomundam, H., 2006. Use of traditional complementary and alternative medicine for HIV patients in KwaZulu-Natal, South Africa. BMC Public Health, 6(1), p.234.

Republic of South Africa, 2007. Traditional Health Practitioners Act (Act No. 22 of 2007). Pretoria: Government Printer.

Republic of South Africa. 2014. Special Economic Zones Act (Act No. 16 of 2014).

Richards Bay Industrial Development Zone (RBIDZ). 2023. RBIDZ Investment and Development Strategy.

Singh V, Raidoo DM, Harries CS. 2004. The prevalence, patterns of usage and people's attitude towards complementary and alternative medicine (CAM) among the Indian community in Chatsworth, South Africa. BMC Complementary and Alternative Medicine, 4:3.

South Africa. 2007. Traditional Health Practitioners Act 22 of 2007. Government Gazette.

uMoya-NILU Consulting (Pty) Ltd, 2024. Atmospheric Impact Report for the Proposed Mabasa Energy and Fuels 750 MW Combined Cycle Power Plant in Richards Bay. Prepared for Nemai Consulting.

United States Environmental Protection Agency (EPA). 2022. Health Effects of Nitrogen Oxides.

Winkler, M., Krieger, G., Divall, M., Singer, B., Utzinger, J. 2013. Untapped potential of health impact assessment. Bulletin of the World Health Organization.

World Bank Group. 2007. Environmental, Health and Safety Guidelines.

World Health Organization (WHO), 2013. WHO Traditional Medicine Strategy 2014–2023. Geneva: WHO.

World Health Organization (WHO), 2021. WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide. Geneva: WHO.

World Health Organization (WHO), 2021. WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide. Geneva: WHO.

World Health Organization (WHO), 2022. Legionellosis Fact Sheet. Geneva: WHO.

World Health Organization (WHO), 2022. Legionellosis Fact Sheet. Geneva: WHO.

World Health Organization (WHO). 2007. Legionella and the Prevention of Legionellosis.

World Health Organization (WHO). 2014. Health Impact Assessment: Main Concepts and Suggested Approach.

World Health Organization (WHO). 2014. Health Impact Assessment: Main Concepts and Suggested Approach. Geneva.

World Health Organization (WHO). 2014. Health Impact Assessment: Main Concepts and Suggested Approach. Geneva.

World Health Organization (WHO). 2014. Health Impact Assessment: Main Concepts and Suggested Approach.

World Health Organization (WHO). 2014. Health Impact Assessment: Main Concepts and Suggested Approach.

World Health Organization (WHO). 2018. Environmental Noise Guidelines for the European Region.

World Health Organization (WHO). 2021. WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2\cdot5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide. World Health Organization, Geneva.

World Health Organization (WHO). 2021. WHO Global Air Quality Guidelines.

World Health Organization Regional Office for Europe. 2018. Environmental Noise Guidelines for the European Region. WHO Regional Office for Europe, Copenhagen.

World Health Organization. 2013. WHO Traditional Medicine Strategy 2014–2023. Geneva: WHO.

Zuma T, Wight D, Rochat T, Moshabela M. 2016. The role of traditional health practitioners in rural KwaZulu-Natal, South Africa: generic or mode specific? BMC Complementary and Alternative Medicine, 16:304.

Appendix A: Specialist CV

Vumile Ribeiro

Director, Principal Environmental Consultant and Community Health Expert
Registered EAP No. 2019/1183



Address: 28 Shamrock Street, Ferndale Ext 3, Randburg 2194, Johannesburg
Email: vumile@niara.co.za
Contact No: +27 82 767 2786

EDUCATION AND QUALIFICATIONS

- BSocSc. (Geography and Environmental Management) University of KwaZulu Natal (2007)
- BSocSc. Hons. (Environmental Analysis and Management) University of Pretoria (2011)
- MPhil. (Environmental Law) University of Pretoria (current)

AFFILIATIONS

- Environmental Assessment Practitioners Association of South Africa (EAPASA)
- International Association of Impact Assessment South Africa (IAIASA)
- Public Health Association of South Africa (PHASA)
- Society of South African Geographers (SSAG)
- National Association for Clean Air (NACA)

YEARS OF EXPERIENCE

- 17 years

KEY COMPETENCIES

- Project Management
- Health Impact Assessments
- Community Health, Environmental Health

BIOGRAPHY

Vumile Ribeiro is the Director of Environmental Management Services at Niara Environmental Consultants (Pty) Ltd. Vumile has 18 years of professional and international experience in Environmental Assessment and Management primarily in the minerals resources and energy sector. Her roles include the operational management responsibilities of Niara Environmental Consultants, project management, report writing, client liaison, as well as business development.

Having worked for a multi-disciplinary advisory firms and environmental consultancies, Vumile has a competent understanding of the work effort and cross collaboration required for a successful multidisciplinary organisation. Vumile has been involved in a number of Environmental Impact Assessments and has a particular interest in health impacts assessments, water resource management, mining, energy and stakeholder engagement. Vumile has considerable experience across a range of developmental and environmental sciences and has worked in South Africa, Mozambique, Sierra Leone and Liberia and is familiar with Regulatory Environmental Legislation in other parts of Africa.

Vumile is very well versed in the IFC Environmental and Social Performance Standards (including IFC PS 2012) and the associated Equator Principles, which have informed the approach and standard for a number of ESIA processes that she has been involved in. Vumile is skilled at organising and driving effective project teams at a scale relevant to the project's requirements. She has technical experience and is able to quickly identify the most pertinent issues of a particular project whilst focussing on driving project success by rigorously implementing project management tools. Vumile's special interest areas involves understanding the systemic nature of factors that pose threats and opportunities in terms of establishing healthy, resilient communities, and exploring the use of various data types, approaches and methodologies to enable effective change.

- Legal Compliance Audits: Environmental / Health & Safety
- Environmental Control Officer
- Performance Assessments (Environmental Audits) on mine EMPrs
- Compliance Audits on Environmental Authorisations (e.g., ROD's, Water, Air and Waste Licenses)
- Consolidated Compliance Programmes
- Environmental Impact Assessments
- Basic Assessment Reports
- Mineral Law -Mining Rights and Permits
- Environmental Authorisation Applications
- Water Use License Applications
- Waste Management License Applications
- Co-ordinating and conducting Public Involvement processes.
- Social Assessment (Stakeholder and Social Analysis)
- Public Participation Process and Stakeholder consultation and mediation

COUNTRIES OF WORK EXPERIENCE

- Cameroon
- Democratic Republic of Congo
- Liberia
- Mozambique
- Sierra Leone
- South Africa
- Tanzania
- Zambia

LANGUAGES

English (excellent), Afrikaans (intermediate), siSwati (excellent), isiZulu (excellent) and Xhosa (excellent)

EMPLOYMENT HISTORY

June 2017 – present: Director: Environmental Management Services, Niara Environmental Consultants

March 2012 – May 2017: Environmental Consultant Human Sciences Department, Digby Wells Environmental, South Africa

January 2010 – December 2010: GIS Technician, Niara Environmental Consultants

October 2008 – October 2009: Client Service Executive, Ernst & Young

July 2007 – August 2008: GIS technician Capturer, Geospace International, (City of Tshwane Public Works and Infrastructure Development Department: Roads and Storm Water Division Project.)

April 2007 – July 2007: Mineral information Management Intern Department of Minerals and Energy, Mpumalanga Regional Office

EXPERIENCE HIGHLIGHTS

The below highlight key recent and relative project experience:

- Environmental Authorisation for Klipspruit Colliery – Inclusion of Pits S & G and Water Use License Application Process, Seriti Power (Pty) Ltd: Project Manager; Stakeholder Engagement Specialist
- Environmental Authorisation Application for The Springfield Colliery, Redan Siding and Vlakfontein Coal Mining Projects by Glubay Coal (Pty) Ltd in The District of Vereeniging and Meyerton, Gauteng: Health Impact Assessments and Social Impact Assessments: Social and Health Specialist and Reports Writer
- Graphit Kropfmühl - Community Impact Assessment for the GK Ancuabe Graphite Mine Graphit Kropfmühl Ancuabe Graphite Mine SA, Cabo Delgado Province Mozambique: Health Specialist and Report Writer
- Health Impact Assessment for the Mining Right Application for Iron Ore for Muhlava Mining on the Farms Berlyn 670 LT and Keulen 669 LT in Tzaneen, Limpopo Province, Titanium Mining (Pty) Ltd, Republic of South Africa: Health Specialist and Report Writer
- Nkomati Mine Closure Project: Community and Occupational Health Assessment Nkomati Joint Venture – a partnership between African Rainbow Minerals Limited and Norilsk Nickel Africa (Pty) Limited (Nkomati Mine
- Scoping EIA, Water Use License Application, Waste Management Licence Application for the Sasol Sigma Colliery Underground Ash Backfilling Project Sasol Mining (Pty) Ltd Republic of South Africa: Project Manager

Please consult the attached appendix for a comprehensive list detailing the project experiences undertaken.

APPENDIX A: PROJECT EXPERIENCE

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2012	Scoping EIA and Water Use License Application for the Bokoni Platinum Mine: Klipfontein Opencast Mining Operation	Bokoni Platinum Mines (Pty) Ltd Republic of South Africa	Project Administrator
2012	Amendment to City Deep EIA/EMP for the inclusion of Dump 3/L/40 and 3/L/42	Ergo Mining (Pty) Ltd Republic of South Africa	Project Assistant
2012	Community Health Baseline Study for Tonguma	Koidu Holdings Sierra Leone	Project Assistant / Report Writer
2012-2013	Community Health Impact Assessment for the Cooke Uranium Project re-mining of historic tailings facilities and establishment of a single large new Tailings Storage Facility for residual tailings	Gold One International Ltd Republic of South Africa	Health Specialist / Report Writer
2012-2013	Water Use Licence Compliance Audit	Ergo Mining (Pty) Ltd Republic of South Africa	Project Administrator
2013	Community Health Impact assessment for the Vedanta Power Plant and Associated Transmission Lines	Vedanta Zinc International Republic of South Africa	Health Specialist / Report Writer
2013	Community Health Impact Assessment for the Balama Graphite Mine	Syrah Resources Mozambique	Health Specialist / Report Writer
2013	Community Health Impact Assessment for the Putu Iron Ore Project	Atkins Global, Grand Gedeh County, Liberia	Project assistant for Health Impact Assessment
2013	Prospecting Right Application and Environmental Management Program Compilation for the St. Agnesfontein	Glenover Phosphate (Pty) Ltd / FermineOre, Republic of South Africa	Project Administrator
2013-2014	Scoping EIA, Water Use License Application, Waste Management Licence Application for the Sasol Sigma Colliery Underground Ash Backfilling Project	Sasol Mining (Pty) Ltd Republic of South Africa	Project Manager
2013-2014	Basic Assessment Report, Scoping EIA, Water Use License Application for the Sasol Syferfontein Block 4 Expansion Project	Sasol Mining (Pty) Ltd Republic of South Africa	Project Administrator
2013-2014	Community Health Impact Assessment for the Platreef underground platinum mine operation	Platreef Resources (PTY) Ltd Republic of South Africa	Health Specialist / Report Writer
2014	Submission of revised Environmental Impact Assessment and Environmental Management Programme for the Trichardtsfontein Project	Glencore Operations South Africa (Pty) Ltd, Republic of South Africa	Project Administrator / Report Co-author

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2014	Amendment to the Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4	Glencore Operations South Africa (Pty) Ltd, Republic of South Africa	Project Administrator / Report Co-author
2014	Community Impact Assessment for the proposed Kamiesberg heavy mineral sands mine Project	Zirco Roode Heuwel (Pty) Ltd Republic of South Africa	Health Specialist / Report Writer
2014	Community Impact Assessment for the proposed Tenge Iron Ore Project	Capitol Resources Limitada –subsidiary of Baobab Resources Plc, Mozambique	Health Specialist / Report Writer
2015	Integrated Water Use Licence Application and Integrated Waste Water Management Plan for the proposed Klipspruit Extension: Weltevreden	BHP Billiton Energy Coal South Africa Limited, Republic of South Africa	Project assistant for the WULA and IWWMP
2015	Integrated Water Use Licence Application for the proposed Middelburg – Mhluzi Powerline Project	Eskom SOC Holdings Limited Republic of South Africa	Project Manager / Report Writer for the WULA
2015	Community Health Impact Assessment for the proposed open-pit magnetite mine and concentrator plant	Pamish Investments No. 39 (Pty) Ltd Republic of South Africa	Health Specialist / Report Writer
2015	Environmental and Social Impact Assessment for the Proposed Nachu Graphite Project	Magnis Resources T/A Uranex Tanzania Ltd, Ruangwa District, Lindi Region Tanzania, East Africa	Health Impact Assessment Report Reviewer
2015	Integrated Water Use Licence Application and Integrated Waste Water Management Plan for the Lanxess Chrome Mine	Lanxess Mining (Pty) Ltd Republic of South Africa	Report Writer for the WULA and IWWMP
2015	De Groote Boom Mining Permit Application: Prescribed Environmental Management Programme	De Groote Boom Minerals (Pty) Ltd Republic of South Africa	Project Administrator and Report Writer
2015	Environmental Impact Assessment and Environmental Management Programme Report for the Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province	Glencore Operations South Africa (Pty) Ltd	Report Compiler
2015	Water Use Licence Application for the Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province	Glencore Operations South Africa (Pty) Ltd, Republic of South Africa	Report Writer for the WULA and IWWMP

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2015	Community Impact Assessment for the GK Ancuabe Graphite Mine	Graphit Kropfmühl Ancuabe Graphite Mine SA, Cabo Delgado Province Mozambique	Project Manager / Health Specialist / Report Writer
2015	Water Use Licence Application for the Proposed Roodekop Wetland Offset and Compensation Strategy Project	Universal Coal Development IV (Pty) Ltd Republic of South Africa	Report Writer for the WULA and IWWMP
2015	Water Use Licence Application for the proposed Lambda Substation near Volksrust, Mpumalanga and Associated 2 x 400kV & 2 x 765kV Loop in Transmission Line Project	Eskom SOC Holdings Limited Republic of South Africa	Project Manager
2016	Klipspruit Extension: Motivation for The Drilling Of Exploration Holes Within A Wetland	South32 Sa Coal Holdings (Pty) Ltd	Project Administrator / Report Writer
2016	Namane Generation Independent Power Producer and Transmission Line Project, near Lephalale, Limpopo	Namane Generation (Pty) Ltd	Health Specialist
2016	Risk Assessment and Associated General Authorisation for the Proposed KPSX Northern Bypass, in Mpumalanga	South32 SA Coal Holdings (Pty) Limited	Project Manager and Report Writer
2016	Environmental and Social Impact Assessment for the Massawa and Sofia Gold Project, Senegal	Randgold Resources Limited	Health Specialist
2016	Proposed Reclamation of the Grootvlei Tailings Storage Facilities Cluster, near Springs, Gauteng	Ergo Mining (Pty) Ltd Republic of South Africa	Health Specialist
2017	Environmental and Social Impact Assessment for the Proposed Ntem Iron Ore Project, in Cameroon: Health Impact Assessment Report	Caminex SA, Cameroon	Health Specialist
2017	Water Use Licence for the Proposed Pit H and Associated Infrastructure at KPSX: Weltevreden and KPSX: South Operations, in Mpumalanga	South32 SA Coal Holdings (Pty) Limited, Republic of South Africa	Project Manager and Report Writer
2017	Risk Assessment and Associated General Authorisation for the Proposed Substation and 132kV Power Lines in Ogies, Mpumalanga	Eskom Holdings SOC Limited, Republic of South Africa	Project Manager and Report Writer
2017	Wetlands Risk Assessment and Associated General Authorisation for the Proposed Geotechnical Drilling Project at Khutala Colliery, in Mpumalanga	South32 SA Coal Holdings (Pty) Limited, Republic of South Africa	Project Manager and Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2017	Community Health Impact Assessment for the Proposed Phase 2 KwaMathukuza Housing Development in KwaMathukuza, Newcastle, KwaZulu-Natal	Phumaf Consulting Engineers, Republic of South Africa	Project Manager and Report Writer
2017	Odour Survey / Assessment for the Proposed Phase 2 KwaMathukuza Housing Development in KwaMathukuza, Newcastle, KwaZulu-Natal	Phumaf Consulting Engineers, Republic of South Africa	Project Manager and Report Writer
2017	Health Impact Assessment for the Mining Right Application for Iron Ore for Muhlava Mining on the Farms Berlyn 670 LT and Keulen 669 LT in Tzaneen, Limpopo Province	Titanium Mining (Pty) Ltd, Republic of South Africa	Project Manager and Report Writer
2017	Emakhazeni Coal Mining Project in the Eastern Basin Coalfield, Mpumalanga Province	Umsimbithi Mining (Pty) Ltd, Republic of South Africa	Health Specialist
2017	Odour Impact Survey for the Proposed Phase 2 KwaMathukuza Housing Development in KwaMathukuza, Newcastle, KwaZulu-Natal	Phumaf Consulting Engineers, Republic of South Africa	Project Manager and Report Writer
2018	Renewal of an Existing Integrated Water Use License for Vlakfontein Mine: Central Block, Ogies in Mpumalanga Province	African Exploration Mining and Finance Corporation SOC Limited (AEMFC)	Project Manager and Report Writer
2018	2017 IWWMP Update and Amendment for Eskom Lethabo Power Station in Free State	Eskom Holdings SOC Limited	Project Manager and Report Writer
2018	East Block External Integrated Water Use License Audit at Vlakfontein Mine, Ogies in Mpumalanga Province	African Exploration Mining and Finance Corporation SOC Limited (AEMFC)	Project Manager and Report Writer
2018	Waste Management License Application for NN Metals proposed listed activities of the scrap metal recycling operation located at 300 Mundt Street on Waltloo township ERF 110 in Pretoria within the City of Tshwane Metropolitan Municipality	NN Metals (Pty) Ltd, Pretoria, Republic of South Africa	Project Manager and Report Writer
2018	Community Health Impact Assessment for The Development of the Proposed Leslie 1 Coal Mining Project, near Leandra, Mpumalanga Province	Anglo Operations (Pty) Ltd and Leslie Coal Mine (Pty) Ltd	Health Specialist
2018	The Development of the Proposed Transformer Manufacturing, Repairing and Testing Facility at Portion 189 of the Farm Zandfontein 317JR, Kirkney Industrial Township, Pretoria West: Health Impact Assessment	Contipower (Pty) Ltd	Health Specialist

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2018	Elandsfontein Colliery: Oosbank Coal Siding Draft Environmental Management Programme	Anker Coal, Elandsfontein Colliery (Pty) Ltd	Project Manager and Report Writer
2018	Elandsfontein Colliery (Pty) Ltd: Elandsfontein Mine Integrated Water and Waste Management Plan Annual Update: 2018	Anker Coal, Elandsfontein Colliery (Pty) Ltd	Project Manager and Report Writer
2018	Rehabilitation, Decommissioning and Mine Closure Plan for the Proposed Woestalleen Holdings (Pty) Ltd Coal Mine in Middelburg, Mpumalanga Province	Woestalleen Holdings (Pty) Ltd	Project Manager and Report Writer
2019	Elandsfontein Colliery: Performance Assessment Audit Report on MP 63 MR Environmental Management Programme	Anker Coal, Elandsfontein Colliery (Pty) Ltd	Project Manager and Report Writer
2019	Community Health Impact Assessment The Development of the Proposed Matai Mining Project in Mankwe District, North West Province	Matai Mining (Pty) Ltd	Project Manager and Report Writer
2019	Social Impact Assessment The Development of the Proposed Matai Mining Project in Mankwe District, North West Province	Matai Mining (Pty) Ltd	Project Manager and Report Writer
2019	Health Impact Assessment Report The Development of the Proposed Panfontein Mining Project in the Magisterial District of Vereeniging, Gauteng Province	Richtrau 253 (Pty) Ltd	Project Manager and Report Writer
2019	Socio-economic Impact Assessment Report The Development of the Proposed Panfontein Mining Project in the Magisterial District of Vereeniging, Gauteng Province	Richtrau 253 (Pty) Ltd	Project Manager and Report Writer
2019	Elandsfontein Colliery (Pty) Ltd: Elandsfontein Mine Integrated Water and Waste Management Plan and RSIP Annual Update: 2019	Anker Coal, Elandsfontein Colliery (Pty) Ltd	Project Manager and Report Writer
2019	Vlakfontein Colliery Financial Provision Assessment: 2019	African Exploration Mining and Finance Corporation (SOC) Ltd (AEMFC)	Project Manager and Report Reviewer
2019	Inyanda Coal Mine Integrated Water and Waste Management Plan Update: 2019	Inyanda Mining Holdings (Pty) Ltd	Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2019	Inyanda Coal Mine Rehabilitation Strategy and Implementation Plan	Inyanda Mining Holdings (Pty) Ltd	Report Writer
2019	Health Risk Assessment for The Proposed Residential Development on Various Portions of The Farm Rooikoppies 297-JQ	Seaton Thomson and Associates Cc	Specialist and Report Writer
2019	Application for Environmental Authorisation and A Change of Land Use for the Proposed Musina-Makhado Special Economic Zone (SEZ) in the Limpopo Province Health Impact Assessment Report	Limpopo Economic Development Agency (LEDA)	Specialist and Report Writer
2019	Integrated Environmental Authorisation Process for the Proposed Weltevreden Mining Right Application, Socio-economic Impact Assessment Report	Saldomate (Pty) Ltd	Specialist and Report Writer
2019	Integrated Environmental Authorisation Process for the Proposed Wildebeestfontein Mining Right Application, Socio-economic Impact Assessment Report and Social and Labour Plan	Opsirex (Pty) Ltd	Specialist and Report Writer
2020	Proposed Aggregate and Gravel Mining in Bizana, Eastern Cape: Social and Labour Plan	Ilitye Industrial (Pty) Ltd	Specialist and Report Writer
2020	Integrated Water Use Licence Application and IWWMP: Inyanda Coal Mine Rehabilitation Strategy and Implementation Plan	Inyanda Mining Holdings (Pty) Ltd	Report Writer
2020	Integrated Water Use Licence Application and IWWMP: The Development of the Proposed Panfontein Mining Project in the Magisterial District of Vereeniging, Gauteng Province	Richtrau 253 (Pty) Ltd	Project Manager and Report Writer
2020	Integrated Environmental Authorisation Process for the Proposed Van Oudshoornstroom Mining Right Application: Socio-economic Impact Assessment Report	Estate Late Philippus Christoffel Johannes De Jager	Specialist and Report Writer
2020	Nkomati Mine Closure Project: Community and Occupational Health Assessment	Nkomati Joint Venture – a partnership between African Rainbow Minerals Limited and Norilsk Nickel Africa (Pty) Limited (Nkomati Mine	Specialist and Report Writer
2020	Social Impact Assessment Report for the Development of the Proposed Zelpy Kafferskraal Mining Right Application	Zelpy Gold Mine (Pty) Ltd	Specialist and Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2020	Health Impact Assessment Report for the Development of the Proposed Zelpy Kafferskraal Mining Right Application	Zelpy Gold Mine (Pty) Ltd	Specialist and Report Writer
2020	Environmental Authorisation and Water Use Licence Application for The Electrisurv Cc Beneficiation Plant	Electrisurv Surveying CC	Project Manager and Reports Writer
2020	Mining Right Application of the Proposed Springfield Opencast Colliery, near Meyerton & Vereeniging in the Gauteng Province: Health Impact Assessment	Glubay Coal (Pty) Ltd, an affiliated company of Canyon Resources (Pty) Ltd	Specialist and Report Writer
2020	Koppie Canyon Mining Right Application near Hendrina, Mpumalanga: Social Impact Assessment Report and Social and Labour Plan	Canyon Resources (Pty) Ltd	Specialist and Report Writer
2020	Risenga Colliery Water Use Licence Application: Integrated Water and Waste Management Plan	SARMCO Group (Pty) Ltd	Project Manager and Report Writer
2021	Integrated Water and Waste Management Plan (IWWMP) for the Proposed Samara Prospecting Right near Barkley West, Northern Cape	Samara Mining (Pty) Ltd	Specialist and Report Writer
2021	Social Impact Assessment Report and Social and Labour Plan for the Development of the Lakeside Colliery S102 Amendment	Zomhlaba Resources (Pty) Ltd	Specialist and Report Writer
2021	Social Impact Assessment Report and Social and Labour Plan for the Development of the Leeuwfontein Colliery S102 Amendment	Zomhlaba Resources (Pty) Ltd	Specialist and Report Writer
2021	Health Impact Assessment Report for the Development of the Proposed Ericure Dannhauser Coal Project	Ericure (Pty) Ltd	Specialist and Report Writer
2021	Application for Environmental Authorisation and Water Use Licence Application for the Proposed Middelburg Mining Services (MMS) Boschmanskrans Section Implementation of Wetland Mitigation and Offset Strategy: Social Impact Assessment	South32 SA Coal Holdings (Pty) Limited: South Africa Energy Coal	Specialist and Report Writer
2021	Application for General Authorisation: Ifalethu Colliery, Middelburg, Mpumalanga	South32 SA Coal Holdings (Pty) Limited: South Africa Energy Coal	Specialist and Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2021	Application for Environmental Authorisation and Water Use Licence Application for the Proposed Middelburg Mining Services (MMS) Boschmanskrans Section Implementation of Wetland Mitigation and Offset Strategy: Water Use Licence Application	South32 SA Coal Holdings (Pty) Limited: South Africa Energy Coal	Specialist and Report Writer
2021	Social Impact Assessment for the Proposed Farm Marsh Lusern and Hydroponics Systems Project: Social Impact Assessment	Sishen Iron Ore Company (Pty) Ltd	Specialist and Report Writer
2021	Environmental Regulatory Process Required for the Proposed Wolvekrans Colliery Boschmanskrans Section Mining Extension Project Wetland Mitigation and Offset Strategy near Middelburg, Mpumalanga	South32 SA Coal Holdings (Pty) Ltd	Project Manager
2021	Water Use Licence Application for the Proposed Wolvekrans Colliery Boschmanskrans Section Mining Extension Project Wetland Mitigation and Offset Strategy	South32 SA Coal Holdings (Pty) Ltd	Specialist and Report Writer
2021	Social Impact Assessment for the Proposed Wolvekrans Colliery Boschmanskrans Section Mining Extension Project Wetland Mitigation and Offset Strategy	South32 SA Coal Holdings (Pty) Ltd	Specialist and Report Writer
2021	Environmental Impact Assessment and IWUL for the Proposed Ikwezi Vanadium Mine, near Northam	Ikwezi Mining (Pty) Ltd	Project Manager
2021	Social Impact Assessment and IWUL for the Proposed Ikwezi Vanadium Mine, near Northam	Ikwezi Mining (Pty) Ltd	Specialist and Report Writer
2021	Integrated Environmental Authorisation Process for The Proposed Aangewys Coal Mine Mining Right Application: Social Impact Assessment	National Treasure Minerals (Pty) Ltd	Specialist and Report Writer
2021	Social and Labour Plan for The Proposed Straffontein Colliery Mining Right Application	Mnambithi Mining (Pty) Ltd	Specialist and Report Writer
2021	Integrated Environmental Authorisation Process for The Proposed Straffontein Colliery Mining Right Application: Social Impact Assessment	Mnambithi Mining (Pty) Ltd	Specialist and Report Writer
2021	Environmental Authorisation and Water Use Licence Application for The Construction of the Doornpoort Pumping Main and Pump Station Project	eMalahleni Local Municipality	Project Manager and Report Writer
2021	Environmental Audit Report for Sekoko Coal – 2021	M3P Mining (Pty) Ltd	Project Manager

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2021	Environmental Authorisation required for Prospecting Right Application on various Portions of the Farm Schaapkopje 194 HT, 5km North of Vryheid Town in the AbaQulusi Local Municipality, KwaZulu Natal	Tuutuuka Resources (Pty) Ltd	Project Manager and Report Writer
2021	Basic Assessment Process and Water Use Licence Application for the Alignment of the Klipspruit Colliery Environmental Management Programme for Klipspruit Colliery, Mpumalanga Province	Seriti Power (Pty) Ltd	Project Manager and Report Writer
2022	Social and Labour Plan for The Proposed Roodepoort Coal Mine	Roodepoort Coal (Pty) Ltd	Specialist and Report Writer
2022	Social Impact Assessment for The Proposed Roodepoort Coal Mine on Farm Roodepoort 40 Is Portion 15, Nkangala District Municipality Within the EMalahleni Local Municipality, Mpumalanga Province	Roodepoort Coal (Pty) Ltd	Specialist and Report Writer
2022	Social and Labour Plan for Kleinwater Colliery	Madini Mining (Pty) Ltd	Specialist and Report Writer
2022	Social Impact Assessment for the Section 102 Amendment in Respect of Portions 2, 8, 9 of the Farm Kleinwater 301 JS, Portions 11, 39, 40 Of the Farm Doornrug 302 JS, and the Remaining Extent of the Farm Rondebult 303 JS, eMalahleni Local Municipality, Mpumalanga	Madini Mining (Pty) Ltd	Specialist and Report Writer
2022	Health Impact Assessment for the Proposed Nellmapius Extension 26 Township on Various Portions of The Farm Hatherley 331 JR, City of Tshwane Metropolitan Council	Tambura 69 Trust	Specialist and Report Writer
2022	Environmental Impact Assessment (EIA) and Water Use Licence Application for The Grootlaagte Opencast Mine Mining Right Application Situated in The Steve Tshwete Local Municipality, Nkangala District Municipality in Mpumalanga	Arnot OpCo (Pty) Ltd	Project Manager and Report Writer
2022	Basic Assessment Process and Water Use Licence for The Proposed Upgrade of Weltevreden Wetland Interventions	Seriti Power (Pty) Ltd	Project Manager and Report Writer
2022	Social Impact Assessment for the Blesboklaagte S102 EA IWUL and WL	Eyethu Coal (Pty) Ltd	Specialist and Report Writer
2022	Environmental Authorisation for Klipspruit Colliery - Pit H: Regulation 31 Amendment and Water Use License Application	Seriti Power (Pty) Ltd	Project Manager and Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2022	Social Impact Assessment for the proposed Wonderhoek Open Cast Coal Mine near Middelburg, Mpumalanga Province	Wonderhoek Colliery (Pty) Ltd	Specialist and Report Writer
2022	Community Health Impact Assessment for the proposed Interwaste Brakkefontein Waste Management Facility near Atlantis, Western Cape	SLR Consulting on behalf of Interwaste (Pty) Ltd	Specialist and Report Writer
2022	Community Health Impact Assessment for the proposed Wonderhoek Open Cast Coal Mine near Middelburg, Mpumalanga Province	Wonderhoek Colliery (Pty) Ltd	Specialist and Report Writer
2022	Community Health Impact Assessment for the proposed Schurvekop Underground Coal Mine near Bethal in Mpumalanga	Mmakau Coal (Pty) Ltd	Specialist and Report Writer
2022	Public Participation Process in Support of the Queenstown Quarry S102 Amendment Process, Eastern Cape	Raumix Aggregates, a subsidiary of Raubex Group Ltd	PPP and Stakeholder Engagement Specialist
2022	Community Health Impact Assessment for the proposed Arengo Iron-Ore Project	Arengo 297 (Pty) Ltd	Specialist and Report Writer
2022	Water Use Licence Application and Associated Specialist Studies for the proposed Idwala Coal Mine	Idwala Coal Mine (Pty) Ltd	Specialist and Report Writer
2022	Rapid Appraisal Health Impact Assessment for the Proposed Platinum Pride Crematorium in Cape Town	Sharples Environmental Services cc (SES)	Specialist and Report Writer
2022	Rapid Appraisal Health Impact Assessment for the Proposed Construction and Operation of a Cement Grinding Facility and Storage of Dangerous Goods Located in Blackheath Within the City of Cape Town Municipality	Cemza Coastal (Pty) Ltd	Specialist and Report Writer
2022	Environmental Authorisation for Klipspruit Colliery – Inclusion of Pits S & G and Water Use License Application Process	Seriti Power (Pty) Ltd	Project Manager; Stakeholder Engagement Specialist
2022-2023	ZNT 03 EDTEA 2021/2022 KwaZulu-Natal Air Quality Management Plan Draft Air Quality Management Plan – Provincial Stakeholder Engagement / PPP	Kwazulu-Natal: Department of Economic Development, Tourism and Environmental Affairs	PPP and Stakeholder Engagement Specialist

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2023	Community Health Impact Assessment for the proposed Holfontein Waste Management Facility Expansion Project	EnviroServ Waste Management (Pty) Ltd	
2023	Social Impact Assessment for the Proposed Highbury Mining Right Application in the Magisterial District of Port Shepstone in the Ray Nkonyeni Local Municipality, KwaZulu Natal Province	SA Lithium (Pty) Ltd	Specialist and Report Writer
2023	Environmental Authorisation Process for the proposed Pivaanspoort Prospecting Right Application in Vryheid, KwaZulu-Natal	Pivaanspoort Mining (Pty) Ltd	PPP and Stakeholder Engagement Specialist
2023	Rapid Appraisal Health Impact Assessment for the Proposed Housing Development on Erf 43937 in Colorado Park, Mitchell's Plain	The City of Cape Town (CoCT) Metropolitan Municipality	Specialist and Report Writer
2023	Health Impact Assessment for the Proposed Highbury Mining Right Application in the Magisterial District of Port Shepstone in the Ray Nkonyeni Local Municipality, KwaZulu Natal Province	SA Lithium (Pty) Ltd	Specialist and Report Writer
2023	Public Participation Process for the proposed Wonderhoek Open Cast Coal Mine near Middelburg, Mpumalanga Province	Wonderhoek Colliery (Pty) Ltd	PPP and Stakeholder Engagement Specialist
2023	Environmental Authorisation Application for The Vlakfontein Coal Mining Project by Glubay Coal (Pty) Ltd in The District of Vereeniging and Meyerton, Gauteng: Health Impact Assessment	Glubay Coal (Pty) Ltd	Specialist and Report Writer
2023	Community Health Impact Assessment for the Proposed Multisand General Waste Management Facility Project	Multisand (Pty) Ltd	Specialist and Report Writer
2023	Seriti MMS Environmental Management Programme (EMPr) Consolidation	Seriti Coal (Pty) Ltd	Project Manager and Report Writer
2023	Randfontein Estates Limited: Doornkop Underground Mining Operations Water Use Licence Application (WU29548) and Associated Specialist Studies	Randfontein Estates Limited (a subsidiary of Harmony Gold Mining Company Limited)	Project Manager, Report Compiler and Reviewer
2023	Klipspruit Extension EIA and WUL: Alignment from opencast to underground	Seriti Coal (Pty) Ltd	Project Manager, Report Compiler and Reviewer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2023	Integrated Environmental Authorisation Process for the Proposed Coastal Fuels: Alkmaar Mining Right Application: Social Impact Assessment	Coastal Fuels	Specialist and Report Writer
2023	Environmental Authorisation Application for The Redan Siding Project by Glubay Coal (Pty) Ltd in The District of Vereeniging and Meyerton, Gauteng: Health Impact Assessment	Glubay Coal (Pty) Ltd	Specialist and Report Writer
2023	Environmental Services for the Upgrade of N11 Section 3 from Newcastle South (KM 50.00) to Ncandu River (KM 57.20) in KwaZulu-Natal Province: Socio-Economic Impact Assessment	South African National Roads Agency SOC Ltd	Specialist and Report Writer
2023	Health Impact Assessment for the Proposed Manganese Slag Processing Plant and Associated Infrastructure in eMalahleni,	Zonglin Resources (Pty) Ltd	Specialist and Report Writer
2023	Community Health Impact Assessment for the Shiva Uranium Mine in the North West Province	Industrial Development Corporation of South Africa Limited (IDC)	Specialist and Report Writer
2023	Health Impact Assessment for the Proposed Samancor TC Smelter Plant: Addition of Two 70 MW Furnaces	Samancor Terris Chrome Smelters Ltd (Pty)	Specialist and Report Writer
2023	Environmental Control Officer Services for Water Conservation and Demand Management in Standerton	Gert Sibande District Municipality	Specialist and Report Writer
2023	Community Health Impact Assessment for the proposed for the proposed Orkney Wize Decline Project in Orkney, North West Province	China Africa Precious Metal (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment for the proposed Bengwenyama Underground Mining Project in the Sekhukhune District Municipality, Limpopo	Miracle Upon Miracle Investments (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment for the Proposed the Development of Coal Mine within Abaqulusi Local Municipality of Zululand District Municipality, KwaZulu Natal Province	Amora Properties (Pty) Ltd	Specialist and Report Writer
2024	External Environmental Audits for MMS (EMPRs, WULS, and WML Audits)	Seriti Power (Pty) Ltd	Specialist and Report Writer
2024	Seriti MMS General Authorisation for Exploration Drilling on Portions 15 and 16	Seriti Power (Pty) Ltd	Specialist and Report Writer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2024	Social Impact Assessment Study for the proposed Palmietfontein Mining Right Application, in the Moses Kotane Local Municipality	Palm Chrome (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment Study for the Izimbiwa Coal Banana Republic (Rietfontein Colliery) S102 Amendment Process, near Middelburg, Mpumalanga	Izimbiwa Coal (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment Study for the Izimbiwa Coal Townlands (Uitkyk Colliery) S102 Amendment Process, near Middelburg, Mpumalanga	Izimbiwa Coal (Pty) Ltd	Specialist and Report Writer
2024	Social and Labour Plan for the proposed Palmietfontein Mining Right Application, in the Moses Kotane Local Municipality	Palm Chrome (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment for the proposed Samancor Western Chrome Mine, near Mooinooi, in the North West Province	Samancor Chrome (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment for the Ivanplats Application for Integrated Environmental Authorisation for the proposed Dry Stack TSF Project	Ivanplats (Pty) Ltd	Specialist and Report Writer
2024	Public Participation Process/ Stakeholder Engagement for the Ivanplats Application for Integrated Environmental Authorisation for the proposed Dry Stack TSF Project	Ivanplats (Pty) Ltd	Specialist and Report Writer
2024	Social Impact Assessment for the proposed Fuleni Mining Project within King Cetshwayo District Municipality, uMfolozi Municipality, Kwa-Zulu Natal Province	Imvukuzane Resources (Pty) Ltd	Specialist and Report Writer
2024	Kusasalethu Deelkraal Water Use Licence and GN 704 Audits	Harmony Gold Mining Company Limited	Specialist and Report Writer
2024	Health Impact Assessment for the proposed Fuleni Mining Project within King Cetshwayo District Municipality, uMfolozi Municipality, Kwa-Zulu Natal Province	Imvukuzane Resources (Pty) Ltd	Specialist and Report Writer
2024	Health Impact Assessment for the proposed Underground Expansion Project at East and West Mines for Tharisa Minerals Near Marikana, North West Province	Tharisa Minerals (Pty) Ltd	Specialist and Report Writer
2024	Community Health Impact Assessment for the Proposed Minetek Resources Newcastle Coal Mine Project, Newcastle, KwaZulu-Natal	Minetek Resources (Pty) Ltd	Specialist and Report Reviewer

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2025	Community Health Impact Assessment for the Proposed Hiryo Plant (Ammonia Manufacturing) Project, Located on a Portion of Portions 6 and 50 of the Farm Vlaklaagte 45 IS, near Kriel, Mpumalanga Province	Suiso (Pty) Ltd	Specialist and Report Writer
2025	Health Impact Assessment for the Proposed for the Proposed Metallurgical Projects in the Musina-Makhado Special Economic Zone (MMSEZ)	Gudani Consulting (Pty) Ltd	Specialist and Report Writer
2025	Community Health Impact Assessment for the Proposed Development of a 10784 - 750MW Combined Cycle Gas Turbine Power Plant in Richards Bay	Mabasa Energy Fuels (Pty) Ltd	Specialist and Report Reviewer
2025	Community Health Impact Assessment Study for the Proposed CEN Manganese and Iron ore Storage and Conveyor Facility near Newlyn Saldanha Bay, Western Cape	CEN Integrated Environmental Management Unit	Specialist and Report Writer

Environmental Assessment Practitioners Association of South Africa

Registration No. 2019/1183

Herewith certifies that

VUMILE CELIWE RIBEIRO

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

EAPASA
Unit 19 Oxford Office Park
3 Bauhinia Street
Highveld Techno Park
Centurion
0157
Tel. (+27) 12 880 2154

Email: registrar@eapasa.org / Website: www.eapasa.org

Environmental Assessment Practitioners Association of South Africa
Advancing environmental assessment practice in South Africa

Mrs Vumile Ribeiro
28 Shamrock Street
Ferndale
Randburg
2194

Sent by email to: vumile@niara.co.za

Dear Mrs Ribeiro

Registered Environmental Assessment Practitioner: Number 2019/1183
Vumile Celiwe Ribeiro : South African ID 8605090831080

The Environmental Assessment Practitioners Association of South Africa (EAPASA) herewith certifies that Vumile Celiwe Ribeiro is a Registered Environmental Assessment Practitioner (EAP) in accordance with the prescribed criteria of Regulation 15.(1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Your registration is duly authorised by EAPASA as the single Registration Authority for EAPs in South Africa (appointed as per Regulation No. 104, Gazette No. 41434 of 8 February 2018, in terms of section 24H(3)(a) of the NEMA). Your status as a Registered EAP is displayed in the 'EAP Register' - please find your name and contact email address at

https://registration.eapasa.org/registered-practitioners

Your registration is effective for a period of five years from 08 February 2024, and expires on 08 February 2029. The renewal of your registration in 2029 will be contingent on you having met the requirements of EAPASA's Continuing Professional Development (CPD) policy during each year of registration.

As a Registered EAP you are required to uphold the EAPASA Code of Ethical Conduct and Practice in your professional endeavours, towards the goal of quality assurance in environmental assessment practice.

Please accept my congratulations on your registration.

Best regards

Dr Patrick Sithole
Registrar
Date: 08 February 2024

Board Members: Ms Snowy Makhudu (Chairperson), Dr Khangwelo Desmond Musetsho (Vice-Chairperson),
Mr Zama Dlamini, Ms Jacqui Hex, Ms Minnette Le Roux, Ms Thato Moeeng,
Ms Jennifer Molwantwa, Mr Phumudzo Nethwadzi, Mr Danie Neumann,
Mr Khathutshelo Tshipala, Ms Letlhogonolo Tungamirai
Registrar: Dr Patrick Sithole
NPO Reg. No. 122-986

iap2 international association for public participation SOUTHERN AFRICA

This is to certify that

Vumile Ribeiro

is a member of the

INTERNATIONAL ASSOCIATION FOR PUBLIC PARTICIPATION

for the year

2026

Membership Number
IAP2SA180

David Morema
Chairperson

IAIAsa
Tel +27 (0)101 406 513
Cell +27 (0)82 961 5750

Address:
CUBE Workspace
1 Wedgewood Link Road
Bryanston
JHB

Email: operations@iaiasa.co.za

Website: www.iaiasa.co.za

IAIAsa Confirmation of Membership: 2026/2027
Vumile Ribeiro | Membership no: 5925

TO WHOM IT MAY CONCERN

Vumile Ribeiro, Niara Environmental Consultants (IAIAsa membership Number 5925) is a paid-up Full Member in good standing of the South African Affiliate of the International Association for Impact Assessment and has been a member of IAIAsa since Thursday, March 1, 2018.

Membership has been continous from Thursday, March 1, 2018 to date.

This membership is valid from 01 March 2026 to 28 February 2027.

IAIAsa is a voluntary association and is not a statutory body regulating the profession. Its members are expected to abide by the association code of ethics which is available on our website.

Any Individual conducting activities governed by the National Environmental Management Act 1998 (Act 107 of 1998) (NEMA) is required to be registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Any practicing natural scientist is required to be registered in terms of the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003) (Sections 18 (1) and 20(2)(a) with the South African Council for Natural Scientific Professions (SACNASP) in the relevant field of practice for the specialist work conducted.

IAIAsa is an Affiliate of IAIA which is an international body through a memorandum of understanding. IAIA is not responsible or liable for the actions or activities of the Affiliates. Membership of one does not imply membership of the other.

Any enquiries regarding this membership may be directed to the Secretariat at the above contact details.

Yours sincerely



Zama Mkhize-Pila
President 2025/2026

President: Z. Mkhize, Past President: C. Niemandt, President Elect: T. Mutshatshi, Secretary: B. Mthembu, Treasurer: M. Vawda.
Members: H. Antonopoulos, T. Hokinyane, O. Mafika, J. Minnaar, D. Wieners. Branch Chairs: M. Botha, N. Jamal, L. Mashego, H. Stander, T. Shakwane.

IAIAsa Membership Certificate

Full Name	Vumile Ribeiro
E-mail	vumile@niara.co.za
Company Name:	Niara Environmental Consultants
Member Type:	Full
IAIAsa Membership Number:	5925
IAIAsa Member Since	Thursday, March 1, 2018

President: Z. Mkhize, Past President: C. Niemandt, President Elect: T. Mutshatshi, Secretary: B. Mthembu, Treasurer: M. Vawda.
Members: H. Antonopoulos, T. Hokinyane, O. Mafika, J. Minnaar, D. Wieners. Branch Chairs: M. Botha, N. Jamal, L. Mashego, H. Stander, T. Shakwane.

PHASA
Public Health Association
of South Africa

MEMBERSHIP CERTIFICATE

This certifies that

Vumile Ribeiro

is a registered member of the **Public Health Association of South Africa**

Membership number: 1526

Membership period ends: 18-03-2027

Date 02 March 2026

PHASA President

Secretariat Enquiries

secretariat@phasa.org.za or phasa.info@gmail.com

28419660

University of Pretoria

The Council and Senate hereby declare that
at a congregation of the University the degree

Bachelor of Social Sciences Honours

in

Environmental Analysis and Management

with all the associated rights and privileges
was conferred on

Vumile Celiwe Dlamini

in terms of the Higher Education Act, 1997 and the Statute of the University

On behalf of the Council and Senate

Vice-Chancellor and Principal

On behalf of the Faculty of Humanities

Dean (Acting)

Registrar

2012-04-23

CERTIFIED A TRUE COPY
OF THE ORIGINAL

Tshegofatso Mokoena
13 Eton Road
Parktown, 2193, Johannesburg
Commissioner of Oaths *Ex Officio*
Practising Attorney
Republic of South Africa
04/08/2023

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

STUDENT NUMBER	28419660
SURNAME	Dlamini
FIRST NAMES	Vumile Celiwe
DATE OF BIRTH	1986-05-09
TYPE OF EXEMPTION	Gr 12 not required
DATE ISSUED	2012-02-23

LIST OF COURSES PASSED

2011 (Full-time)	Program: BSocSci Hons		Plan: Environmental Anal and Mngm	
Course offering	**Description**	**Academic progress unit**	**%**	**Decision result**
GGY 793	Geography of land reform 793	20	75	A- (Pass with distinction)
GGY 785	Env impact assess and man 785	20	68	B+ (Pass)
GGY 780	Urban geography of SA 780	20	75	A- (Pass with distinction)
GGY 729	Industrial environmental 729	20	78	A- (Pass with distinction)
GGY 727	Environmental compliance 727	20	68	B+ (Pass)
GGY 711	Environmental principles 711	20	75	A- (Pass with distinction)
GGY 703	Research and presen skills 703	10	68	B+ (Pass)
GGY 702	Geography Project 702	30	73	B+ (Pass)

Term percentage average: **72.81**
Cumulative Percentage Average: **72.81**

Outcome: Bachelor of Social Sciences Honours

The abovementioned student formally complied with all the requirements for the qualification: Bachelor of Social Sciences Honours on 2012-01-31 and this qualification will be conferred/issued on 2012-04-23

2012 (Full-time)	Program: BSocSci Hons		Plan: Environmental Anal and Mngm	
	In partial fulfilment of the requirements for Bachelor of Social Sciences Honours			
Course offering	**Description**	**Academic progress unit**	**%**	**Decision result**

Term percentage average: **0.00**
Cumulative Percentage Average: **72.81**

for **REGISTRAR**

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to the degree of

Bachelor of Social Science
(Geography and Environmental Management)

having satisfied the conditions prescribed for the degree.

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