


EIMS Ref	1607	Venue	Kelvin Estate Club House	Date	27 August 2024
----------	------	-------	--------------------------	------	----------------

I&AP Name	Comment	Response
<b>Michele Visagie</b>	Where will Kelvin get the gas from?	<b>EAP:</b> There is a Sasol agreement to supply gas.
	Michele Visagie wants to be added as a standard I&AP for all gas projects.	The I&AP will be registered for the Kelvin project.
	Michele Visagie indicated that comments will be sent to the Kelvin email.	EIMS supplied a copy of the presentation and indicated where the contact details are found on the presentation. EIMS confirmed that comments can be submitted by no later than the 16th of September 2024.
<b>Gary Thomas</b>	Gary indicated interest on the impacts on water resources and stated that the residents are very mindful of what is going on and they monitor the river, river colour, etc.	<b>Lavhe:</b> Indicated that it is a closed system, not all water will be released, only when water is in excess will it be released and the water is often much cleaner.
	Gary enquired about the water quality and the release point into the Modderfontein spruit.	It was explained that a Water Use Licence process for release of heated water and effluent was in process. The plant entails a water treatment plant, the water will be released in accordance with the limits set in the WUL licence. Lavhe explained they are constantly monitoring their releases in the Modderfontein spruit.
	Emissions - will the emissions be impacting the residents, especially those lower down?	<b>EAP:</b> indicated the emissions shown on the maps under Scenario 1 (normal operations assuming MES where exhaust gas goes through the main stacks) showing the simulated annual average ground level concentrations of NO <sub>2</sub> , Particulate Matter and SO <sub>2</sub> . The Air Quality should improve compared to the current baseline emissions.
	Where does the gas pipeline come from?	<b>EAP:</b> it is a Sasol pipeline (indicated on the map).
	The I&AP indicated they live in Illiondale and wanted to know about the noise.	<p><b>EAP:</b> referred to the section of the poster regarding the Noise specialist study. The findings indicate that there is expected to be no community reaction due to the increased noise level due to construction which is predicted to be within the Gauteng Noise Control Regulations of 60 dBA and recommended day-time Environmental Noise Standards at all the residential noise sensitive receptors identified.</p> <p>During the operational phase, it is expected that there will be little reaction with a few sporadic complaints in the industrial area indicated on the map as a result of the increase in noise levels from the current baseline noise level.</p>

EIMS Ref	1607	Venue	Kelvin Estate Club House	Date	27 August 2024
----------	------	-------	--------------------------	------	----------------

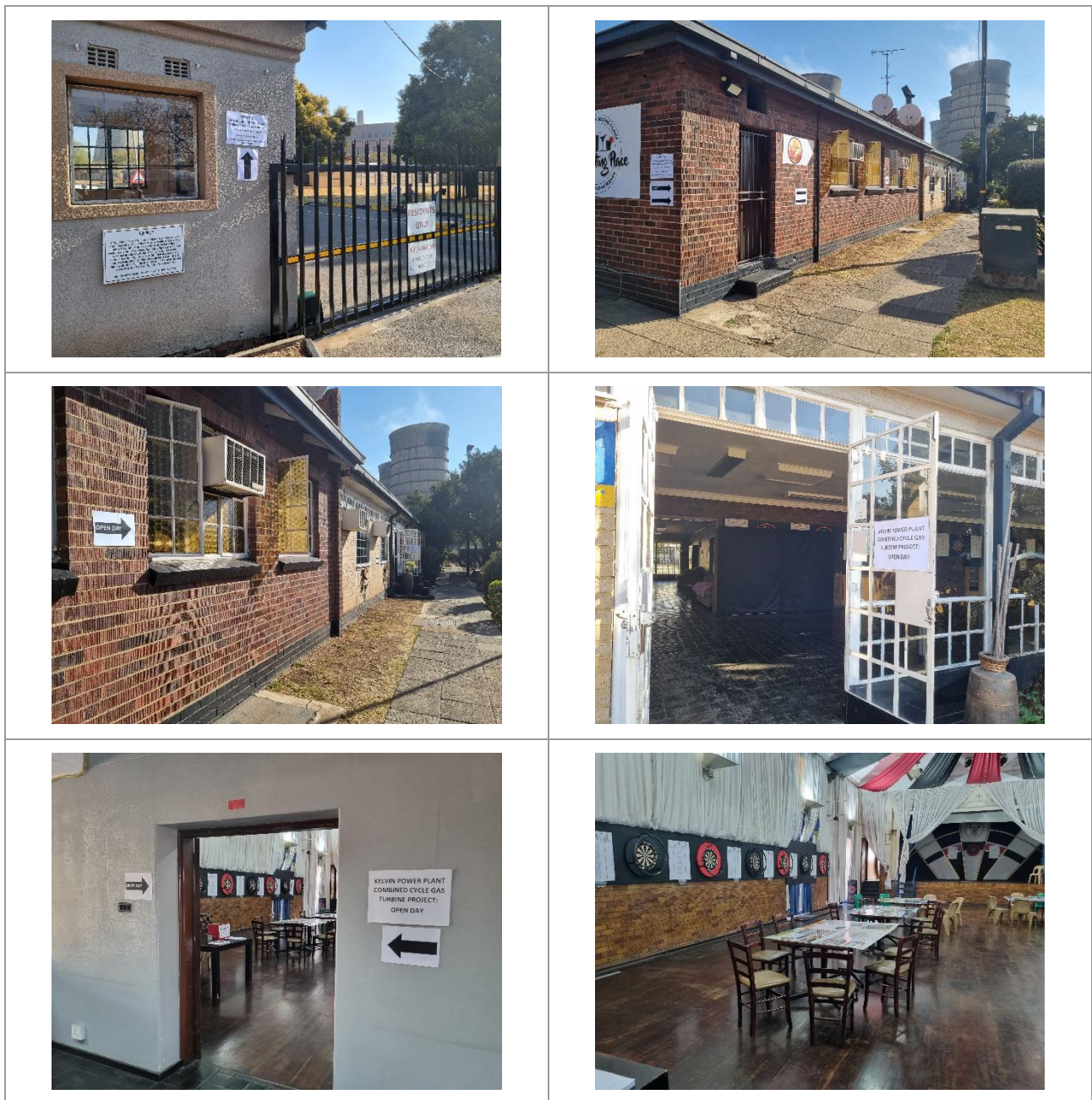
I&AP Name	Comment	Response
		The EAP further explained that as part of the proposed mitigation measures Kelvin will be expected to monitor noise for the first few months to ascertain the findings of the model or check if additional mitigation is required.
<b>Thompson Nzimande</b>	Where will construction be and when will it start?	<b>EAP:</b> construction is expected to start next year and is expected to commission around 2027/2028.
	Asked about the Air Quality and the stacks releasing emissions.	<p><b>EAP:</b> referred to the section of the posters showing the results of the air quality study that was done and referred to the maps showing the simulated annual average NO<sub>2</sub>, Particulate Matter and SO<sub>2</sub> ground level concentrations under Scenario 1 (normal operations assuming MES where exhaust gas goes through the main stacks) indicated on the maps.</p> <p>The Air Quality specialist concluded that the proposed development will have lower air quality impacts compared to that of the existing coal fired power station and will provide an improvement on the air quality in the area.</p>
	Asked about the Noise.	<p><b>EAP:</b> referred to the Noise specialist study section of the poster. The EAP explained the findings of the study and that there is expected to be no community reaction due to the increased noise level due to construction which is predicted to be within the Gauteng Noise Control Regulations of 60 dBA and recommended day-time Environmental Noise Standards at all the residential noise sensitive receptors identified.</p> <p>During the operational phase, it is expected that there will be little reaction with a few sporadic complaints in the industrial area indicated on the map as a result of the increase in noise levels from the current baseline noise level.</p> <p>The EAP further explained that as part of the proposed mitigation measures Kelvin will be expected to monitor noise for the first few months to ascertain the findings of the model or check if additional mitigation is required.</p>
	Asked about any jobs.	<b>EAP:</b> indicated that there would be more jobs during the construction phase of the project and that less workers would be required during the operational phases. The number of workers during the operational phase would be similar to the number of workers that are currently there. It was also indicated that the workers during the operational phase would largely be skilled workers with few general workers.

		<b>PUBLIC OPEN DAY RECORD</b>	
<i>EIMS Ref</i>	1607	<i>Project Name</i>	KELVIN POWER STATION COMBINED CYCLE GAS TURBINE PLANT

## OPEN DAY DETAILS

Town	Venue	Time and Date
Spartan	Kelvin Estate Club House (Kelvin Estate Club House, Cnr Starling & Cape Wagtail Street, Kelvin Estate, Spartan)	27 August 2024, 16:00-19:00

## PHOTOGRAPHS



A 8 Dalmeny Road, Pine Park, Randburg PO Box 2083, Pinegowrie 2123, South Africa T (011) 789-7170   F (086) 571- 9047	E mail@eims.co.za W www.eims.co.za	A Regus Business Centre, 14 Stewart Drive, Berea, East London PO Box 19731, Tecoma, 5214, South Africa T (043) 783-9826   F (086) 571- 9047
---	---------------------------------------	---



## PUBLIC OPEN DAY RECORD

*EIMS Ref*

1607

*Project Name*

KELVIN POWER STATION COMBINED CYCLE GAS TURBINE PLANT





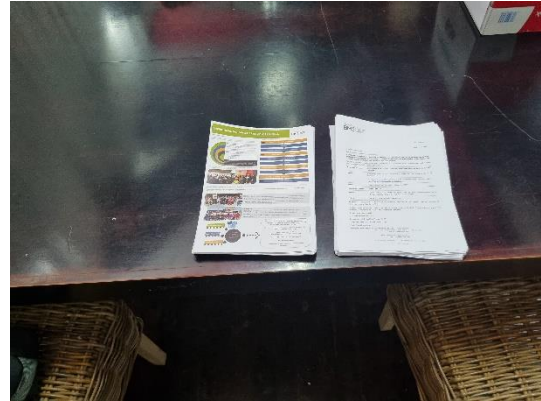
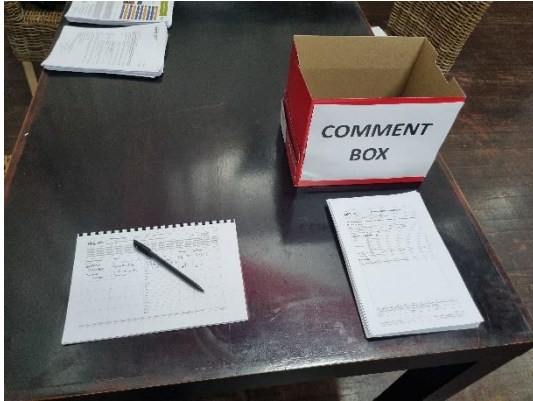
## PUBLIC OPEN DAY RECORD

*EIMS Ref*

1607

*Project Name*

KELVIN POWER STATION COMBINED CYCLE GAS TURBINE PLANT





# ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

## WHY DO WE NEED AN EIA?

An Environmental Impact Assessment (EIA) is a crucial process that evaluates the potential environmental effects of planned development projects, policies, or activities. It's necessary because:

**Promotes Sustainable Development:** Environmental considerations integrated into decision-making process = sustainable outcomes.

**Economic Feasibility:** Cost savings + reduced project implementation time = avoiding future environmental damage + associated costs.

**Legal Compliance:** SA requires EIAs by law to ensure that development projects meet environmental standards and regulations.

**Mitigates Negative Impacts:** Reveal the need for changes in design to minimize or avoid negative environmental effects.

**Community Involvement:** Public participation, increasing community awareness and involvement in environmental issues.

**Informs Decision-Making:** Help decision-makers make informed choices.

The National Environmental Management Act (NEMA) lists activities which may have a negative effect on the environment. If a proposed development or activity triggers one or more of these 'listed activities', then an Environmental Authorisation is required which must be preceded by an Environmental Impact Assessment.

Overall, EIAs play a vital role in protecting the environment and ensuring that development is done responsibly and with consideration for the natural world.



## WHAT STEPS ARE INVOLVED AND WHEN CAN YOU PARTICIPATE?



## WHAT ARE YOUR RIGHTS AND RESPONSIBILITIES IN AN EIA PROCESS?

The public plays an important role in the Environmental Impact Assessment (EIA) process, which aims to ensure that environmental and social issues are considered in project planning. Here are some of the rights and responsibilities that the public has in this process:



### Your Rights

- RIGHTS!**
- Information Sharing: You must access relevant information about planned project and its possible environmental effects.
  - EIA Process Involvement: You have the right to be involved in the entire EIA process and give feedback on all the reports.
  - Public Hearings: You can join and share your opinions at public hearings or meetings, which are often part of the EIA process.
  - Legal Action: If you think that the EIA process has not been done properly or that your views have not been sufficiently addressed, you may seek legal review or other legal options.



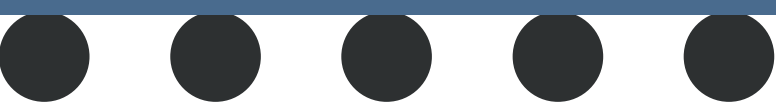
### Your Responsibilities

- RESPONSIBILITIES**
- Involvement: You should get involved in the process in a positive way, giving feedback, suggestions, and issues about the planned project.
  - Polite Communication: When taking part in public hearings or sending comments, it is important to communicate politely and truthfully.
  - Prompt Participation: There are often cut-off dates for public comments and involvement. It is your duty to follow these deadlines to make sure that your input is considered.

Questions / Clarification



Support / Suggestions



Concerns / Objections



**WE WANT YOU!**

.....TO SUBMIT  
YOUR VIEWS ON  
THE PROPOSED  
PROJECT!!

All inputs received by EIMS will be considered and included in the submissions to the competent authority Competent Authority for consideration in their decision-making process.

Please submit all comments or queries via letter, fax, phone call, or email to the following contact details:

Contact Person: Jolene Webber  
Postal Address: P.O. Box 2083; Pinegowrie; 2123  
Telephone: (011) 789 7170 / Fax: (086) 571 9047  
E-mail: [kelvin@eims.co.za](mailto:kelvin@eims.co.za)

Please include the project reference number 1607 in all correspondence.



# DESCRIPTION OF THE PROPOSED ACTIVITY

## WHO IS THE APPLICANT AND WHAT DO THEY INTEND TO DO?

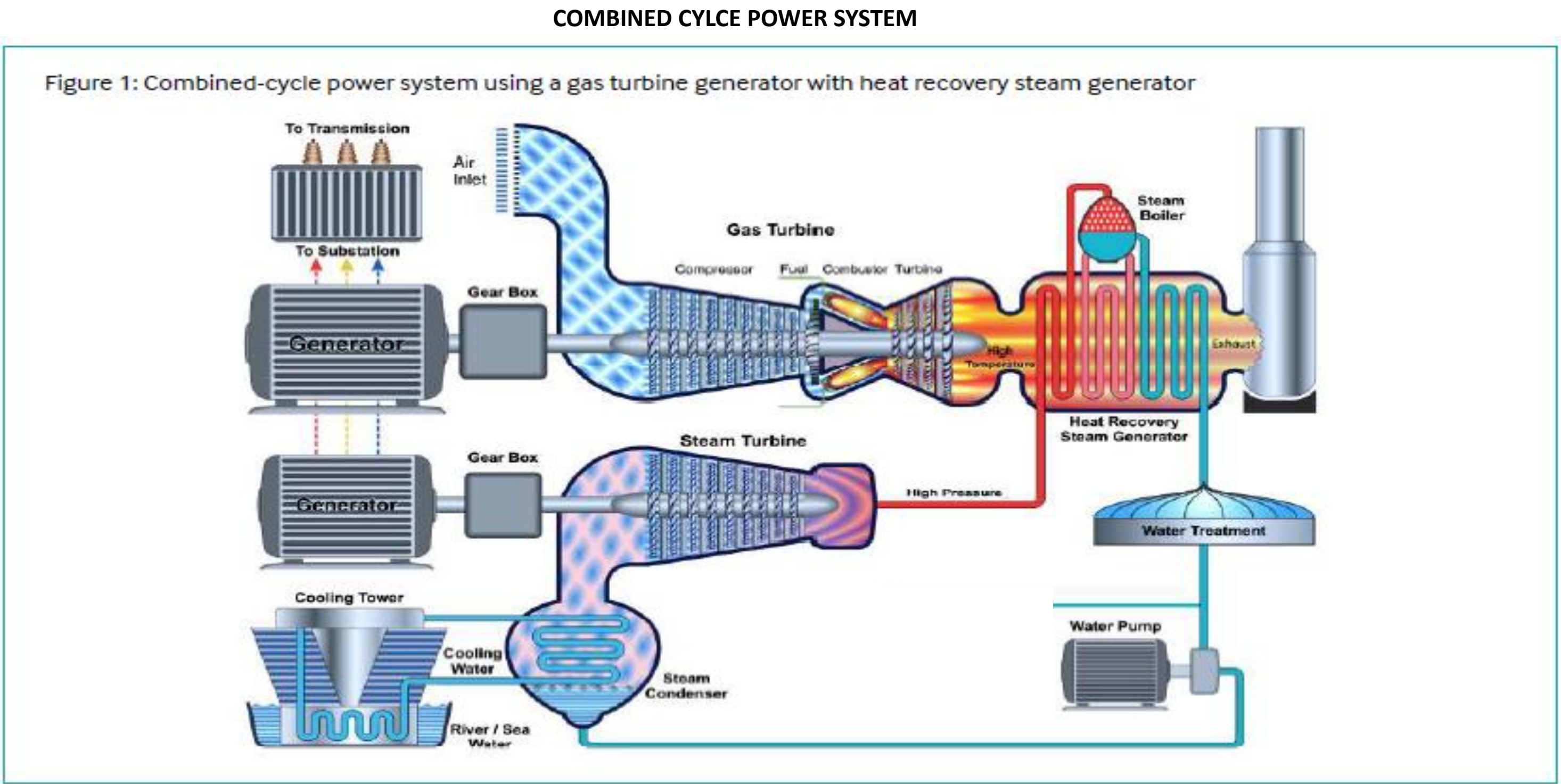
Kelvin intends to construct a Combined Cycle Gas Turbine (CCGT) plant with generation capacity of up to 600 MW at the open area next to the Kelvin A building where the current cooling towers are located. Kelvin aims to supply the electricity generated to Eskom through a Power Purchase Agreement.

A CCGT power plant burns natural gas to produce electricity in a two staged process, creating a pressurised gas which powers a gas turbine that is connected to a generator. A CCGT refers to a gas turbine consisting of a heat recovery system generator that captures exhaust heat produced by the gas turbine to power a steam turbine to produce additional power to run a generator.

The CCGT Power Plant will comprise of gas turbines, heat recovery boilers and steam turbines (with associated High Voltage switchgear and control gear). The gas turbines will receive natural gas from the Sasol gas pipeline network into the gas turbine where the combustion will take place producing mechanical energy that is converted by a generator to electric power and a hot exhaust gas.

The hot exhaust gas will be captured by the heat recovery boilers where treated water will be heated producing high pressure steam with high potential energy. The steam will be moved to the steam turbines where the potential energy contained in the steam will be converted to mechanical energy powering a generator that will produce electricity. The steam is then discharged into a condenser where it is then collected and returned to the boiler to be reused in the steam cycle. Commission of the proposed CCGT plant is expected to occur around 2027/2028. The planned operational life cycle of the proposed CCGT plant is at least 20 years from commissioning.

TYPICAL CCGT PLANT

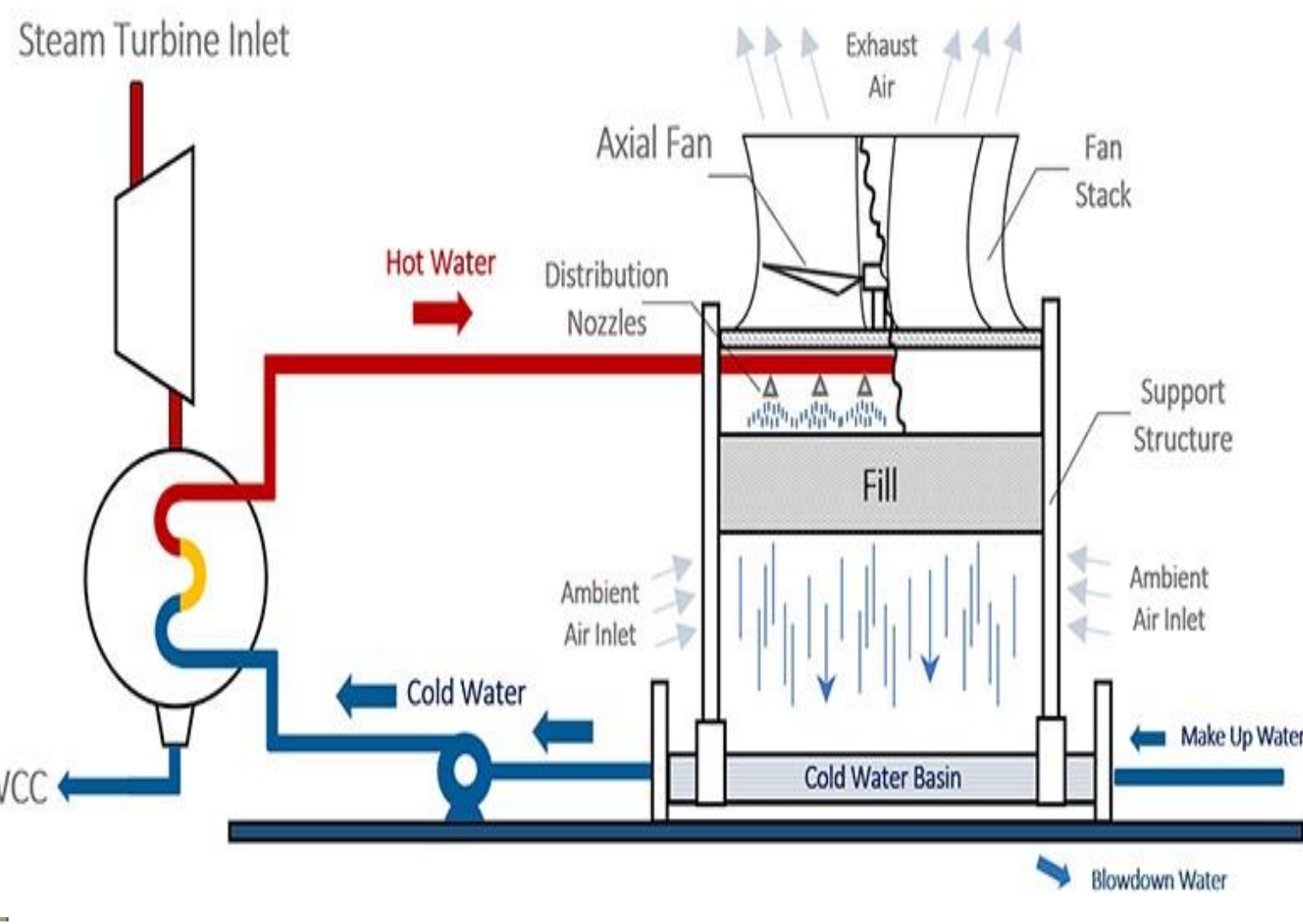


The proposed CCGT includes MV to EHV step-up transformers to raise the voltage to the grid specification. Electricity generated at the Kelvin Power CCGT Plant will be evacuated from the plant by means of new 275kV lines from the generating plant to the Sebenza 275/88kV Substation located adjacent (250m) to the proposed CCGT plant. The Sebenza Substation already has bays allocated for the integration of Kelvin Power within the substation network. The Sebenza Substation is connected to the Eskom grid via two 275kV powerlines to Prospect Substation each with a transfer capacity of 625MVA .

Kelvin Power also aims to construct a diesel storage area and a chemical stores area whose combined capacities could exceed 80 cubic metres and will be less than 500 cubic meters.

Water from the Diepsloot Waste-Water Treatment Works, will be supplied through an existing pipeline network. Process water will be sprayed within the Cooling Tower for cooling and the turbine exhaust steam that will be recirculated within the system. A Water Treatment Plant will be installed to supply makeup water from system losses. Waste-water will be treated in an Effluent Treatment Plant. Treated effluent water meeting required standards will be discharged via the existing Kelvin Power effluent discharge point into the Modderfontein river channel.

MECHANICAL COOLING TOWERS



## OPERATION PROCESS

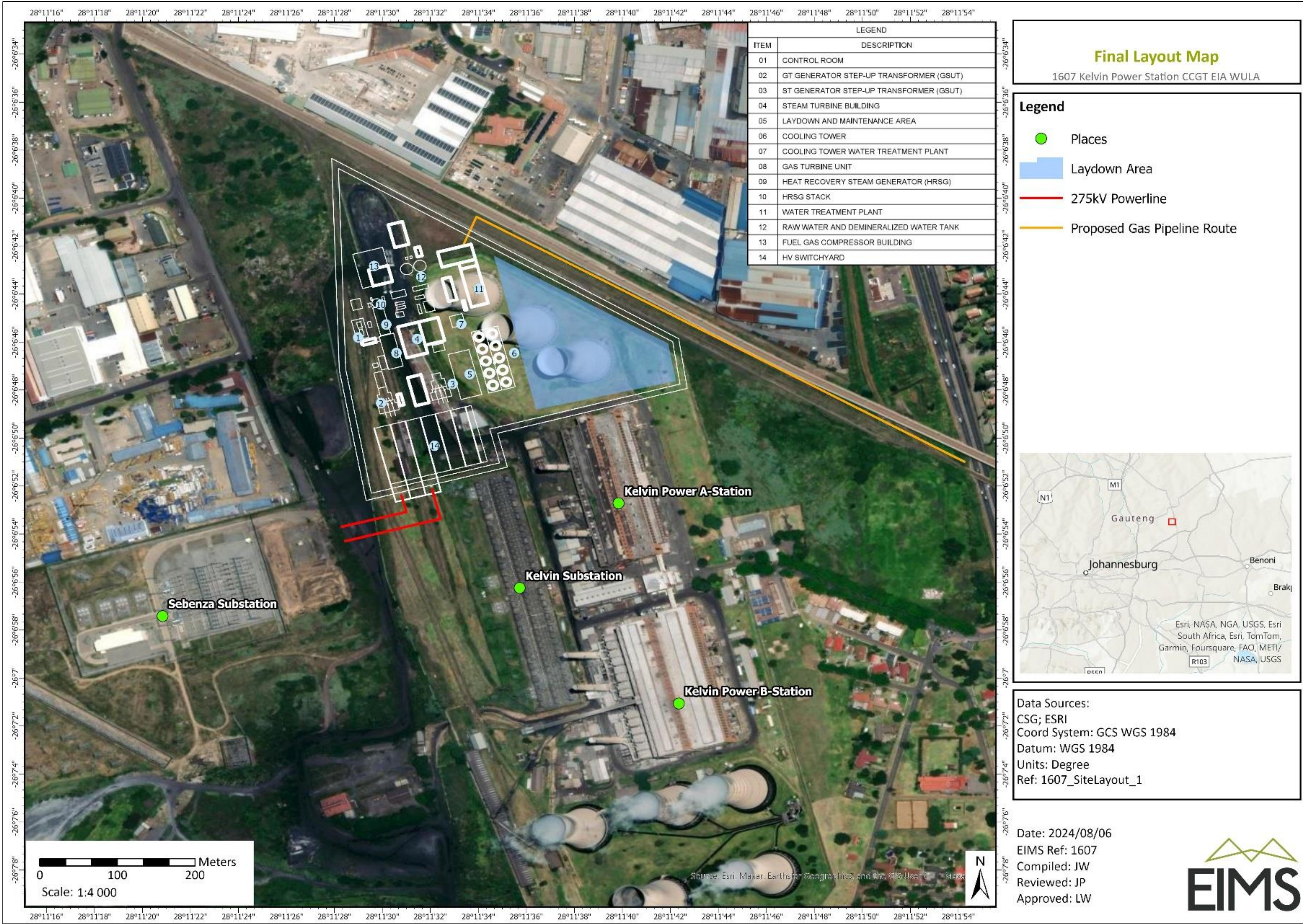
- Fuel Supply:** Natural gas will be supplied from the Sasol gas pipeline network (A pipeline connection is required).
- Electricity Generation and Heat Recovery:** The gas turbines will combust the natural gas, converting it into mechanical energy that drives a generator to produce electric power. The combustion process will also generate hot exhaust gas. The hot exhaust gas will be captured by a Heat Recovery Steam Generator (HRSG).
- Steam Cycle:** : Treated water in the HRSG will be heated, producing high-pressure steam. The high-pressure steam will drive a steam turbine, converting the potential energy into mechanical energy to power a generator. The steam will then be condensed and recycled back to the boiler.

## NORMAL OPERATING TIMES

It is expected that the plant will run for most of the year, if not all of it, at a maximum of 65% capacity. This is 8760 hours. Daily peaks are likely to depend on load demand. There will be maintenance periods where less equipment is in operation.

## Main Structures and Components:

- Up to three (3) gas turbines and generators using gas as a fuel source.
- Up to three (3) HRSGs for capturing exhaust heat.
- Up to two (2) steam turbines.
- Control room.
- Mechanical draft cooling tower for steam condensation.
- Steam turbine building.
- Up to three (3) HRSG main stacks (50 to 60 meters high).
- Up to three (3) bypass stacks (20 to 60 meters high, 4-9 meter diameter).
- Water treatment plant for process water and fire fighting purposes.
- Raw water and demineralized water tanks.
- Firewater storage and control system.
- Fuel gas compressor building.
- High Voltage switchyard.
- Auxiliary and administration buildings.
- Compressed air station for service and process air.
- Closed Fin-fan coolers for lubrication oil cooling.
- Site access roads.
- Diesel storage area (maximum capacity of 50m<sup>3</sup>) with off-loading facilities.
- Diesel generator for black start up and emergency operation.





WHAT ARE THE CHARACTERISTICS OF THE RECEIVING ENVIRONMENT?

Potential sensitive receptors within 5 km from the project include residential areas, i.e., Esther Park, Edleen, Cresslawn, Kelvin Estate, Croydon, Eden Glen and Illiondale. Residential areas within 10 km from the project site include Edenvale, Kempton Park, and Lethabong as well as various hospitals and schools.

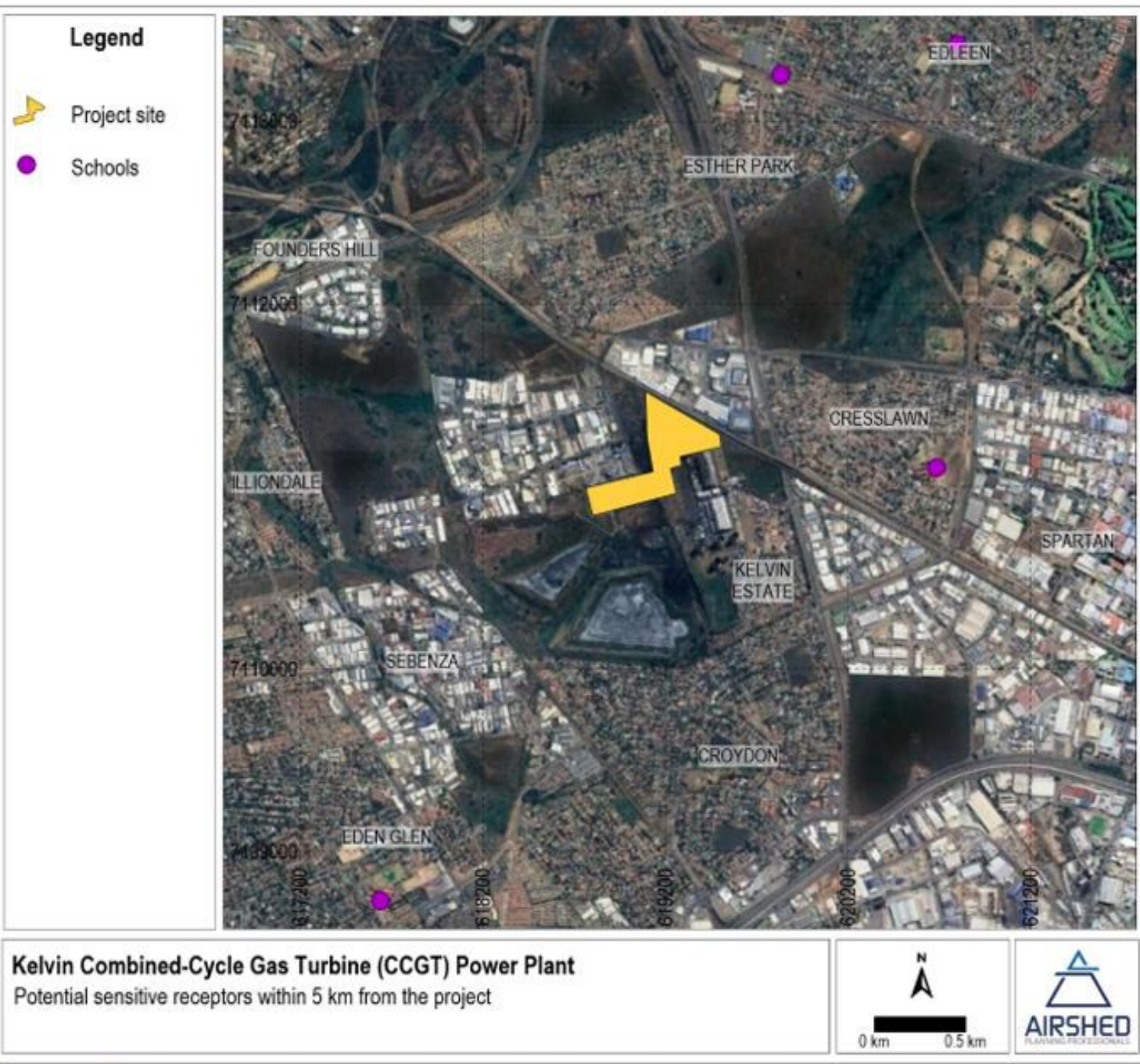


Figure 1-1: Potential sensitive receptors within 5 km from the project

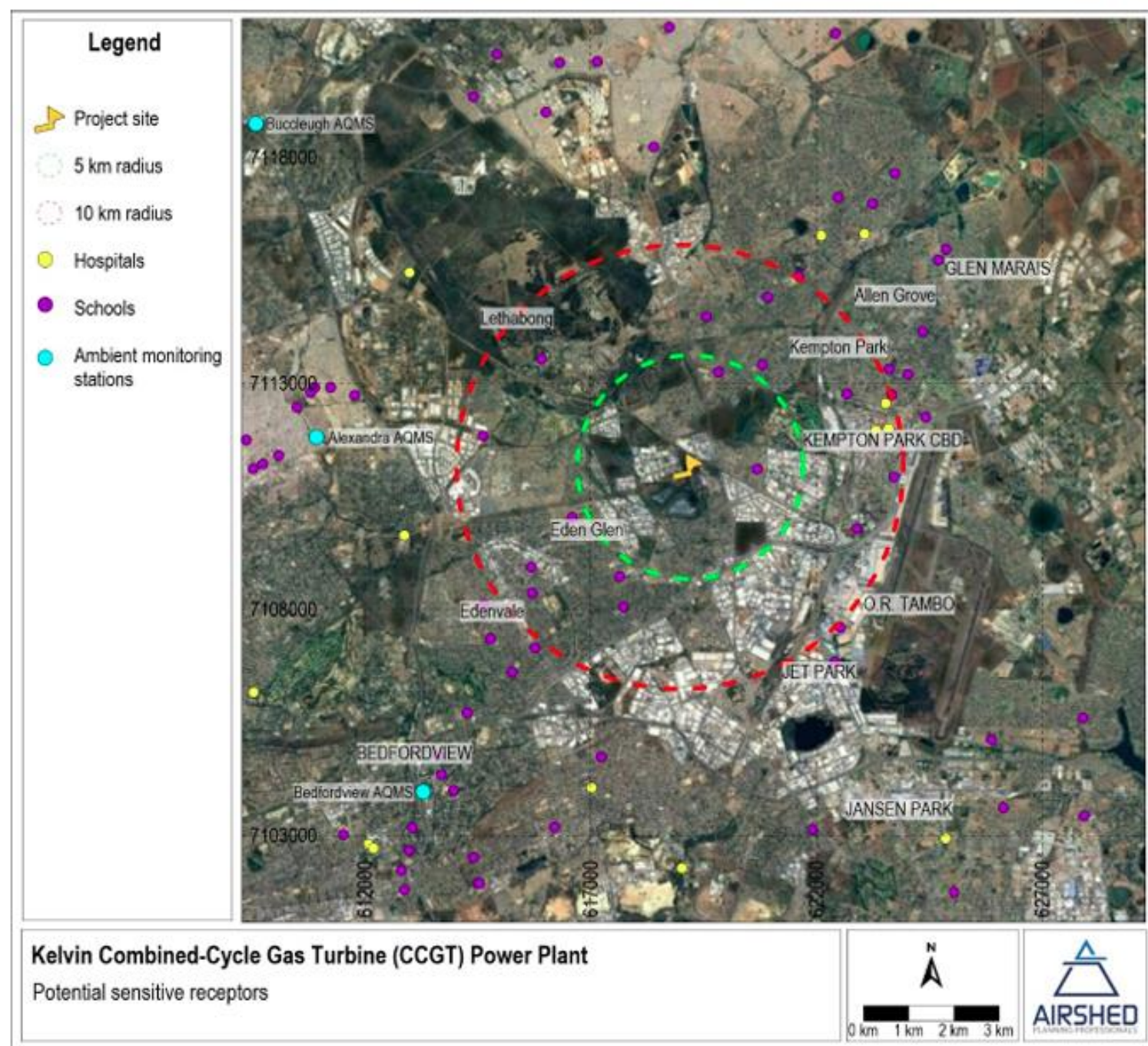


Figure 1-2: Potential sensitive receptors and ambient monitoring stations within the study area

HOW DOES AN AIR QUALITY STUDY WORK?

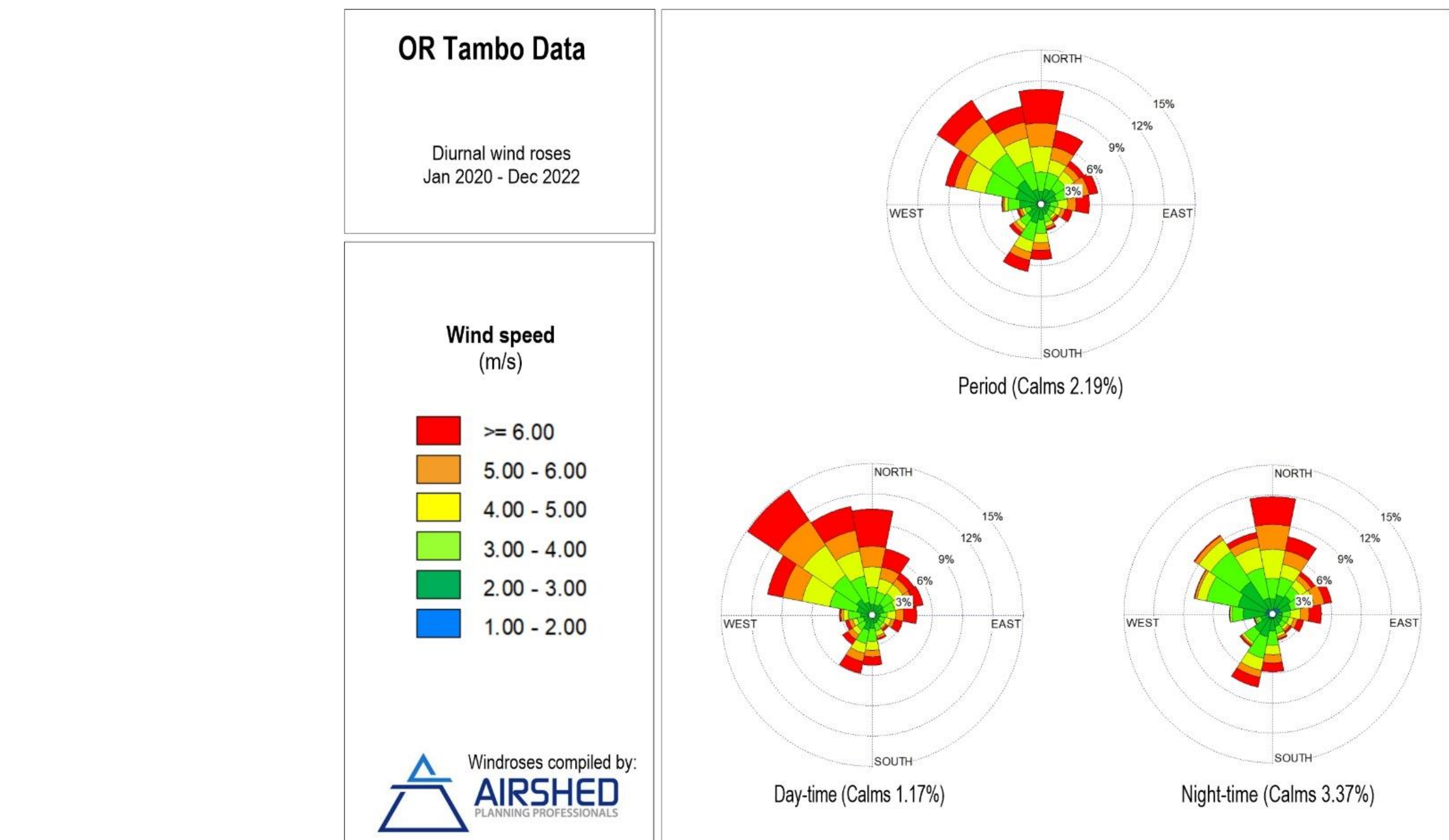
In the evaluation of ambient air quality impacts reference is made to National Ambient Air Quality Standards (NAAQS). These standards apply only to certain common air pollutants, collectively known as criteria pollutants. Criteria pollutants include sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), inhalable particulate matter (PM) (including thoracic PM with an aerodynamic diameter of equal to or less than 10 µm or PM<sub>10</sub> and inhalable PM with an aerodynamic diameter equal to or less than 2.5 µm or PM<sub>2.5</sub>), benzene, ozone (O<sub>3</sub>) and lead.

SO<sub>2</sub>, NO<sub>2</sub> and PM represent the main pollutants of concern in the assessment of the project. For the current assessment, the impacts were assessed against published NAAQS and National Dust Control Regulations (NDCR).

The establishment of a comprehensive emissions inventory formed the basis for the assessment of the air quality impacts from the project. An internationally accepted computer model was used which considered the existing environment, the planned emissions and then tries to predict where and what level of pollution will occur

MES: Minimum Emissions Standards which Kelvin must comply with to protect human health

NAAQS: National Ambient Air Quality Standards for certain pollutants for which the impacts are assessed against



Period average, daytime and night-time wind roses (measured data; January 2020 to December 2022; SAWS OR Tambo meteorological station)

WHAT ARE THE POTENTIAL IMPACTS ON AIR QUALITY?

- Scenario 1:** Normal operations assuming MES where exhaust gas goes through the main stacks.
- Scenario 2:** Normal operations assuming US EPA emission factors for SO<sub>2</sub>. This scenario was included to understand the range in SO<sub>2</sub> ground level concentrations based on emission factors designed for gas turbines and sulfur content of the natural gas being used.
- Scenario 3:** Normal operations assuming MES where off-gas goes through the main stacks and gas generators running for 1 hour per month assuming MES where off-gas goes through the main stack (when normal operations are not taking place). Only short-term impacts were assessed, i.e. highest hourly and highest daily (99th percentile).
- Scenario 4:** Normal operations assuming US EPA emission factors for SO<sub>2</sub> and gas generators running for 1 hour per month assuming MES. Only short-term impacts were assessed for SO<sub>2</sub>, i.e. highest hourly and highest daily (99th percentile).

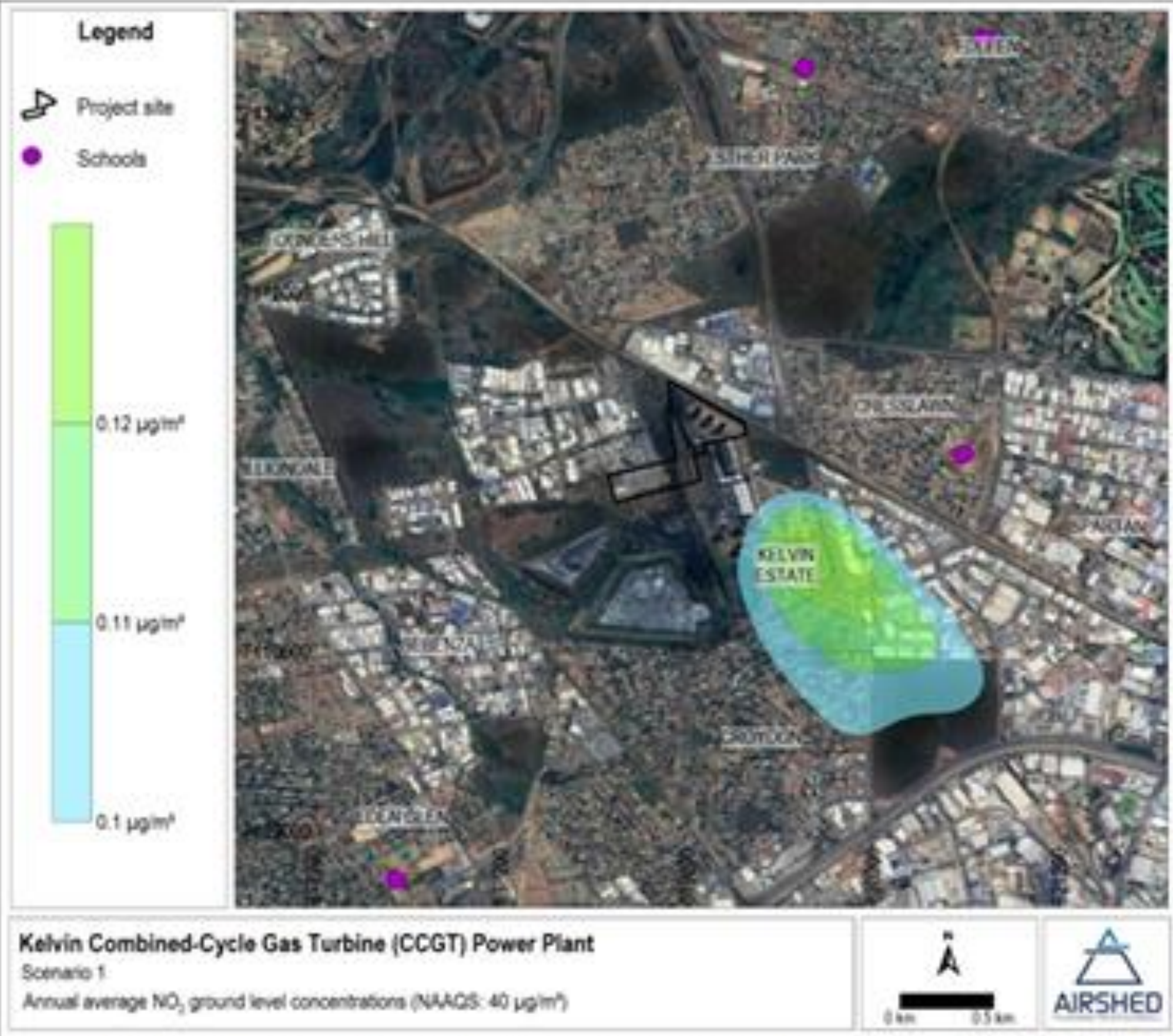


Figure 5-24: Simulated annual average NO<sub>2</sub> ground level concentrations due to project operations (Scenario 1: Normal operations assuming MES)



Figure 5-27: Simulated annual average PM ground level concentrations due to project operations (Scenario 1: Normal operations assuming MES)

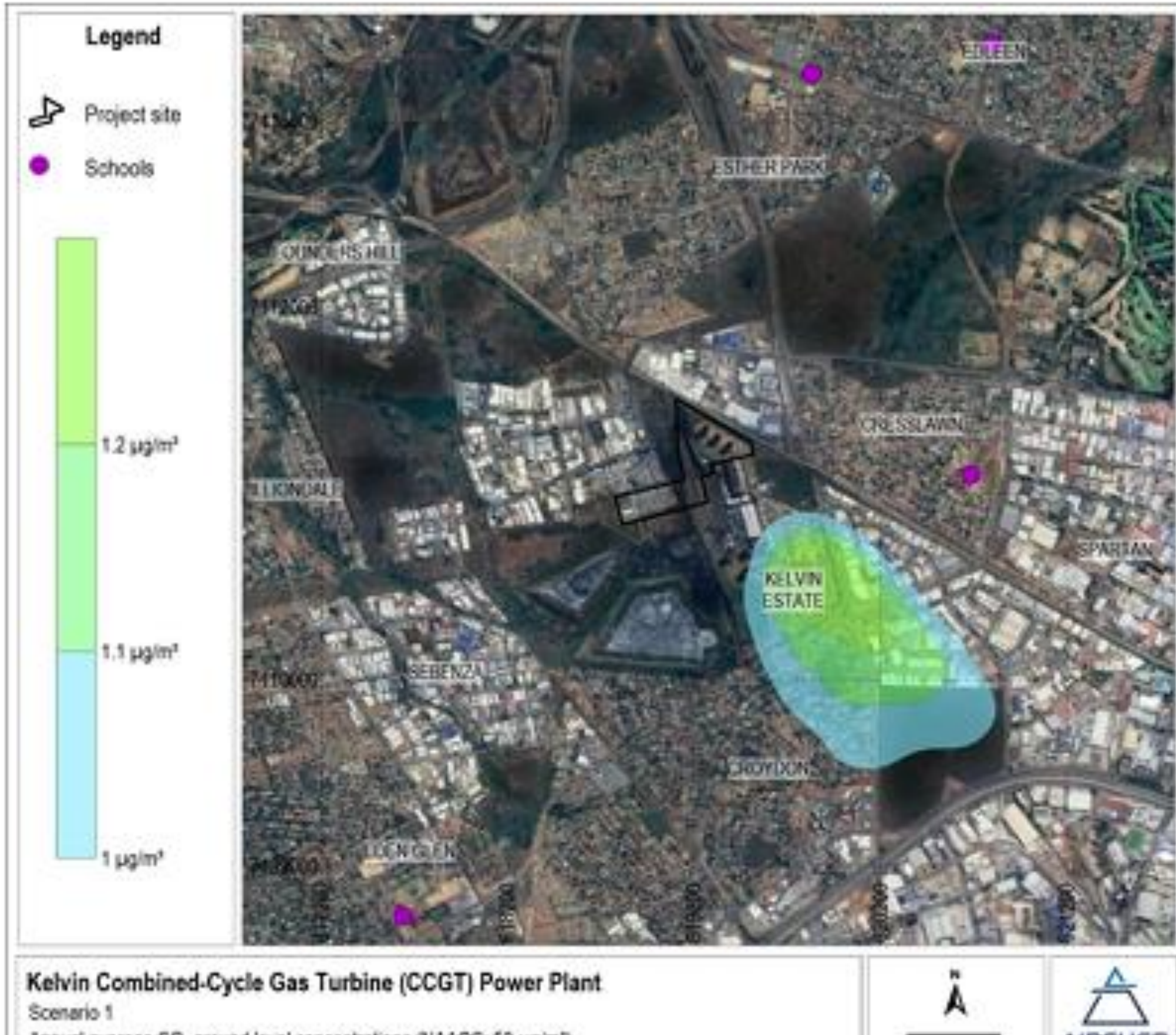


Figure 5-20: Simulated annual average SO<sub>2</sub> ground level concentrations due to project operations (Scenario 1: Normal operations assuming MES)

FINDINGS

- Simulated SO<sub>2</sub> concentrations for the project operations complied with NAAQS across the modelling domain for all scenarios.
- Simulated NO<sub>2</sub> concentrations for the project operations complied with NAAQS across the modelling domain for all scenarios.
- Simulated PM concentrations for the project operations complied with PM<sub>10</sub> and PM<sub>2.5</sub> NAAQS across the modelling domain for all scenarios.
- Annual SO<sub>2</sub> and NO<sub>2</sub> concentrations due to project operations were below critical levels for vegetation throughout the domain for all scenarios.
- Simulated dust fallout due to project operations was well within the NDCR over the modelling domain.
- The impact significance rating for the construction, operation and closure phases for the project was “low”.

ARE THERE EXPECTED TO BE ANY HIGH SIGNIFICANCE OR FATAL FLAW IMPACTS?

The Air Quality specialist thus concluded that the proposed CCGT Power Plant has lower air quality impacts than the existing coal fired power station (Station B) and will provide an improvement on air quality in the area. From an air quality perspective, it is recommended that the project go ahead on condition that:

- Emissions due to construction activities be mitigated using good practise guidelines.
- The emissions from the project comply with MES.



Monitoring of Fugitive Emissions



Dust suppression / control



Emissions to comply with MES



Air Quality Monitoring as stipulated in Air Emissions License



INTRODUCTION

Gaseous pollutants released from the combustion of fuel is the main source of GHGs from the project. The release of GHG includes mainly carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth’s surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect.

The effect of climate change is related to changing atmospheric GHG concentrations, increased temperatures and changing weather patterns. From a process point of view, elevated ambient temperatures may slightly increase evaporative fuel losses from vehicles and increase temperature related wear on equipment. Similarly, there will be increased water use for drinking water and dust emission abatement on roads. Increased temperatures and increased evaporation rates may also result in lower water availability for facilities and should be noted when sourcing water for the project.

The physical risks of climate change on the study area, based on the Intergovernmental Panel on Climate Change (IPCC) ’s fifth assessment report (AR5) data, can be summarised as follows:

Temperature:

- Baseline: 0.84 hot days (90th percentile - i.e. 10% chance that temperatures will fall above this threshold for that time period)
- High mitigation RCP4.5 climate situation: 9.5 hot days with an increase in temperature of 2.75°C (90th percentile)
- Low mitigation RCP8.5 climate situation: 12 hot days with an increase in temperature of 3°C (90th percentile)

Rainfall:

- Baseline: 9.94 extreme rainfall days (90th percentile)
- High mitigation RCP4.5 climate situation: additional 0.08 extreme rainfall days with a decrease in total annual rainfall of 7.7 mm (90th percentile)
- Low mitigation RCP8.5 climate situation: additional 1.32 extreme rainfall days with an increase in total annual rainfall of 46.6 mm (90th percentile)

Hazards assuming the low mitigation RCP8.5 climate situation:

- Wildfires: low increased risk with 17 increased fire danger days;
- Drought: Low risk of increased frequency;
- Exposure to heat extremes: medium potential increase; and,
- Urban flooding: low increased risk.

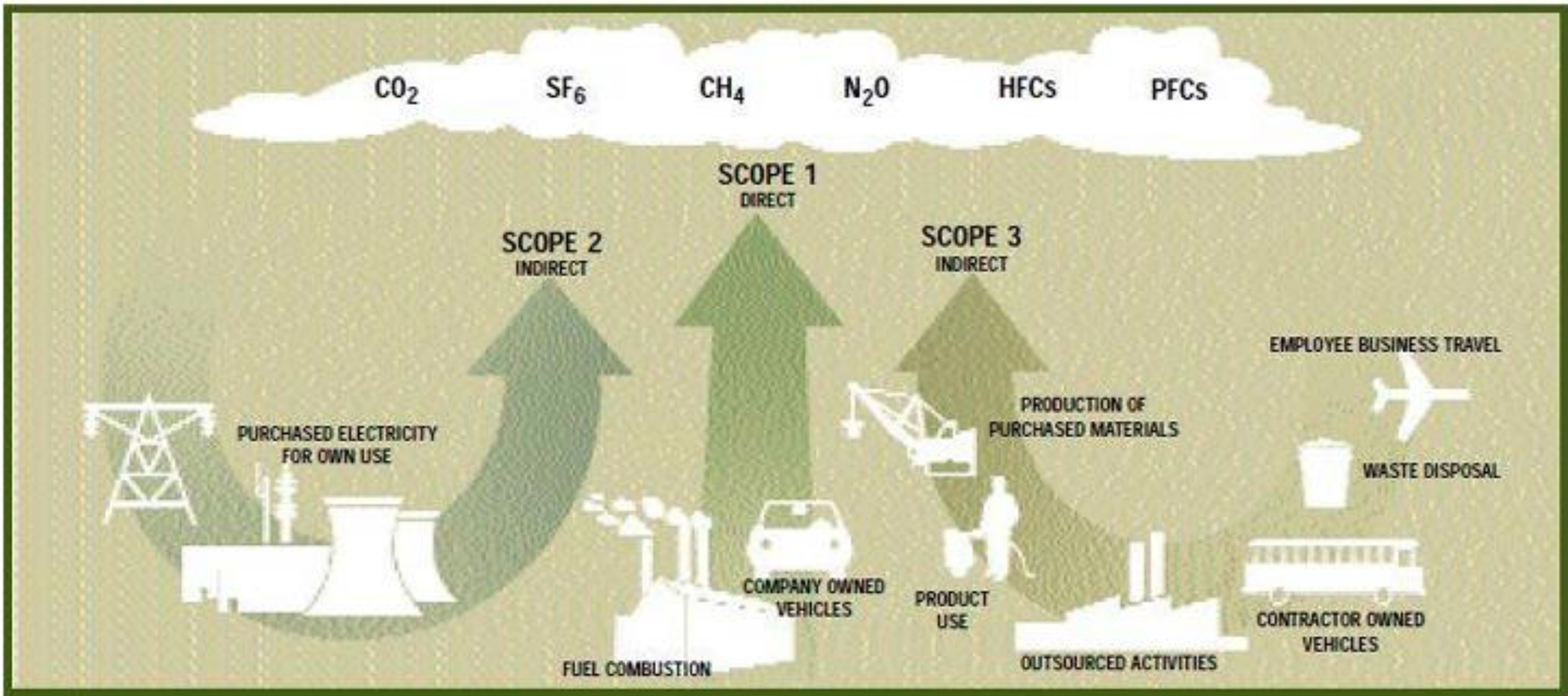


Figure 4-1: Overview of scopes and emissions (WRI & WBCSD, 2004)

WHAT IS AN RCP?

Representative Concentration Pathways (RCP) are climate change scenarios to project future greenhouse gas concentrations.

- High mitigation RCP4.5 climate situation: 0.08 extreme rainfall days with a decrease in rainfall of 7.7 mm (90th percentile)
- Low mitigation RCP8.5 climate situation: 1.32 extreme rainfall days with an increase in rainfall of 46.6 mm (90th percentile)

FINDINGS

The project is likely to result in an estimated total of 5 853 t carbon dioxide equivalent (CO2e) direct emissions (1 672 t CO2e annually) and 7 355 t CO2e indirect emissions (2 101 t CO2e annually) due to construction activities.

For project operations, the estimated total GHG emissions is 19 210 749 t CO2e (direct) (960 537 t CO2e annually) and 3 872 961 t CO2e (indirect) (193 648 t CO2e annually). This was calculated to represent 0.001% (construction) and 0.33% (operation) of the remaining South African annual GHG budget.

The project will be required to report CO2e emissions annually via the South African Greenhouse Gas Emission Reporting System (SAGERS) monitoring and reporting system.

Although South Africa is on a drive to eliminate fossil fuel driven energy, this needs to be done with a **Just Energy Transition**. This includes the gradual movement towards lower carbon technologies, while not negatively impacting society, jobs and livelihoods. The Just Energy Transition is important to the country and to our future growth and sustainability as an organisation.

From a **GHG emissions** perspective reference is made to the United States Environmental Protection Agency’s (US EPA’s) Emissions and Generation Resource Integrated Database, released in 2018 with 2016 data, which shows that at the national level, natural gas units have an average emission rate of 898 pounds CO2 per megawatt-hour (MWh), while coal units have an emissions rate of 2,180 pounds CO2 per MWh. **Natural gas units, therefore, on average, release ~58% less CO2 per MWh compared to coal**

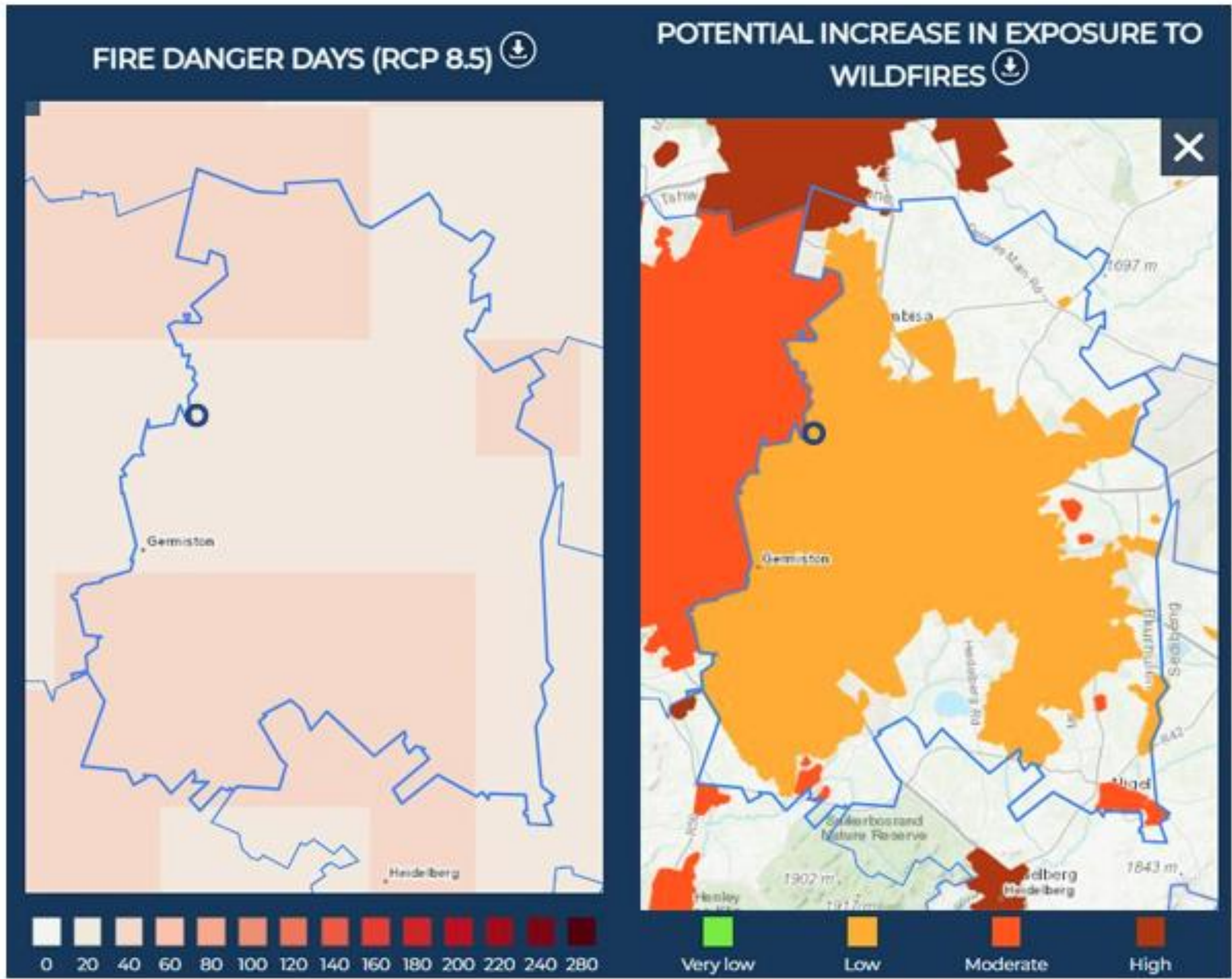


Figure 3-15: Risk of increased wildfires for Ekurhuleni Municipality in 2050 based on RCP8.5 trajectory (dark blue

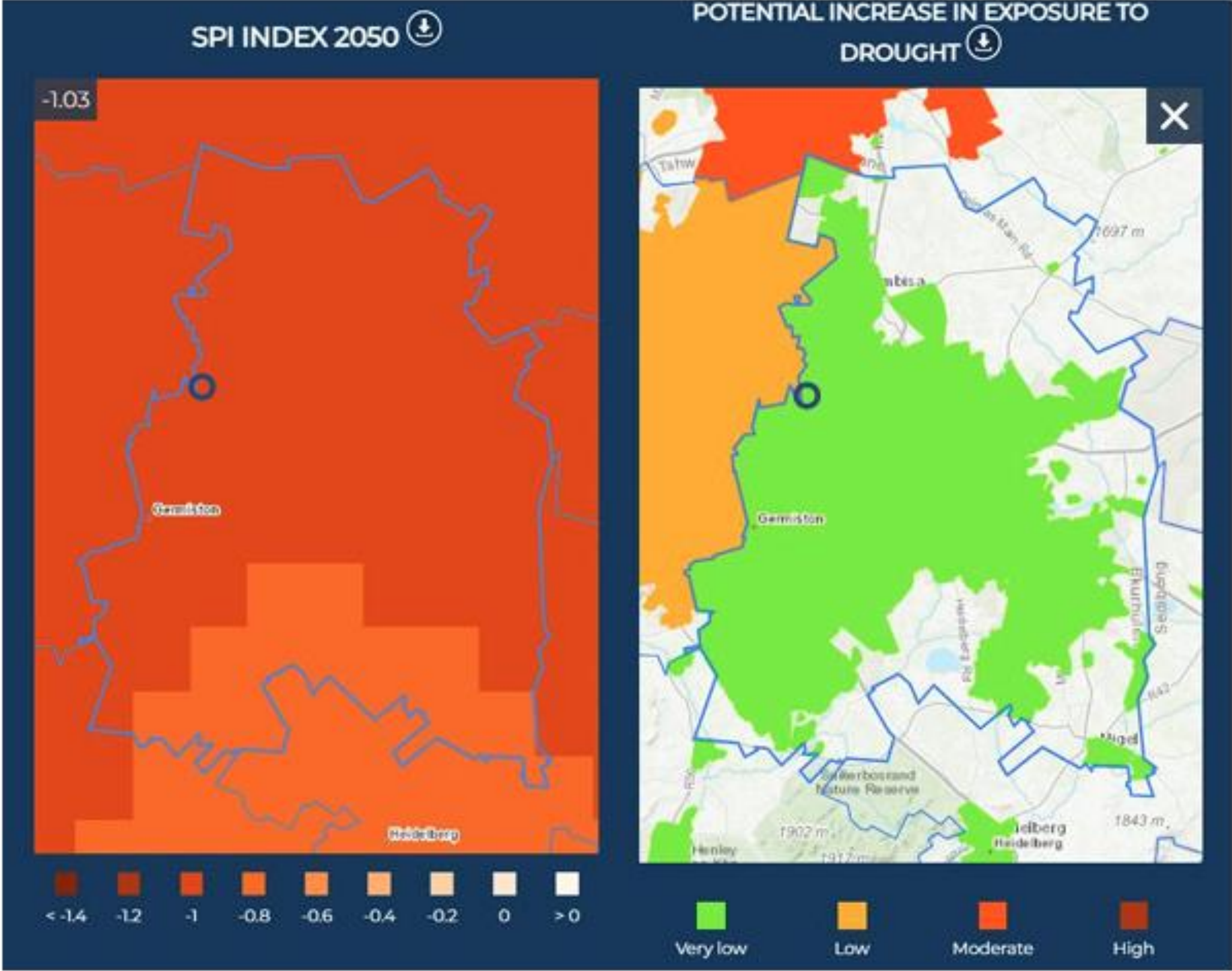


Figure 3-16: Risk of increased drought tendencies for Ekurhuleni Municipality in 2050 based on RCP8.5 trajectory (dark blue marker indicates approximate location of the project)

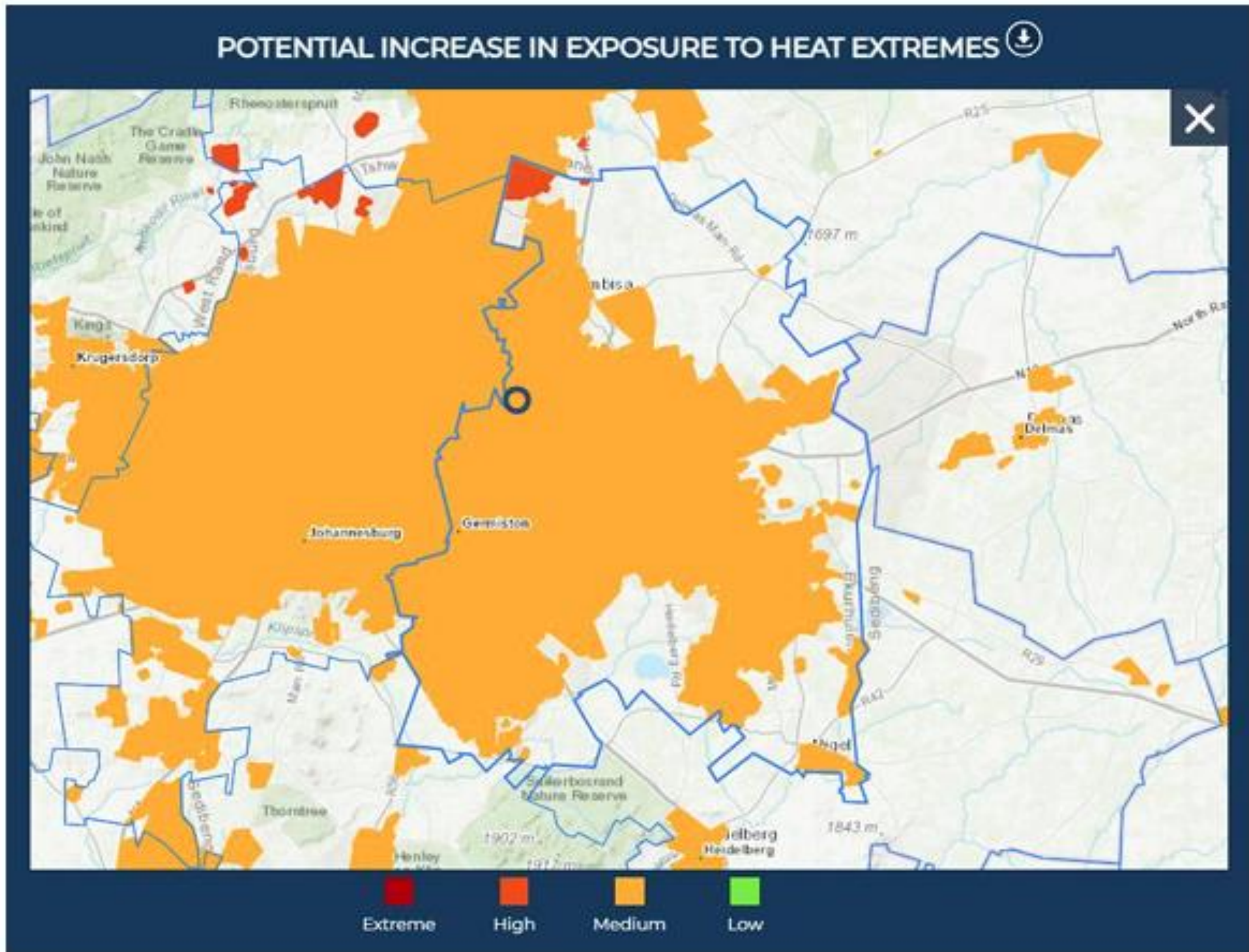


Figure 3-17: Risk of increased heat extremes for Ekurhuleni Municipality in 2050 based on RCP8.5 trajectory (dark blue marker indicates approximate location of the project)

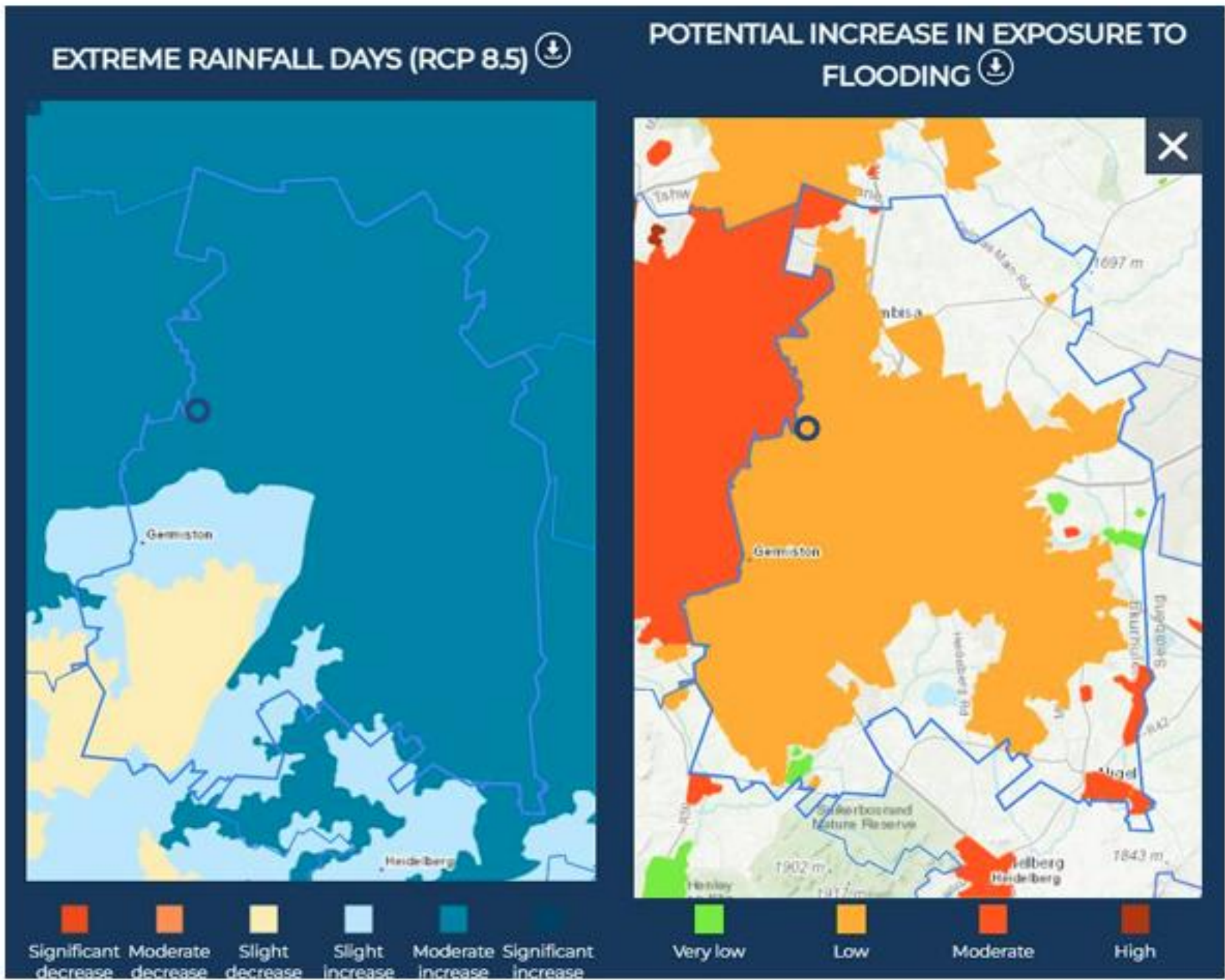


Figure 3-18: Risk of increased flooding for Ekurhuleni Municipality in 2050 based on RCP8.5 trajectory (dark blue marker indicates approximate location of the project)

Scope 1: Direct GHG Emissions  
Direct GHG emissions occur from sources that are owned or controlled by the company.

Scope 2: Electricity - Indirect GHG Emissions  
Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the company..

Scope 3: Other Indirect GHG Emissions  
Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions.

Direct emissions include: diesel, oil, LPG , petrol and natural gas combustion.

Indirect emissions include all emissions associated with the off-site production of energy for such aspects as extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by Kelvin, outsourced activities, waste disposal, etc.

MITIGATION

The project will be required to report carbon dioxide equivalent (CO2e) emissions annually via the NAEIS. Implement a Leak Detection and Repair program that includes regular inspections of all equipment and pipelines to identify fugitive gas emissions.

Establish a monitoring schedule that includes frequent inspections of high-risk areas, such as compressor stations, valve stations, and turbine seals..

CONCLUSION

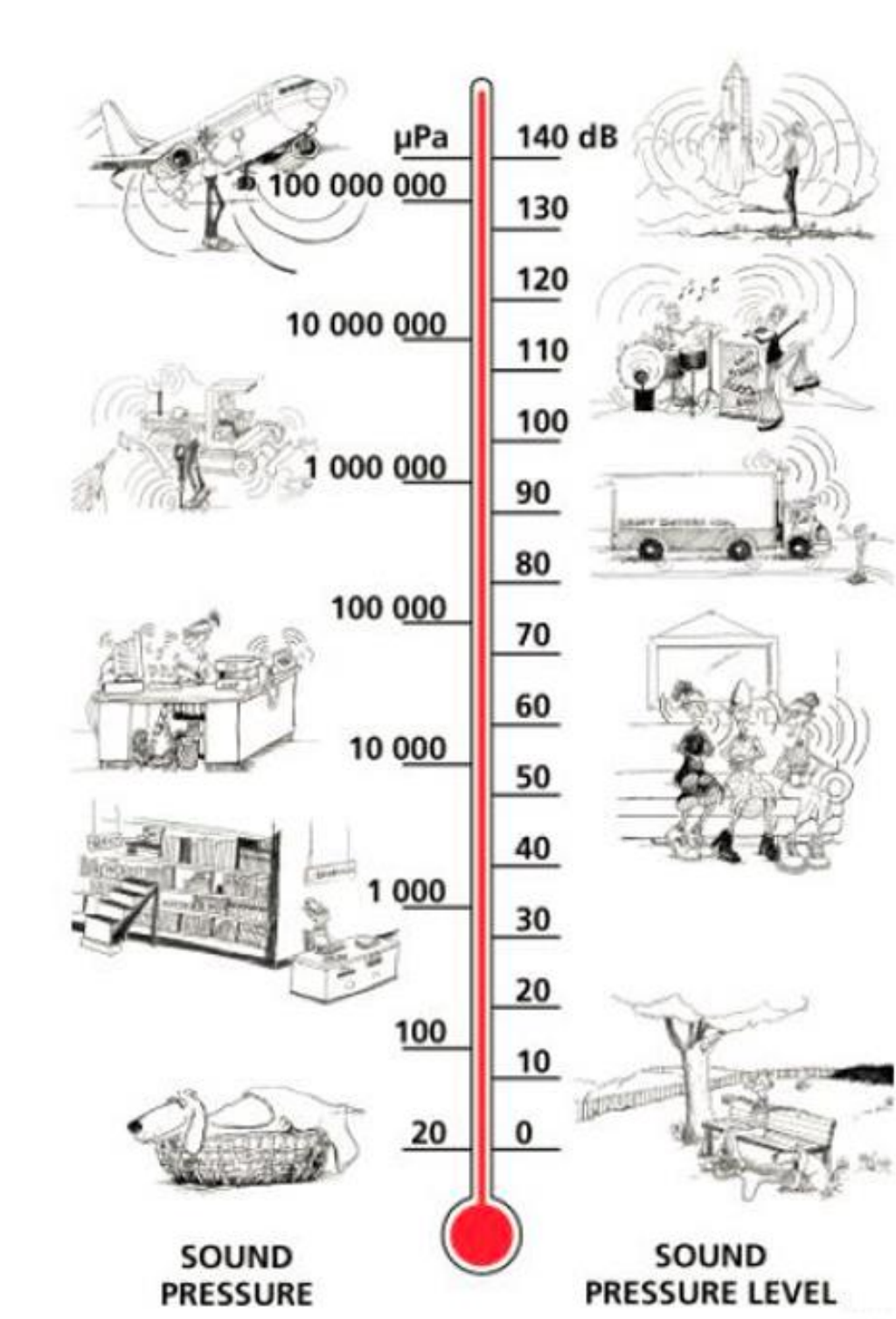
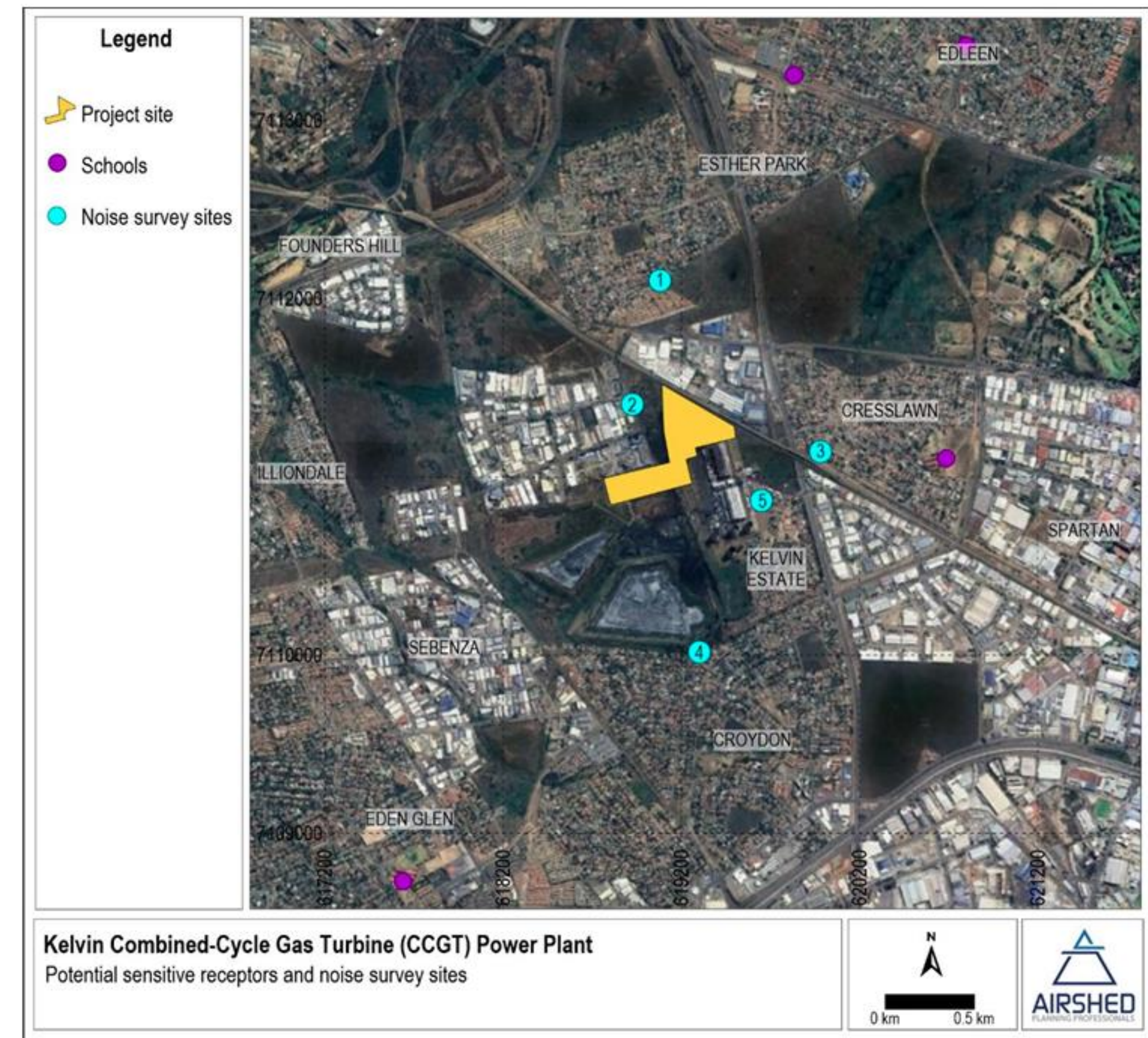
From the perspective of climate change and given that GHG emissions are lower than coal burning electricity generation, it is the opinion of the specialist that the project be authorised, on condition that GHG emissions are reported annually according to legal requirements.



INTRODUCTION

The main objective of the noise specialist study was to determine the potential impact on the acoustic environment and noise sensitive receptors (NSRs) as a result of the proposed operations and to recommend suitable management and mitigation measures.

In the assessment of simulated noise levels, reference was made to the draft Environmental Noise Standards. To assess annoyance at nearby places of residence, the increase in noise levels above the baseline at NSRs were calculated and compared to guidelines published in the SANS 10103 and the 1992 Noise Control Regulations. The Gauteng Noise Control Regulations were also considered for the assessment.



< 3 dBA	< 5 dBA	< 10 dBA	< 15 dBA	< 20 dBA
Change imperceptible	No reaction	'Little' reaction with sporadic complaints	'Medium' reaction with widespread complaints	'Strong' to 'very strong' reaction with threats of community action or vigorous community action.

WHAT INPUTS ARE USED IN THE MODEL?

The source inventory, local meteorological conditions and information on local land use were used to populate the noise attenuation model (CadnaA, ISO 9613). The propagation of noise was calculated over an area of 5 km east-west by 5 km north-south.

The baseline acoustic environment was described in terms of the location of NSRs, the ability of the environment to attenuate noise over long distances, as well as existing baseline noise levels. The following was found:

- The closest potential sensitive receptors to the proposed project consist of residential settlements and industrial areas.
- The baseline noise levels (LAeq) for the area during day-time conditions were between 42.3 dBA and 60.6 dBA and for night-time conditions between 48.0 dBA and 59.4 dBA.

The plant is designed for hot starts and black starts. Hot starts and black starts may be required under emergency conditions and do not form part of normal operations for the project. The plant is, however, required to run the diesel generators once a month for an hour for testing.

**What is a Black Start?**  
The CCGT requires electricity to start operating, however in cases where there is no power a "black start" will be required to allow startup with no external help (e.g. use of diesel generators on site)

**What is a Hot Start?**  
Hot Start in relation to steam turbine, means start up after a shutdown period of less than 10 hours

Two scenarios were therefore assessed:

- Scenario 1: Normal operating conditions; and,
- Scenario 2: Normal operating conditions as well as the diesel generators running for an hour.

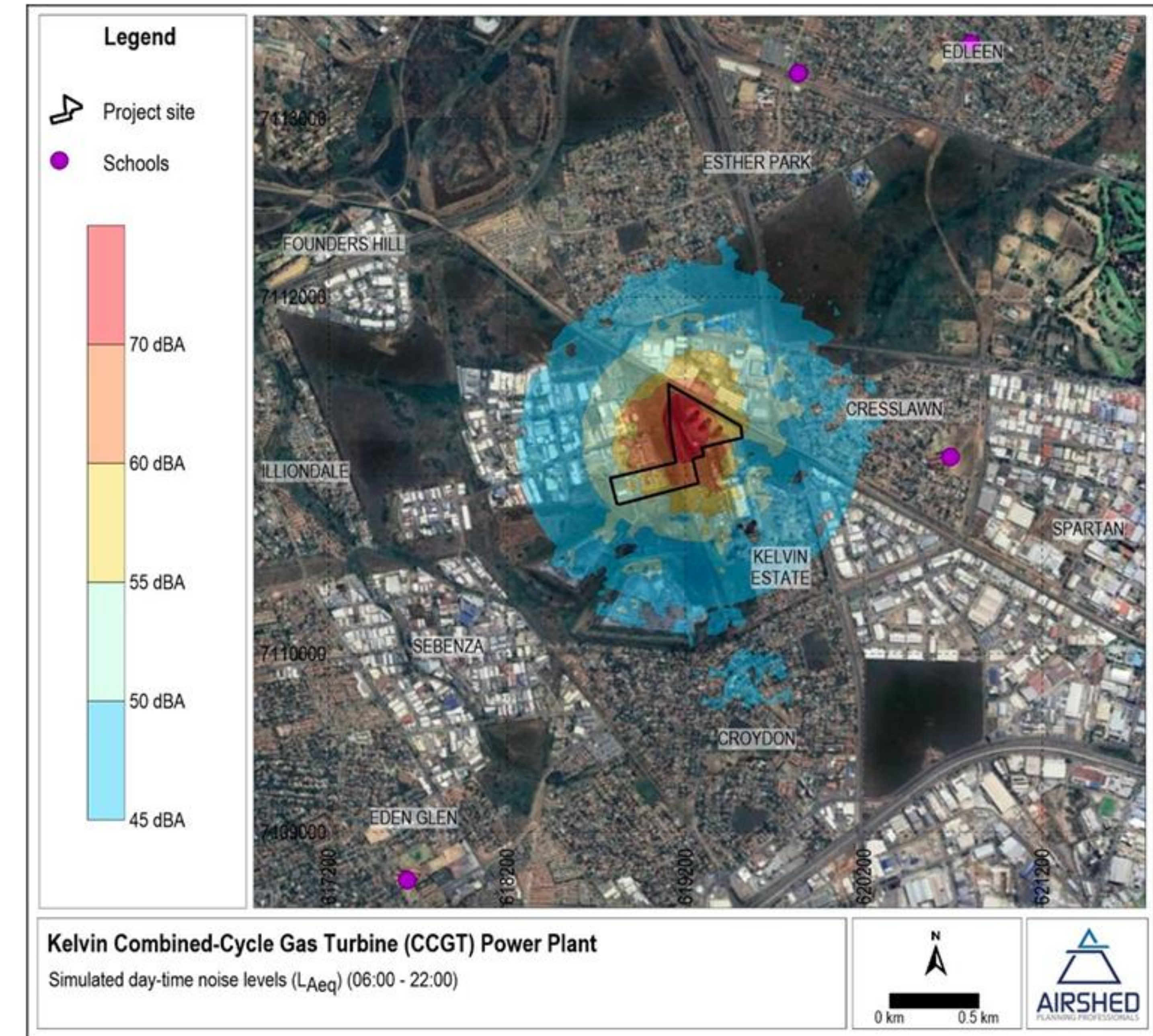


Figure 4-2: Simulated day-time noise levels due to proposed project operations only (Scenario 1)

FINDINGS

Noise levels due to project construction activities are predicted to be within the Gauteng Noise Control Regulations of 60 dBA and recommended day-time Environmental Noise Standards at all residential NSRs within the study area.

Noise levels due to operational phase project activities are predicted to be within Gauteng Noise Control Regulations and the recommended day-time Environmental Noise Standards at all residential NSRs within the study area.

For a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level is not detectable. According to SANS 10103 (2008); the predicted increase in noise levels from the current baseline due to proposed project construction only is expected to result in no community reaction.

The predicted increase in noise levels from the current baseline due to proposed project operations only is expected to result in "little" reaction with sporadic complaints at the industrial area directly north and west of the project site.

The 1992 Noise Control Regulations defines a "disturbing noise" as a noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more. The increase in noise levels from baseline due to project operations does not exceed 7 dBA at surrounding NSRs.

KEY MITIGATION

- It is suggested that noise monitoring be undertaken during the first three months of the operations to verify and validate the modelling results from the noise study and if necessary adjust mitigation measures.
- Machines and mobile equipment used intermittently should be shut down between work periods or throttled down to a minimum and not left running unnecessarily.
- Equipment to be employed should be reviewed to ensure the quietest available technology is used.
- Regular and effective maintenance of equipment.
- As far as is practically possible, sources of significant noise should be enclosed.
- Complaints register and grievance mechanism.

CONCLUSIONS

The noise impacts due to the project operations are within the Environmental Noise Standards at the closest NSRs if the plant operates with the sound pressure of 85 dBA at a distance of 1 m from all equipment. This may be achieved by including noise attenuators or enclosures where feasible.

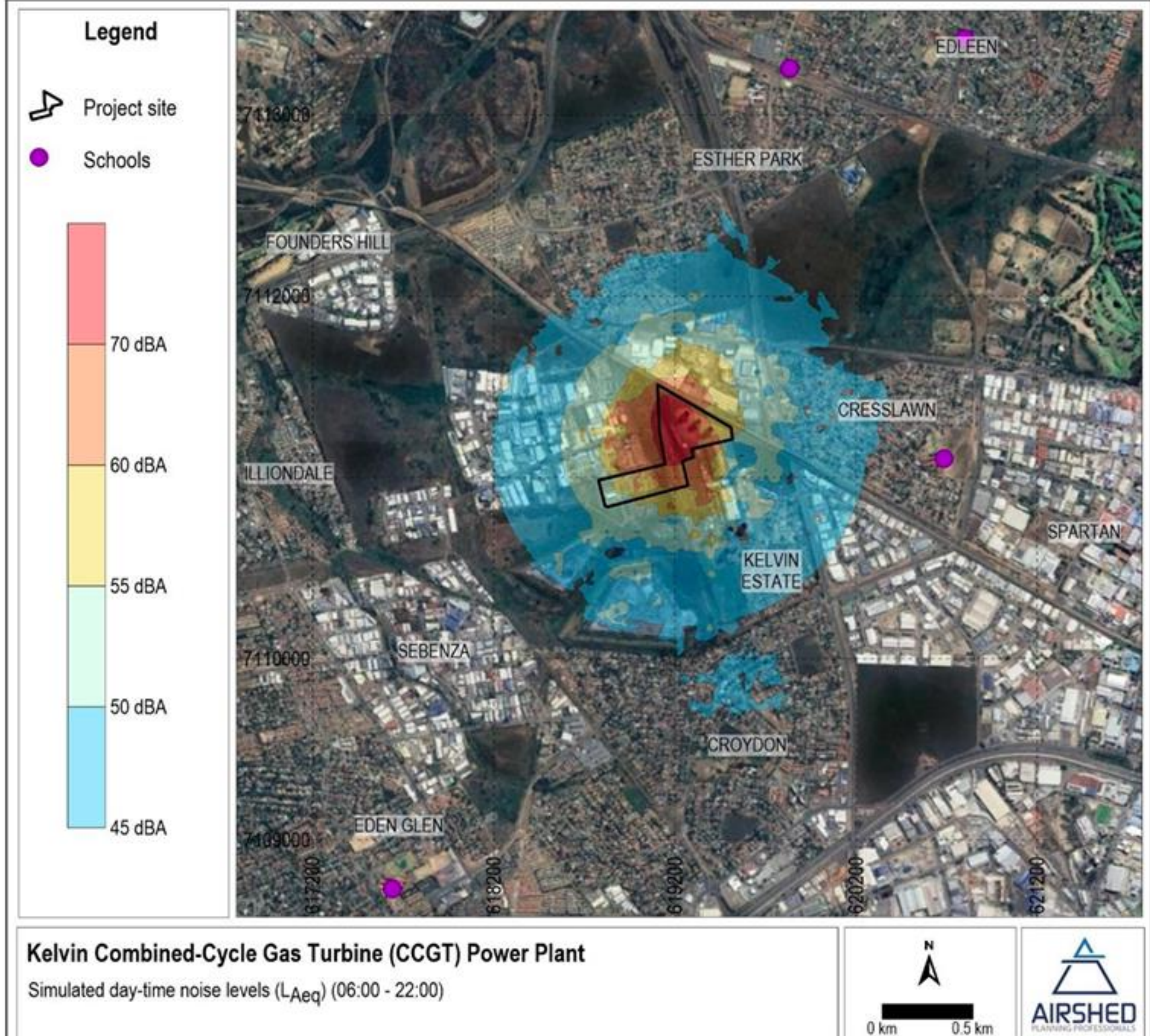


Figure 4-3: Simulated day-time noise levels due to proposed project operations only (Scenario 2)



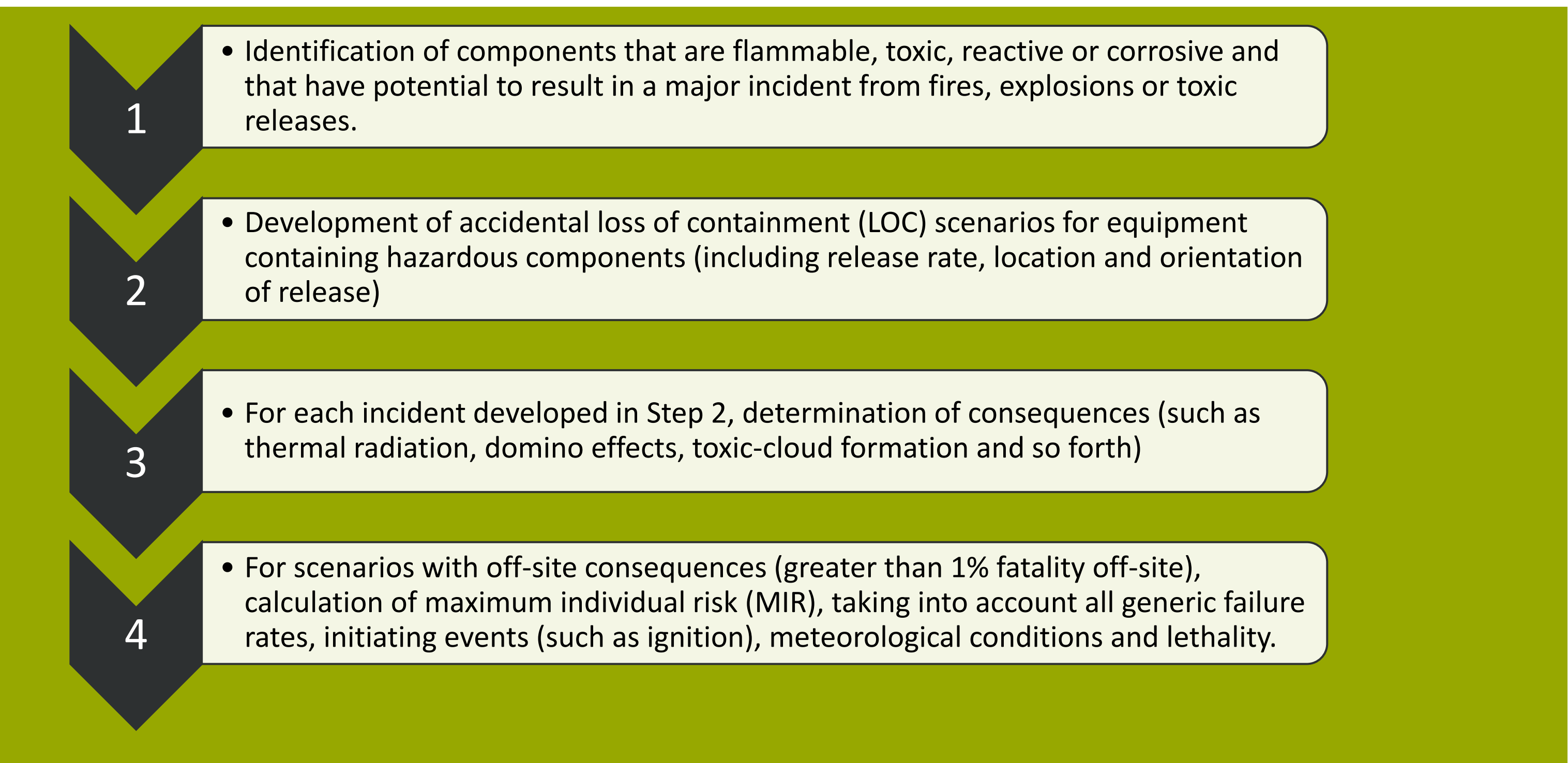
# MHI RISK ASSESSMENT

## HAZARDS

The main hazards that would occur with a loss of containment of hazardous components at the proposed CCGT facility in Kempton Park include exposure to:

- Thermal radiation from fires;
- Toxic gas releases; and
- Overpressure from explosions.

## QUALITATIVE RISK ASSESSMENT PROCESS



## KEY BULK HAZARDOUS COMPONENTS

**Ammonia** is a colourless gas with a pungent and suffocating odour. It liquefies easily under pressure, with a normal boiling point of -33°C. Although classified as a non-flammable gas, it will burn in 16–25% vapour concentrations in air when exposed to open flames. Ammonia would be used to adjust the pH of the boiler water feed. The size and storage details of the ammonia has not been provided. However, a 10 m<sup>3</sup> ammonia tank was assumed.

**Diesel** is a hydrocarbon mixture with variable composition, with a boiling-point range of between 252°C and 371°C. It is a pale-yellow liquid with a petroleum odour. Due to the flash point of diesel between 38°C and 65°C, this material is not considered highly flammable but will readily ignite under suitable conditions. A 24 m<sup>3</sup> diesel storage tank would be provided for emergency power.

**Hydrogen** is a colourless odourless gas that is flammable over a wide range of air or vapour concentrations. The vapour forms an explosive mixture with air. Vapours or gases may travel considerable distances to an ignition source and flash back.

**Nitrogen** can combine with other elements, such as oxygen, to form combustible and flammable compounds. Nitrogen would be required to purge natural gas in pipelines and equipment prior to conducting maintenance. The nitrogen designs have not been specified at this stage of the project.

**Natural Gas:** The composition of natural gas is primarily methane (±95% v/v), with other components including ethane, propane and nitrogen. Given the flammable and potentially explosive nature of natural gas, fires and vapour cloud explosions represent the primary hazards associated with transfer of the gas. The gas is a fire and explosion hazard when it is exposed to heat and flame. The lower explosive limit (LEL) is 5% v/v (meaning 5% gas to 95% air, measured by volume) and the upper explosive limit (UEL) is 15% v/v. In unconfined atmospheric conditions, the likelihood of an explosion is expected to be small. Natural gas would be used to fuel the gas turbines. The gas will be supplied via a pipeline. No storage of natural gas would take place on site.

### THE ALARP TRIANGLE

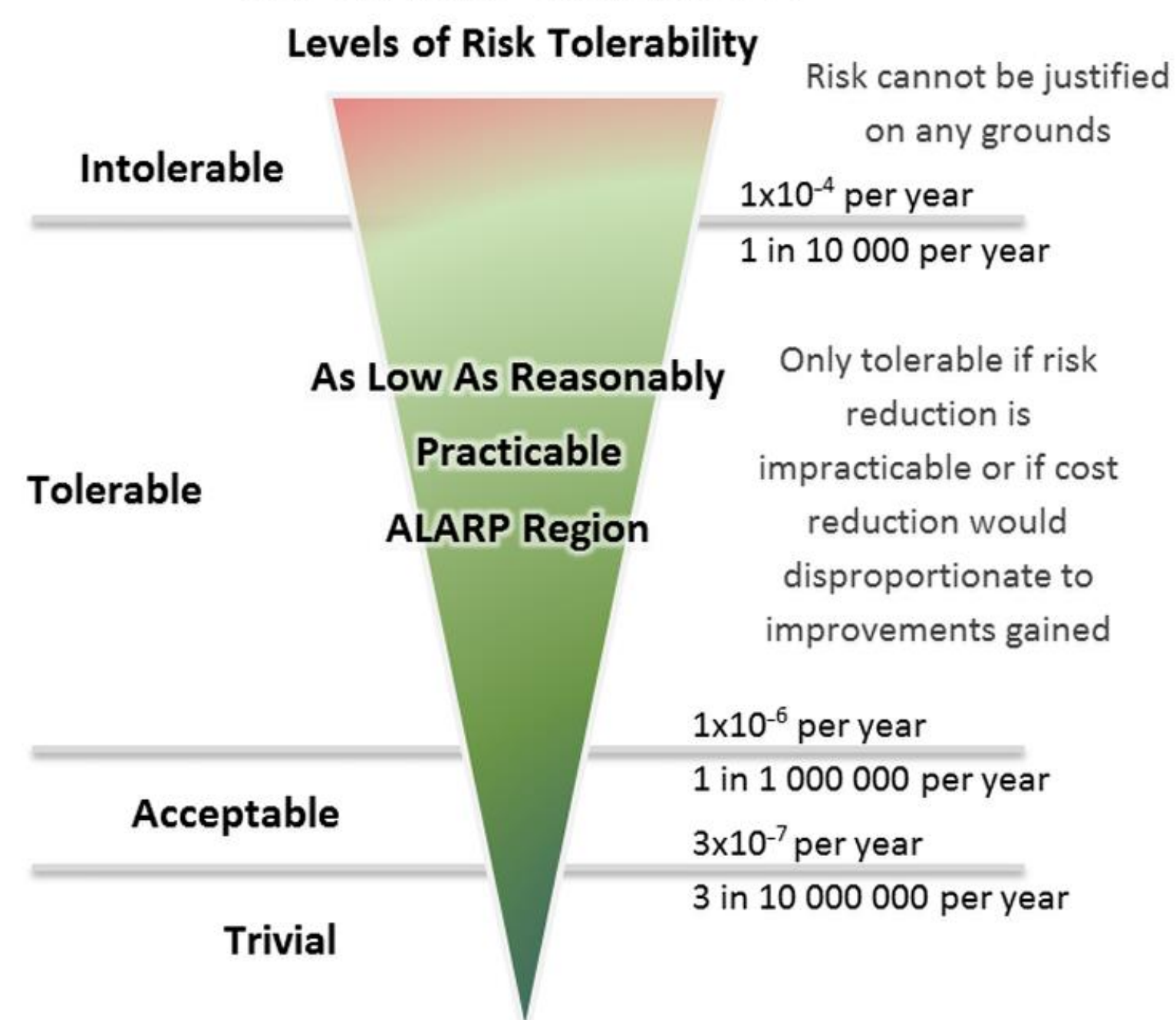


Figure 4-1: UK HSE decision-making framework

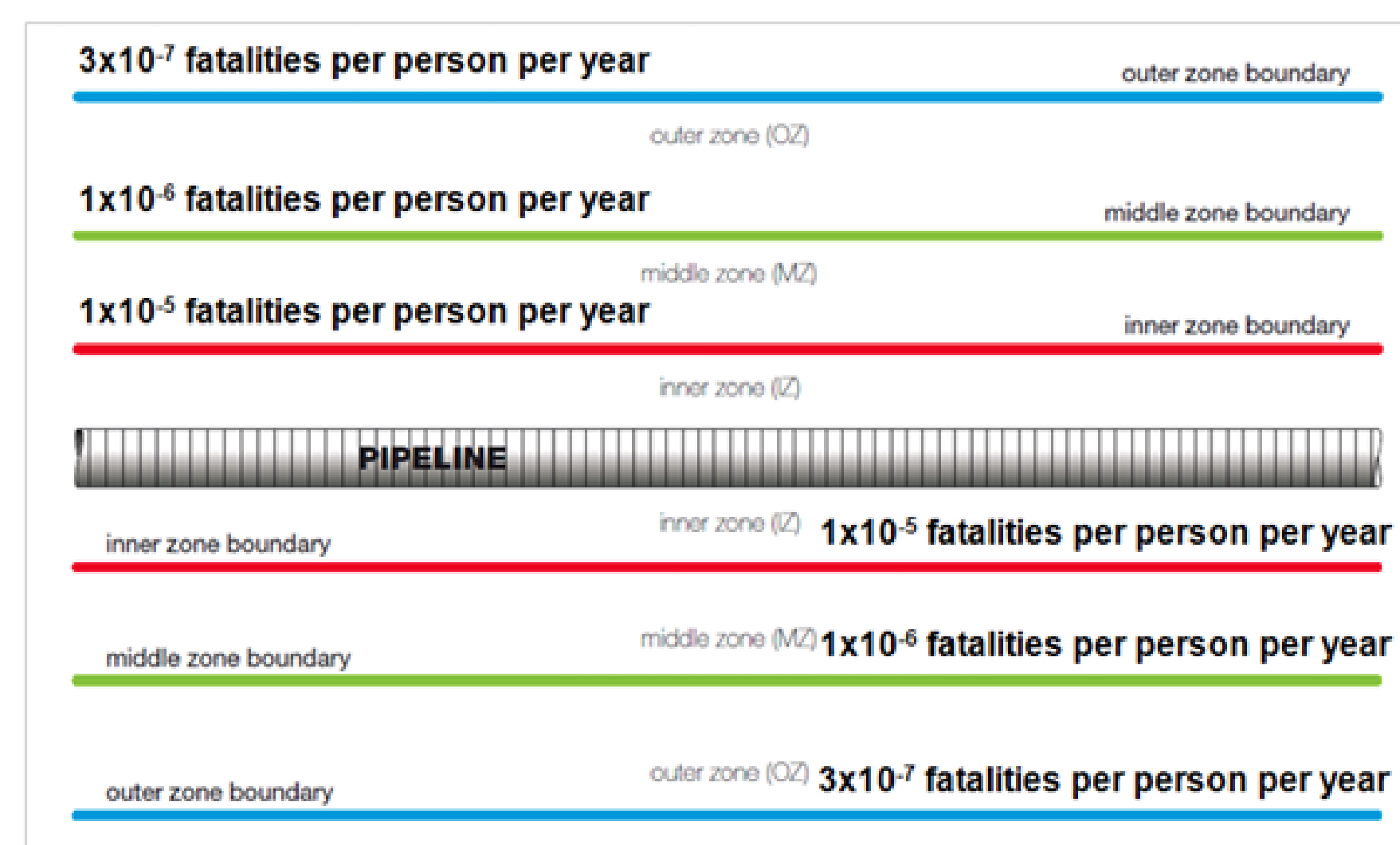


Figure 4-2: Town-planning zones for pipelines

## CONCLUSIONS AND RECOMMENDATIONS

From the simulations performed, the areas of highest risk have been identified as the release of natural gas and ammonia. The specialist did not find any fatal flaws that would prevent the project proceeding to the detailed engineering phase of the project, and would support the project under the following conditions:

- Process Hazard Analysis (PHA) - Hazardous areas should be reviewed using detailed Process Hazard Analysis (PHA)1 such as a HAZOP study that should be completed to identify potential hazards and suggest further mitigation for safer operations.
- Ignition sources near the facility must be minimised as far as possible. This is particularly relevant with the natural gas usage. A hazardous area classification as per SANS 10108 must be developed for all flammable materials. Only suitable instrumentation and electrical equipment should be installed in accordance with the requirement of the code.
- Emergency Shut Down System (ESD) : The fast detection of a loss of containment with appropriate shut-down action to limit the amount of natural gas released, will assist in the reduction of the site risks.

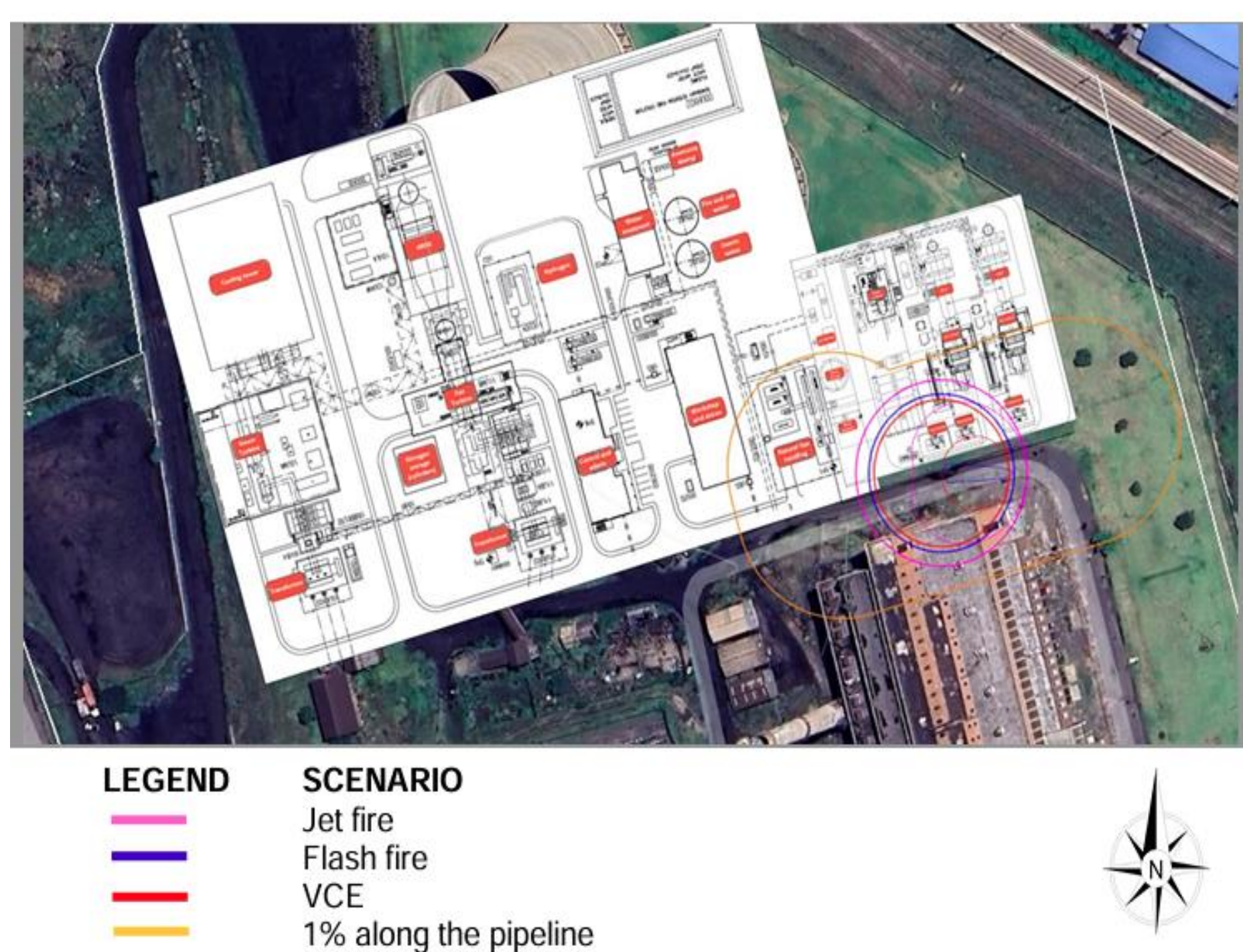


Figure 5-1: 1% Fatality along the pipeline routing of the common supply line

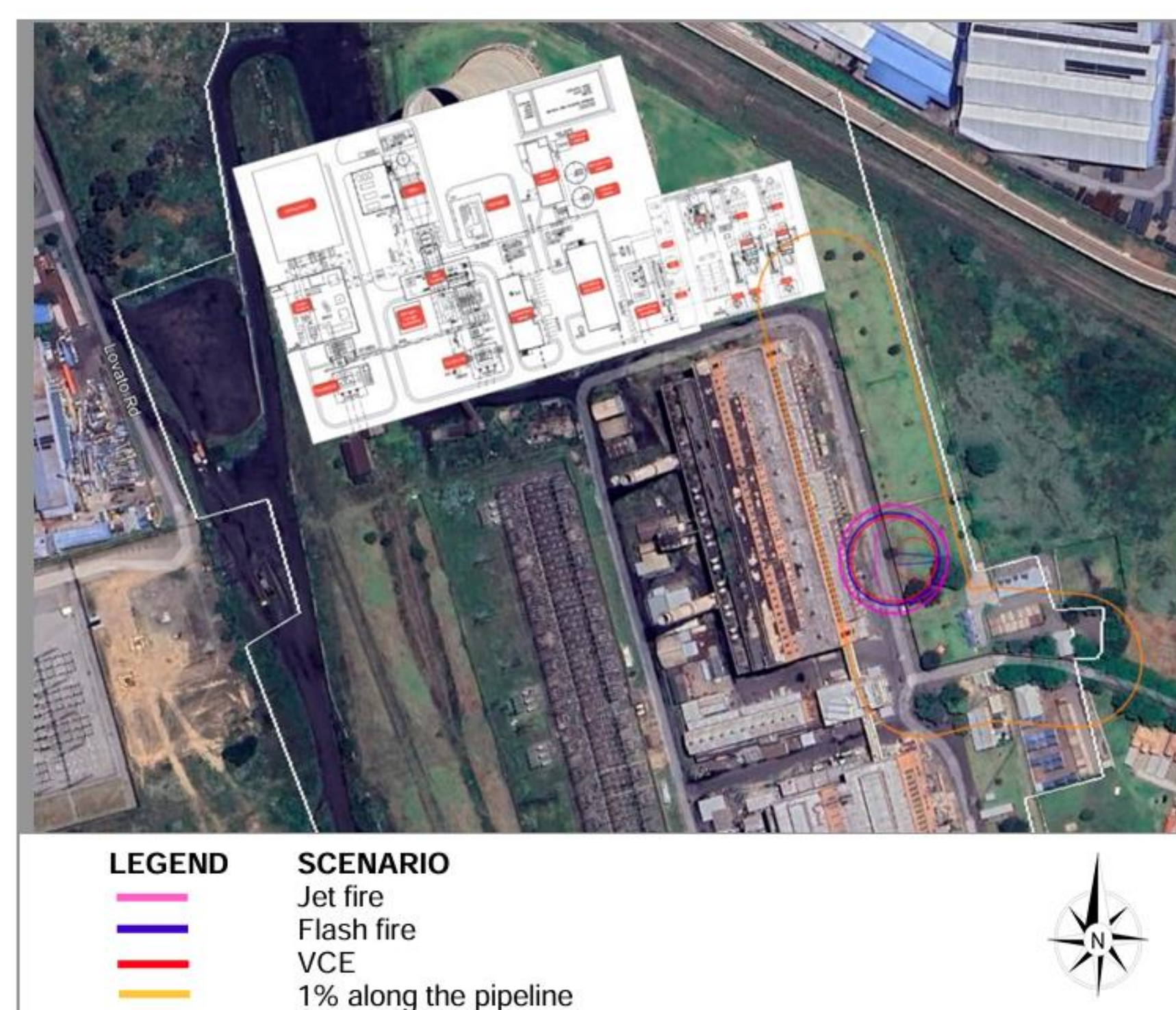


Figure 5-3: 1% Fatality along the pipeline routing of the supply route option 2

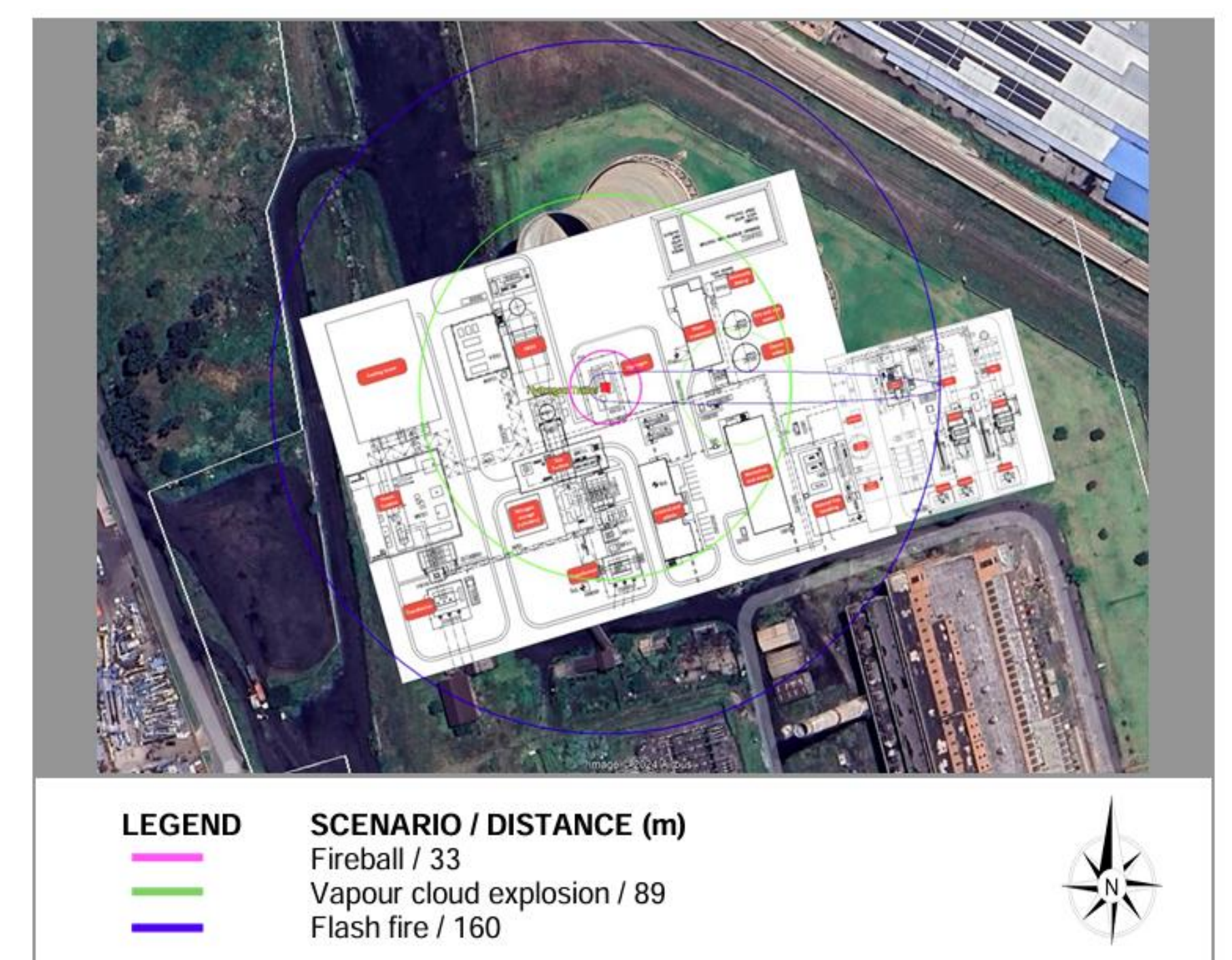


Figure 5-5: The extent to the 1% fatality from the worst-case loss of containment of the hydrogen trailer

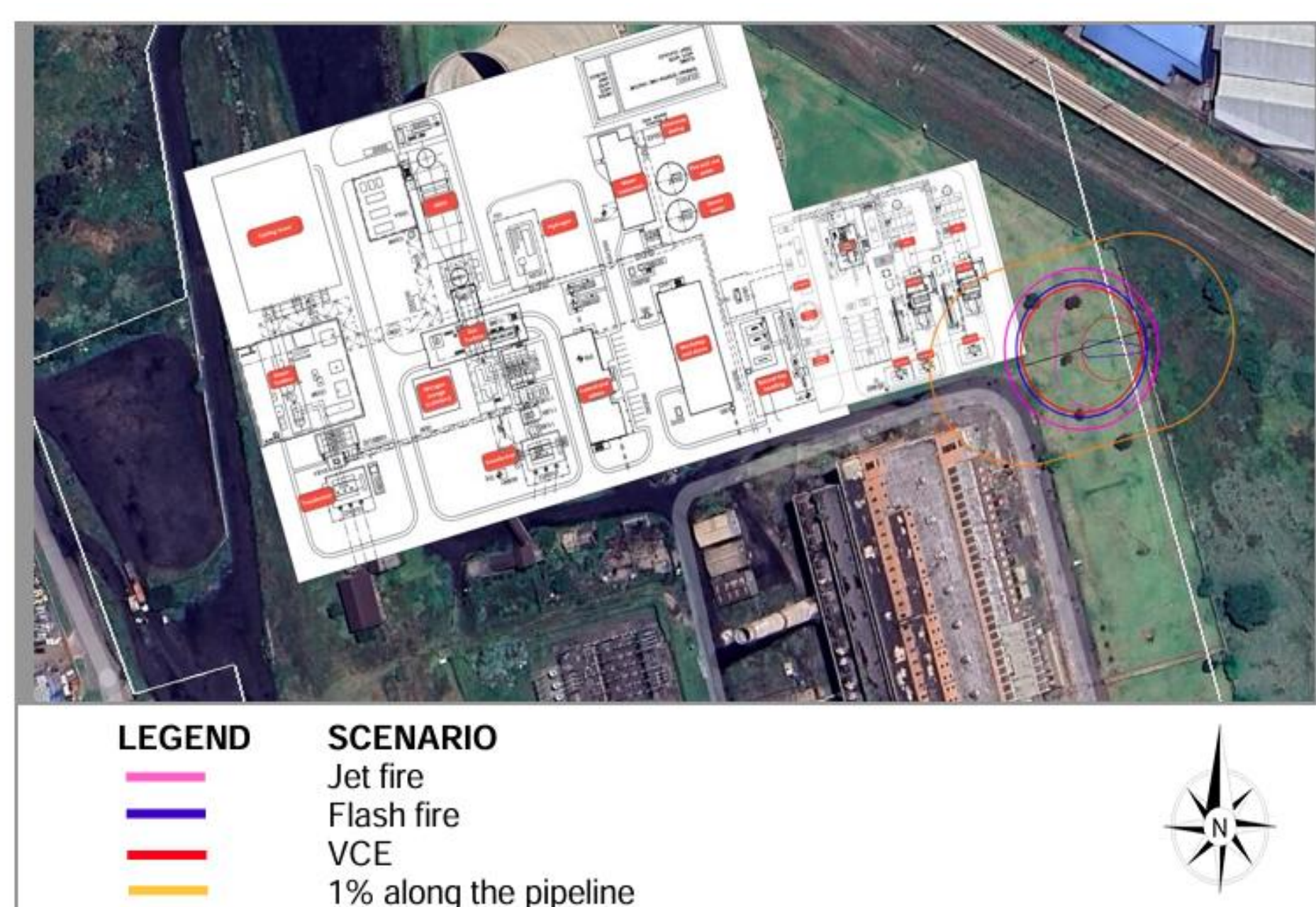


Figure 5-2: 1% Fatality along the pipeline routing of the supply route option 1

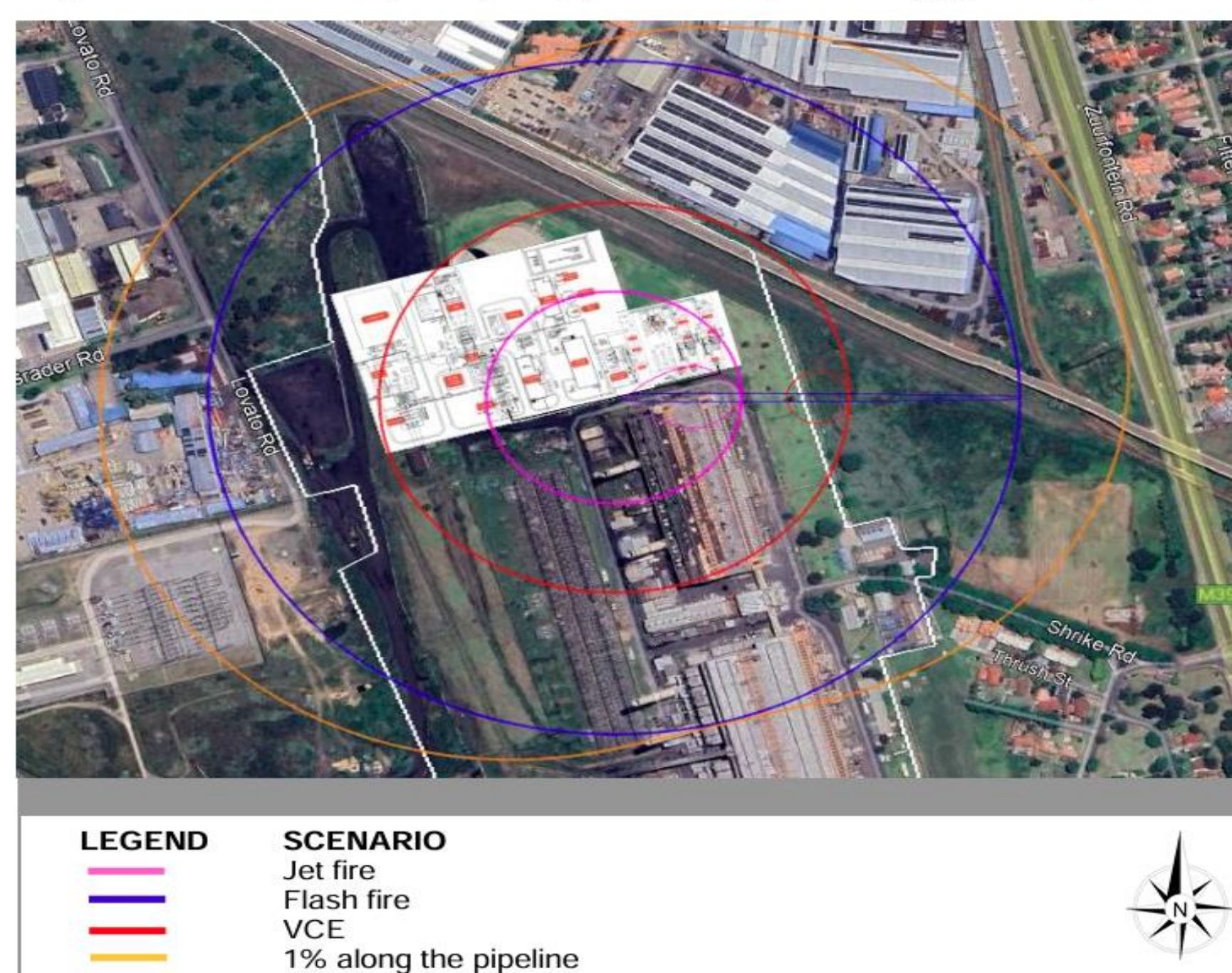


Figure 5-4: 1% Fatality along the pipeline routing to the gas turbine

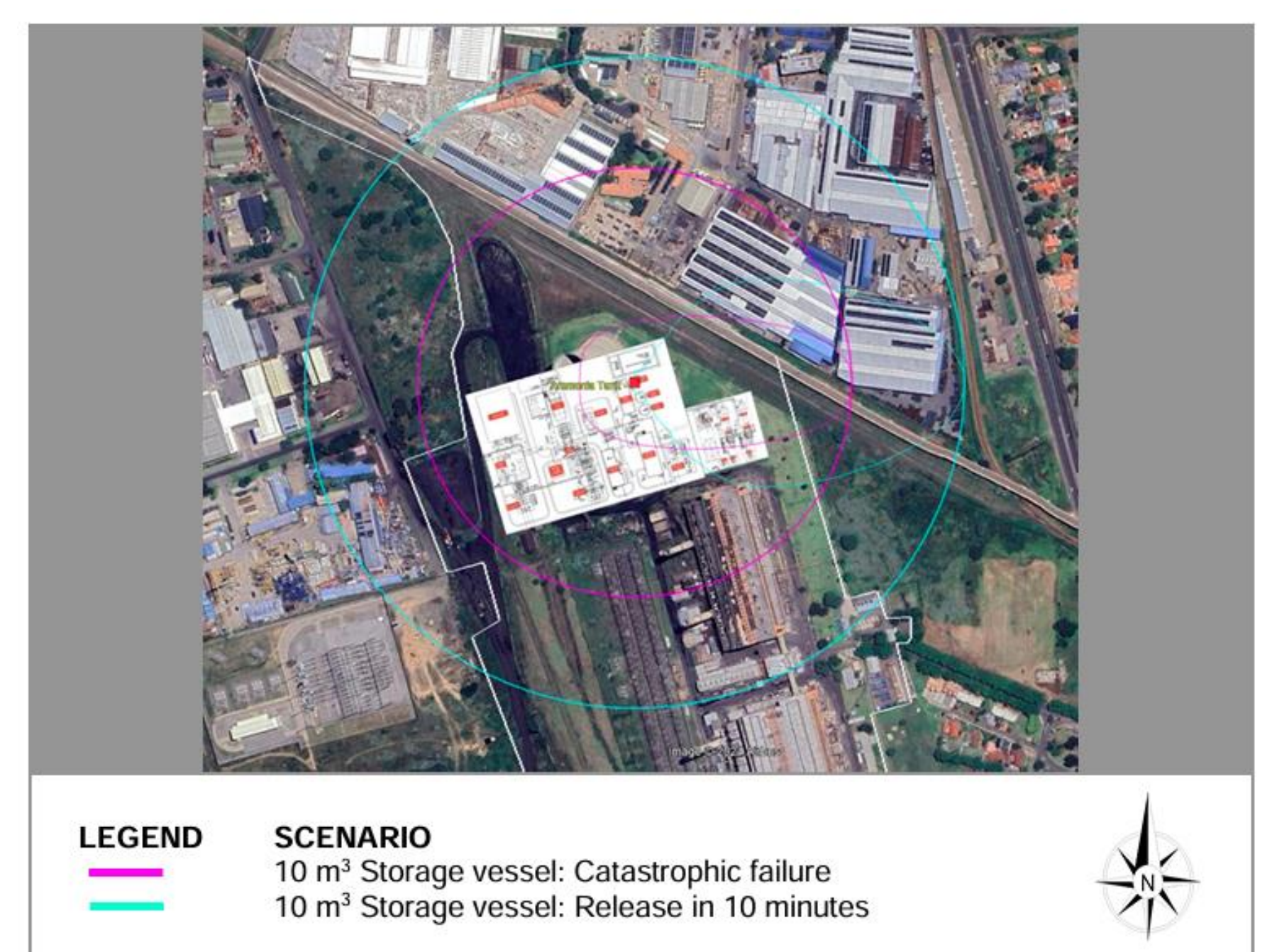


Figure 5-7: Maximum extent of the 1% fatality for major releases



# SOCIO-ECONOMIC

## WHAT IS “SOCIAL IMPACT”?



Something that is experienced or felt (physical or perceptions).



A change in .....Positive or negative.



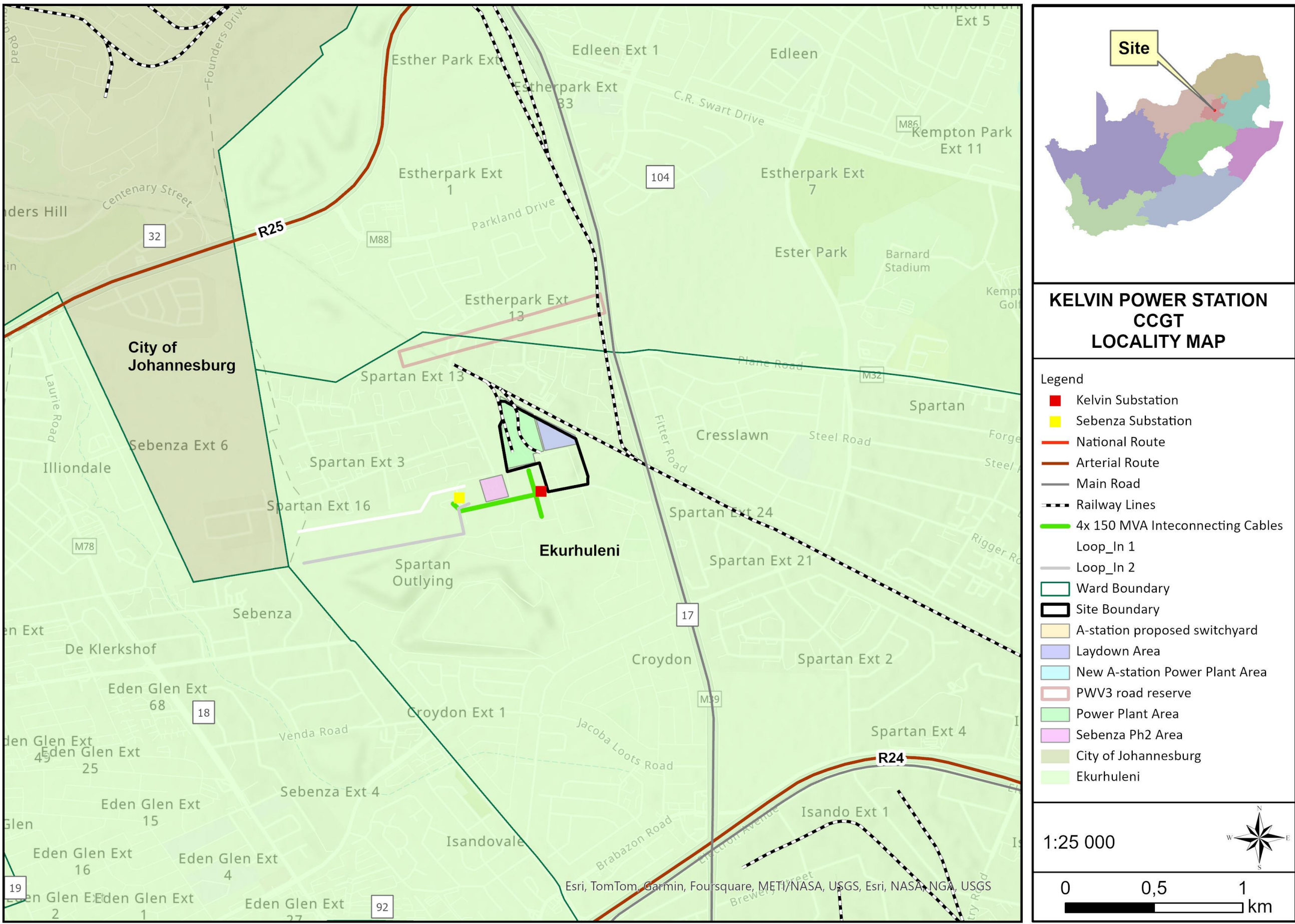
Can happen to individuals, groups, families and communities.



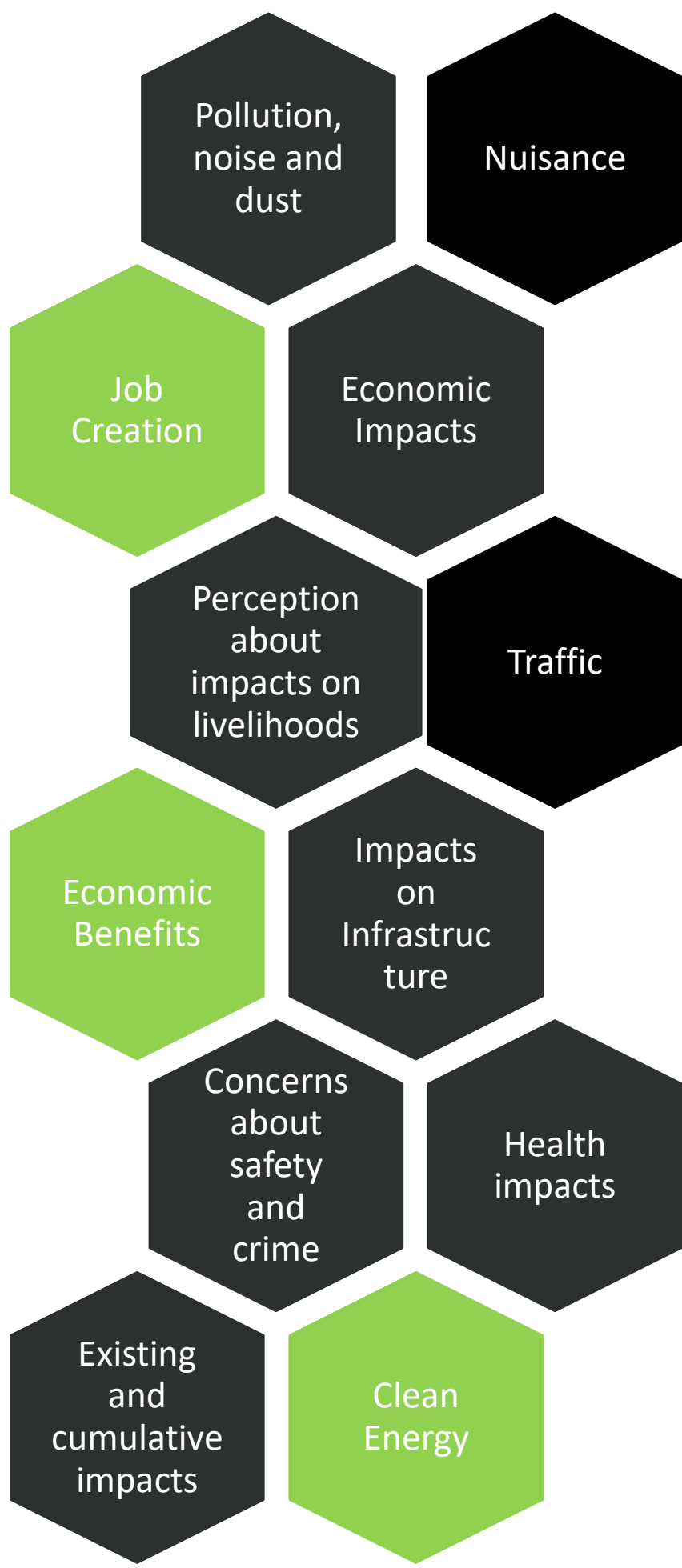
The people part of environmental assessment



## WHERE DO THE AFFECTED PEOPLE LIVE?



## WHAT ARE THE POTENTIAL IMPACTS?



## HOW SERIOUS ARE THE SOCIAL IMPACTS?

The proposed CCGT will be situated between a residential and a light industrial area. The communities are already exposed to a number of social and environmental impacts from different sources.

Given its location, it is not expected that the project will cause a significant influx of people into the area, as there are already people with some skills in the area that the power station could employ.

## SOCIAL IMPACT MANAGEMENT PLAN

No	Mitigation Measures	Phase	Timeframe
1.	Kelvin must develop a stakeholder engagement strategy specific to the CCGT plant	Design and planning, Construction Operation Decommission	Commence in the planning phase and continue through to the decommission phase of the project
2.	Kelvin must continue to implement their grievance mechanism and ensure that it is community friendly. Kelvin must continue to address and keep record of community grievances. Kelvin must continue to keep a grievance register. It is important to have documented evidence of community/power station interactions. This will assist Kelvin to track the issues, and the community to see what actions the power station has taken.	Design and planning, Construction Operation Decommission	Commence in the planning phase and continue through to the decommission phase of the project
3.	The relevant specialists will provide scientific mitigation measures for the dust and noise issues. From a social perspective it is important to continue to communicate the mitigation, monitoring and management measures to the affected parties.	Design and planning, Construction, Operation.	Commence in the planning phase and continue through to the operation phase of the project
4.	Kelvin should put measures in place to ensure the most effective local employment strategy. The strategy must include women and vulnerable people.	Design and planning Construction Operation Decommission	Use the design and planning phase to refine strategy
5.	Kelvin should ensure a fair number of secondary economic opportunities are given to local contractors. A percentage of goods as determined by Kelvin and the relevant stakeholders must also be procured locally. Services and goods must be procured locally as far as reasonably possible.	Construction, operation, decommission, closure and rehabilitation	Throughout life of the power station
6.	All contractors and employees need to wear photo identification cards. Vehicles should be marked as construction vehicles and should have logos clearly exhibited. Entry and exit points of the site should be controlled.	All phases	Throughout the life of the project
7.	Kelvin should compile and implement a traffic safety plan in accordance with recommendations from the traffic specialist. This plan should form part of the Health and Safety requirements for all contractors. Appropriate road signage must be used at the entry and exit points to the site. Although Kelvin cannot take responsibility for all road users, they should include road safety toolbox talks.	Construction Operation	Commence before construction starts, for the life of the project
8.	Develop a pamphlet that describes the new technology, any safety issues and risks and how the risks are managed. Distribute to surrounding communities through existing channels such as WhatsApp groups and Home Owners Associations.	Construction	Commence before construction starts.



# SUMMARY OF FINDINGS FROM EIA

## Impact Assessment Summary

Impact	IMPACT DESCRIPTION	Alternative	Phase	Pre-Mitigation						Pre-mitigation ER	Post Mitigation						Post-mitigation ER	Confidence	Priority Factor Criteria			
				Nature	Extent	Duration	Magnitude	Reversibility	Probability		Nature	Extent	Duration	Magnitude	Reversibility	Probability			Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Soil Compaction and Erosion: Movement of heavy machinery and construction activities can lead to soil compaction, reducing permeability and aeration, and increasing the risk of erosion. This can affect the regeneration of indigenous plants and overall soil fertility.		Alternative 1	Construction	-1	2	3	3	3	4	-11	-1	1	3	2	1	3	-5.25	Medium	2	2	1.25	-6.5625
Dust Pollution: Ongoing construction activities generate dust that can impact surrounding terrestrial habitats by settling on the ground and altering the microhabitats for soil organisms.		Alternative 1	Construction	-1	3	3	4	3	5	-16.25	-1	2	3	3	3	4	-11	Medium	2	2	1.25	-13.75
Chemical Spills: The use of construction materials and machinery poses a risk of chemical spills, which can contaminate the soil and affect both soil quality and the organisms that depend on it.		Alternative 1	Construction	-1	3	3	4	3	4	-13	-1	2	3	3	3	3	-8.25	Medium	2	2	1.25	-10.3125
Noise Pollution: Construction noise can disrupt local fauna, particularly during critical periods such as breeding seasons. Persistent noise may lead to longer-term displacement of any sensitive species.		Alternative 1	Construction	-1	3	3	4	2	4	-12	-1	3	3	3	2	3	-8.25	Medium	1	1	1.00	-8.25
Vehicle and Machinery Impact: Increased vehicular and machinery movement poses a risk of direct harm to wildlife and can lead to the creation of barriers to animal movement, particularly affecting small and less mobile species.		Alternative 1	Construction	-1	2	3	4	2	3	-8.25	-1	2	3	3	2	3	-7.5	Medium	1	1	1.00	-7.5
Anthropogenic Activity: Continuous human presence and activity can deter fauna from returning to or settling in the area, particularly impacting species sensitive to human disturbance.		Alternative 1	Construction	-1	2	3	4	3	3	-9	-1	2	3	3	3	2	-5.5	Medium	1	1	1.00	-5.5
Waste Generation: Construction waste, if not managed properly, can lead to pollution and ingestion hazards for wildlife, including small mammals and birds that might forage in the area.		Alternative 1	Construction	-1	2	3	4	3	3	-9	-1	2	3	3	3	3	-8.25	Medium	2	2	1.25	-10.3125
Clearing of Remaining Vegetation: Additional clearing may be necessary for construction, further reducing local biodiversity and impacting any surviving indigenous plants.		Alternative 1	Construction	-1	2	3	2	2	3	-6.75	-1	1	2	1	1	2	-2.5	Medium	1	1	1.00	-2.5
Dust Deposition: Dust from construction can continue to impact surrounding plant communities by settling on leaves, thereby inhibiting photosynthesis and growth.		Alternative 1	Construction	-1	3	3	4	3	3	-9.75	-1	2	3	3	3	3	-8.25	Medium	2	1	1.13	-9.28125
Introduction of Invasive Species: Construction activities can facilitate the spread of invasive plant species, which can outcompete and displace indigenous vegetation, further altering the local ecosystem.		Alternative 1	Construction	-1	3	3	4	3	3	-9.75	-1	2	3	3	2	2	-5	Medium	2	2	1.25	-6.25
Soil Contamination: Continuous operation can lead to small, cumulative spills of hydrocarbons and other chemicals that can seep into the soil, potentially affecting soil health and microorganism populations.		Alternative 1	Operation	-1	3	4	3	4	4	-14	-1	2	3	2	3	3	-7.5	Medium	2	2	1.25	-9.375
Heat Emissions: The heat released from the plant can alter the local microclimate, affecting soil temperature and potentially influencing local vegetation growth and soil-dwelling organisms.		Alternative 1	Operation	-1	3	4	3	3	4	-13	-1	3	3	2	2	3	-7.5	Medium	2	1	1.13	-8.4375
Noise Pollution: Ongoing operation of the power station generates noise, which can disrupt local wildlife. Persistent noise can interfere with communication, breeding, and feeding behaviors of nearby fauna.		Alternative 1	Operation	-1	3	4	4	3	4	-14	-1	3	4	3	2	3	-9	Medium	1	1	1.00	-9
Light Pollution: The facility's lighting can affect nocturnal animals, altering their natural behaviors and potentially displacing them from their habitats.		Alternative 1	Operation	-1	2	4	4	3	4	-13	-1	2	4	3	2	3	-8.25	Medium	1	1	1.00	-8.25
Collision Risks: Birds and bats may collide with power station structures, particularly during migration periods or in poor weather conditions.		Alternative 1	Operation	-1	2	4	3	3	4	-12	-1	1	3	2	2	3	-6	Medium	1	1	1.00	-6
Air Emissions: Emissions from the gas turbines, including nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter, can settle on nearby vegetation, affecting plant health and growth. Over time, this can lead to reduced photosynthesis and plant vigor.		Alternative 1	Operation	-1	3	4	3	3	4	-13	-1	3	4	2	3	3	-9	Medium	2	1	1.13	-10.125
Altered Hydrology: The operation of the power station might alter local hydrology, especially if water is used for cooling processes. This can impact the availability of water for local plant communities, leading to stress or changes in species composition.		Alternative 1	Operation	-1	3	4	3	4	3	-10.5	-1	2	4	2	3	2	-5.5	Medium	2	1	1.13	-6.1875
Concerns about safety of the CCGT Plant		Alternative 1	Planning	-1	3	2	3	2	5	-12.5	-1	3	2	2	2	3	-6.75	High	1	1	1.00	-6.75
Concerns about crime		Alternative 1	Construction	-1	3	2	4	2	5	-13.75	-1	3	2	3	2	4	-10	High	2	1	1.13	-11.25
Environmental nuisance		Alternative 1	Construction	-1	3	2	2	2	5	-11.25	-1	3	2	2	2	4	-9	High	2	2	1.25	-11.25
Traffic related impacts		Alternative 1	Construction	-1	3	2	3	2	5	-12.5	-1	3	2	2	2	4	-9	High	2	1	1.13	-10.125
Jobs and economic benefits		Alternative 1	Construction	1	3	2	3	2	4	10	1	3	2	4	2	5	13.75	High	2	1	1.13	15.46875
Jobs and economic benefits		Alternative 1	Operation	1	3	4	3	2	4	12	1	3	4	4	2	5	16.25	High	2	1	1.13	18.28125
Cleaner energy generation		Alternative 1	Operation	1	4	4	3	3	4	14	1	4	4	4	3	5	18.75	High	2	1	1.13	21.09375
Impacts on existing infrastructure and services		Alternative 1	Planning	-1	2	3	3	3	3	-8.25	-1	2	3	3	3	1	-2.75	Medium	1	2	1.13	-3.09375
Impacts on soil and agriculture		Alternative 1	Construction	-1	2	4	2	3	2	-5.5	-1	2	2	1	2	2	-3.5	Medium	1	1	1.00	-3.5
Impact on Air Quality		Alternative 1	Construction	-1	3	2	2	2	3	-6.75	-1	3	2	2	2	2	-4.5	Medium	1	1	1.00	-4.5
Impact on Air Quality		Alternative 1	Operation	-1	3	4	2	2	3	-8.25	-1	3	4	2	2	3	-8.25	Medium	1	1	1.00	-8.25
Impact on Air Quality		Alternative 1	Decommissioning	-1	3	2	3	2	3	-7.5	-1	3	2	3	2	2	-5	Medium	1	1	1.00	-5
Increase in noise levels		Alternative 1	Construction	-1	3	2	3	2	3	-7.5	-1	3	2	2	2	3	-6.75	Medium	1	1	1.00	-6.75
Increase in noise levels		Alternative 1	Operation	-1	3	4	4	3	4	-14	-1	3	4	2	3	3	-9	Medium	1	1	1.00	-9
Increase in noise levels		Alternative 1	Decommissioning	-1	3	2	3	2	3	-7.5	-1	3	2	2	2	3	-6.75	Medium	1	1	1.00	-6.75
Job losses		Alternative 1	Decommissioning	-1	4	4	4	2	4	-14	-1	4	4	2	2	4	-12	Medium	1	1	1.00	-12
Climate Change Impacts		Alternative 1	Operation	-1	5	4	5	4	4	-18	-1	5	4	5	4	4	-18	Medium	2	2	1.25	-22.5
Climate Change Impacts		Alternative 1	Construction	-1	4	3	3	2	3	-9	-1	4	3	2	2	3	-8.25	Medium	1	1	1.00	-8.25
Waste Management Impacts		Alternative 1	Operation	-1	2	4	3	3	3	-9	-1	2	4	2	3	3	-8.25	Medium	1	1	1.00	-8.25
Waste Management Impacts		Alternative 1	Decommissioning	-1	2	2	3	3	3	-7.5	-1	2	2	2	2	3	-6.75	Medium	2	2	1.25	-8.4375
Heritage Impacts (Incl Fossils)		Alternative 1	Construction	-1	2	5	2	2	1	-2.75	-1	2	5	1	2	1	-2.5	Medium	1	2	1.13	-2.8125
Visual Impacts		Alternative 1	Operation	-1	3	4	1	3	4	-11	-1	3	4	1	3	3	-8.25	Medium	3	1	1.25	-10.3125
Impacts due to communication inefficiency		Alternative 1	Planning	-1	3	4	3	3	3	-10.5	-1	3	2	2	2	2	-4.5	Medium	2	1	1.13	-5.0625
Natural gas pipeline installation		Alternative 1	Operation	-1	2	5	5	5	1	-4.25	-1	1	4	5	5	1	-3.75	Medium	1	3	1.25	-4.6875
Hydrogen Installation		Alternative 1	Operation	-1	2	5	4	5	1	-4	-1	1	5	4	5	1	-3.75	Medium	1	3	1.25	-4.6875
Ammonia Storage		Alternative 1	Operation	-1	2	5	5	5	1	-4.25	-1	1	5	4	5	1	-3.75	Medium	1	3	1.25	-4.6875
Cumulative Risk Impact of Project		Alternative 1	Operation	-1	2	5	5	5	1	-4.25	-1	5	4	5	5	1	-4.75	High	1	3	1.25	-5.9375

### The EIA Phase aimed to achieve the following:

- Provide an overall assessment of the social, economic and biophysical environments affected by the proposed project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.



### Impact Statement

The findings of the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. Based on the nature and extent of the proposed project, the limited level of disturbance predicted as a result of the Kelvin CCGT Power Plant development, the findings of the specialist studies, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team and the EAP that the significance levels of the majority of identified negative impacts can generally be reduced to an acceptable level by implementing the recommended mitigation measures and the project should be authorized on condition that the below recommended conditions are included in the decision and that compliance with the EMPr must be strictly adhered to



### REMINDER!

Questions / Clarification

WE WANT  
YOU!

Support / Suggestions

.....TO SUBMIT  
YOUR VIEWS ON  
THE PROPOSED  
PROJECT!!

Concerns / Objections

All inputs received by EIMS will be considered and included in the submissions to the competent authority Competent Authority for consideration in their decision-making process.

Please submit all comments or queries via letter, fax, phone call, or email to the following contact details:

Contact Person: Jolene Webber  
Postal Address: P.O. Box 2083; Pinegowrie; 2123

Telephone: (011) 789 7170 / Fax: (086) 571 9047

E-mail: kelvin@eims.co.za

Please include the project reference number 1607 in all correspondence.