



Draft Basic Assessment Report (DBAR) as part of the Integrated Environmental Authorisation and Waste Management Licence Application for the proposed expansion of the Waste Management Facility at A-Thermal Retort Technologies (Pty) Ltd, Ekurhuleni

A 3D rendering of a globe with water splashing over it, symbolizing sustainability and environmental impact. The globe is positioned in the center of the page, with a large, faint 'E' watermark behind it.

Innovation in Sustainability

Technical Report: E44700206_BAR_V1

Prepared for: A-Thermal Retort Technologies (Pty) Ltd

Prepared by: Exigo Sustainability (Pty) Ltd

Draft Basic Assessment Report (DBAR) as part of the Integrated Environmental Authorisation and Waste Management Licence Application for the proposed expansion of the Waste Management Facility at A-Thermal Retort Technologies (Pty) Ltd, Ekurhuleni

June 2021

Conducted on behalf of:

A-Thermal Retort Technologies (Pty) Ltd

Project team:

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Exigo Sustainability (Pty) Ltd have been appointed by A-Thermal Technologies (Pty) Ltd to assist the company in facilitating an application for an integrated environmental authorisation and waste management licence in respect of the proposed upgrade of its Waste Management Facility.

What follows herein below is an accounting of an independent assessment undertaken by Exigo in accordance with section 24 of the National Environmental Management Act, 107 of 1996 read with the provisions of the Environmental Impact Assessment Regulations, 2014 the purpose of which is to give effect the general objectives of environmental authorisation process by identifying and assessing environmental impacts that are associated with the proposed activities to be undertaken by the A-Thermal in order to, amongst others, ensure that:

- (i) such information as may be required is provided to decision-makers enabling them to execute their administrative duties and to make an informed decision regarding the application for authorisation;
- (ii) potential interested and affected parties are afforded an opportunity to engage in the authorisation process and to have their concerns, if any, addressed;
- (iii) potential negative impacts to the environment are avoided, and or where it cannot be avoided, that it is mitigated and minimised to an acceptable operating standard; and
- (iv) the project conforms to the principles of sustainable development.

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E44700206_BAR_V1	June 2021	1.0	Draft for I&AP review

LIST OF ABBREVIATIONS

Abbreviation	Description
BA	Basic Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Areas
CEMS	Continuous Emission Monitoring System
EMM	Ekurhuleni Metropolitan Municipality
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DEAT	Department of Environmental Affairs and Tourism
ECO	Environmental Control Officer
EMPr	Environmental Management Programme Report
GDARD	Gauteng Department of Agriculture and Rural Development
GEMF	Gauteng Environmental Management Framework
GHG	Greenhouse Gas
GNR	Government Notice Regulation
GVA	Gross Value Added
HHV	Higher Heating Value
IEM	Integrated Environmental Management
I&AP's	Interested and Affected Parties
IDP	Integrated Development Programme
ISO	International Organization for Standardization
MES	Minimum Emission Standards
MRF	Materials Recycling Facility
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NHRA	The National Heritage Resources Act
PLC	Programmable Logic Controller
SAHRA	South African Heritage Resources Association
SAWS	South African Weather Services
TDP	Thermal Desorption Plant/ Process
WM	With Mitigation
WOM	Without Mitigation

EXECUTIVE SUMMARY

BACKGROUND

A-Thermal Retort Technologies (Pty) Ltd was founded in 1996 and successfully operates a waste management and treatment facility in Olifantsfontein, Ekurhuleni, Gauteng.

A-Thermal uses thermal desorption technology (also known as pyrolysis) for the treatment and destruction of hazardous and general wastes. The process used has a destruction efficiency of 99.9999 % (known as 6 nines performance) and is considered by the United States Environmental Protection Agency (US EPA) and the European Commission Integrated Pollution Prevention and Control (EU IPPC) Directive as a “*Best Available Technology*” for the treatment of hazardous waste.

The operations are governed and managed in accordance with the prescribed conditions of A Thermal’s existing Environmental Authorisations.

The operations’ objective is to ensure the safe destruction of waste materials, including chemical and health care risk waste, that pose a significant risk to human health and the environment if not treated, and in this way, deliver an essential service to the waste sector.

To add to the above, critical services provided to the country by A-Thermal, in just the last few years, include amongst others:

- The safe treatment of contaminated meat and food products during the 2017 listeriosis outbreak;
- The safe treatment of COVID-19 isolation waste as part of ongoing measures implemented to prevent the spread of the Corona virus;
- Soil remediation from petrochemical contaminated land;
- The safe treatment of ozone depleting substances, including chlorofluorocarbons (CFCs), hydrochlorofluorocarbons and halons to name but a few examples.

To ensure continued improvement and conformance to both industry and international standards, A-Thermal has adopted and implemented an integrated HSEQ management system and have obtained certification in terms of ISO 9001, ISO 14 001 and ISO 45 001 standards.

PROPOSED PROJECT

A-Thermal is proposing to upgrade its existing operations to allow for energy recovery by power generation, which will require additional gas abatement technologies.

The driving factors for the project are:

1. Reduction of waste to landfill as part of government policy and objectives;
2. Increase of waste recycled and/or diverted from disposal to landfills as part of the circular economy;
3. Reduction of greenhouse gas emissions (GHG) compared to disposal of waste to landfill;
4. Generation of electricity using non-fossil fuels;
5. Socio-economic development through direct local investment, creation of new jobs and permanent skilled positions.

All of the above items are in-line and complementary to the South African Government's National Waste Management Strategy 2020.

To ensure the viability of power generation, the plant treatment capacity will need to be increased by 200 tons of general and hazardous wastes per day in order to make energy recovery possible. The proposed project will not trigger any new waste management activities in addition to those which have already been authorised in the company's existing licences, but will require an upgrade of the existing Waste Management Facility.

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Process Description

Upgrades to the existing plant will allow for the production of 42 Megawatt (MW) thermal energy, based on the calorific value of the wastes received. Since the waste feed is variable, the throughput, steam generation and electricity generation may vary from time to time. However, for power generation, the calorific value has been approximated at a weighted average of 11-18 MJ/kg, set at 12.2 MJ/kg (HHV) from which 42 MW thermal heat is available. With an efficiency of 30-33 % of a steam boiler system, **approximately 14 MW electricity will be produced**. A more detailed description of the process will be discussed in the relevant sections below.

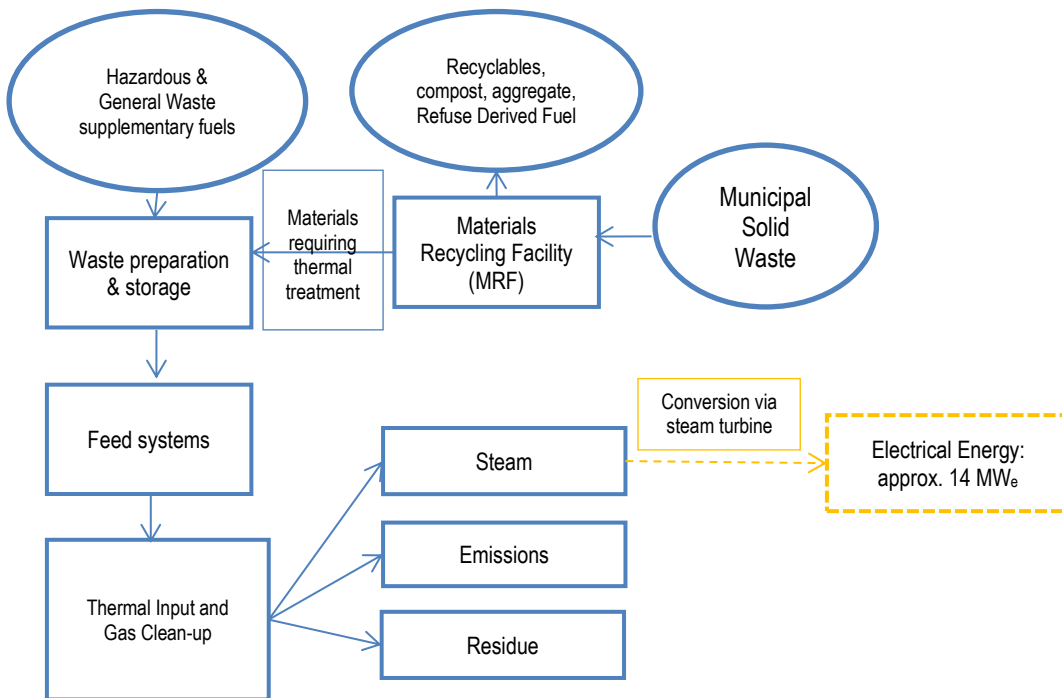


Figure 1: Flow Diagram of activities on site. The dotted line orange boxes indicate the proposed upgrade.

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1. Waste Handling (Raw/ Feed Materials)

Waste is pre-screened for acceptance by the Technical Sales Department before it is delivered to site. Waste is transported using vehicles registered with the relevant authorities for the transportation of hazardous and general waste. Waste streams are stored according to the chemical compatibility. A-Thermal is already registered and complies with the provisions of the Norms and Standards for the Storage of Hazardous Waste (GNR 926 published in Government Gazette 37088 of 29 August 2013). All employees responsible with the handling of waste are competent and have received the necessary Hazmat and waste management training. Where possible, recyclable products are recycled into different components via the Materials Recycling Facility (MRF), including Refuse Derived Fuel (RDF).

After screening, which also determines if any recycling is possible, the materials are fed into the thermal plant according to the treatment schedule.

2. Thermal Treatment and Energy Recovery

The current thermal reactor plant that is used for the destruction of the materials operates at 850- 1100 °C. Air is introduced for oxidation of the organic compounds to carbon dioxide (CO₂) and water (H₂O). The gas in the chamber has a residence time of at least two seconds in a turbulent gas flow to ensure complete destruction of the organics, resulting in a destruction efficiency of 99.9999 %. The gas passes through scrubbers for gas cleaning before being discharged to atmosphere.

Proposed power generation upgrade: It is estimated that the facility will produce a maximum of 42 MW thermal energy, based on the calorific value of the wastes received, however, may vary depending on throughput, steam and electricity generation. For power generation, the calorific value has been approximated at a weighted average of 11-18 MJ/kg, set at 12.2 MJ/kg (HHV). From this, 42 MW thermal heat is available. The electricity will be produced using established boiler and steam turbine technology. With an efficiency of 30-33 % of a steam boiler system, **approximately 14 MW electricity will be produced**. The power generated will be used on-site by A-Thermal, but may also be distributed to neighbouring industries or residences, subject to the establishing relevant agreements with government authorities.

3. Abatement technologies

'Gas abatement' is the generic term used to refer to the removal and/or reduction of pollutant species from a gas stream to meet emission concentration limits. A-Thermal utilises a series of scrubbers to ensure that emissions meet the prescribed emission limits before it is vented to the atmosphere.

The Continuous Emission Analyser System (CEMS) for gas concentration measurement and Programmable Logic Controller (PLC) automation system used on site ensures that waste is fed when both the plant and emission parameters are within specification.

Upgrade: An additional bag filter is required for the power generation installation system that will allow the temperature of the gas stream to be kept above 130 °C. This will result in no visible plume, since plumes are created from water vapour present at temperatures below 100 °C.

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Diagram of proposed upgrade:

Figure 2 provides a block diagram of the current plant process. Figure 3 indicates where energy recovery will be incorporated into the existing process.

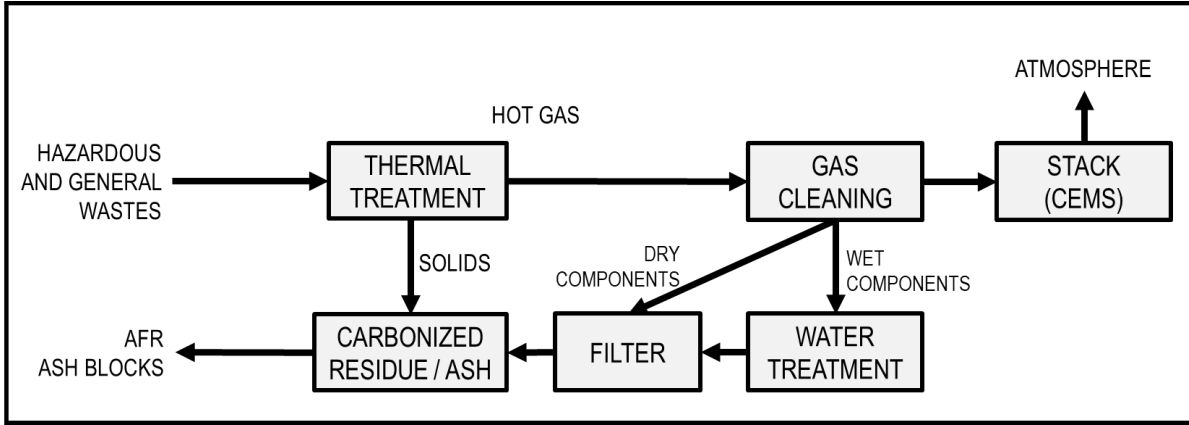


Figure 2: Block diagram of plant: current process.

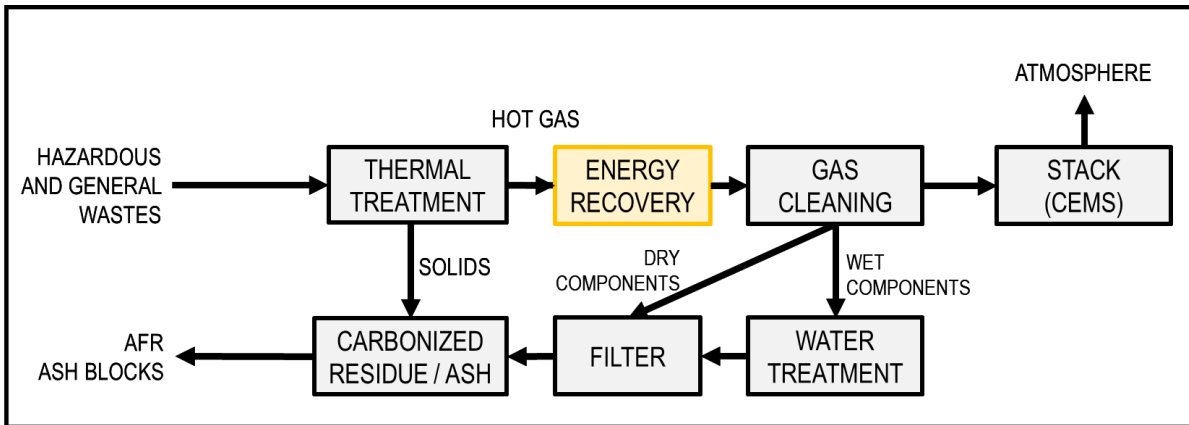


Figure 3: Block diagram of plant: with energy recovery (steam boiler) shown in orange.

MOTIVATION AS TO NEED AND DESIRABILITY

Guided policies and government objectives:

A review of the proposed project was undertaken against National, Provincial and Local Government objectives: Reduction of waste to landfill, reducing GHG emissions, increasing recycling and renewable energy. The review concluded as follows:

- Government policy aims to (i) minimise the use of natural resources; (ii) avoid and minimise the generation of waste and instead steer towards the reducing, re-using, recycling and recovering of waste. Government's views on the use of thermal technologies as a means to treat waste is that it is *"an acceptable waste management option in South Africa"*. This includes the incineration of general and hazardous waste in dedicated incinerators or other high temperature thermal treatment technologies;
- The reduction of waste to landfill and waste beneficiation are direct objectives of the recently published National Waste Management Strategy 2020, GN 56 of 2021, 28 January 2021:
 - Section 3.4 Expected Outcomes: Prevent waste, and where waste cannot be prevented ensure 45 % of waste is diverted from landfill within 5 years.
 - Section 9.1 National Government: "The DFFE through Chemicals and Waste Economy (CWE) Phakisa are constantly seeking new and improved technologies to meet the objectives of the Department's National Waste Management Strategy (NWMS). Through engagements with private sector, various government departments, waste specialists as well as tertiary institutions the CWE Phakisa is currently focusing on the following, but not limited to:
 - Biological Treatment (Anaerobic Digestion / Fluidised Bed Reactors);
 - Material Recovery Facilities and palletisation;
 - Composting and re -use of household biomass;
 - Waste-to- Energy plants;
 - Pyrolysis; and
 - Use of ash, sludge and animal matter as a soil ameliorant and input to high agricultural production land.

The above technologies will be implemented through internal sources of funding leveraging from the Green Fund as well as the Infrastructure Fund to the Municipalities that are aligned to the objectives of the programme. Furthermore, CWE Phakisa supports research and innovation such as in the development of roads using plastic and waste to energy projects using biomass, sludge and non - recyclable waste."

- Section 9.4 Private Sector: "The involvement of the private sector is therefore critical to the implementation of the NWMS."

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- Energy recovery is also in line with government policies: The National Policy on the Thermal Treatment of General and Hazardous Waste GNR 777 of 2009; Municipal Waste Sector Plan: Challenges with Waste Service Provision in South Africa GNR 270 of 2012; National Waste Management Strategy 2020 relating to the recovery / beneficiation of products from wastes and hazardous wastes. The energy recovered from the treatment of waste will be used to power the facility, and potentially allow the distribution of surplus energy to local industry. This is in line with the move towards power supply by the private sector to assist and supplement the power shortfall currently experienced in South Africa. Economic development, population growth and rapid urbanisation continues to contribute to an increase in waste generation, placing continued pressure on South Africa's landfill sites. According to the DFFE, 98 million tonnes of waste is deposited across South Africa's 826 landfill sites every year (Engineering News, 2018). Of the total amount of waste generated, a maximum of only 10% is recycled or recovered for other uses, whilst at least 90% is landfilled or dumped (State of Waste Report, Department of Environmental Affairs, 2017). The report highlights that approximately 94% of the 48 million tons of hazardous waste generated in 2017 was also directed to landfill sites. Metropolitan Municipalities in Gauteng have not licenced a new landfill facility for 24 years, and the few remaining landfill sites are filling up and approaching closure at a rapid and increasing rate (Association for Water and Rural Development Website, February 2019). It is calculated that existing landfill sites in Johannesburg have approximately 6 years available before reaching end of life (as stated by Mr Nico de Jager, MMC for Environmental Affairs in the City of Johannesburg, as reported by EWN article, 2018). All the while there are more stringent restrictions on waste streams that are disposed to landfill. One of the most recent significant developments has been the DFFE placing a ban on all forms of liquid waste (GNR 636 of 2013).
- Waste to Energy is therefore a much-needed solution for waste management in Gauteng and South Africa. (*Waste to energy can reduce South Africa's refuse and electricity problems – and the climate crisis*, Mail & Guardian, 19 May 2021)
- Waste-to-energy initiatives are robust and effective alternative energy options to reduce CO₂ emissions and replace the use of fossil fuels. Greenhouse gas (GHG) emissions calculations show that thermal desorption results in lower GHG emissions than landfilling, see Section 3.2.12.

It follows from the above, that the proposed project is not only in line with internationally accepted principles of best environmental practice and sustainable waste management, but also supports government's policy by offering an acceptable waste management option whilst minimising the consumption of natural resources, creating permanent employment and stimulating economic growth, and last but not least, providing an alternative to the disposal of waste to landfill, thereby assisting companies striving to achieve a zero waste to landfill objective and adhering to the principles of the waste management hierarchy.

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Comparison of CO₂ Emissions between Thermal Treatment and Disposal to Landfill

Historically, the availability of non-developed land has made landfilling the most popular and cheapest method of waste disposal. However, the Integrated Waste Management Policy and the National Waste Management Strategy seek to minimise the waste stream going to landfills, while extracting maximum value from the waste stream at all stages of collection and disposal. A well-engineered thermal treatment design with emission controls to maintain emissions within the limits, and following the intended operational procedures offers a good opportunity of waste reduction and energy generation.

For the purposes of comparing the advantage of the proposed project (thermal desorption process (TDP) with energy recovering) over landfilling, greenhouse gas inventories were established for the two operations.

According to the calculation of GHG emissions calculated for the disposal of the 248 tpd waste by respective operations, the best option would be the proposed Project with fixating of the carbon in the ash (0.70 kg CO₂-eq/s). This is followed by treatment in the thermal desorption process with the ash disposed on a landfill fitted with gas collection and electricity generator (1.55 kg CO₂-eq/s). The usage of the carbon residue/ ash from the thermal desorption process in the clamp kilns at a brickworks assume that this would not affect the quality and specification of the bricks. It also does not incorporate the GHG emissions that would be saved by replacing more conventional fuel (coal) in the brickmaking process. The worst option was calculated to be landfilling without any gas collection and LFG usage (i.e., flare or electricity generation).

Therefore, a reduction of 70 % in CO₂-e emissions is achieved, as a minimum value, by implementation of the project.

Table 1A: Calculated GHG emissions for various options of disposing waste,

1 kg general waste:	kg CO₂-e generated	Reduction of CO₂	Carbon capture
To landfill (no flare/elec)	+ 5.0	0 % (base case)	0 %
To thermal desorption	+ 1.9	70 % reduction	39 %

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Table 1B: Calculated GHG emissions for various options of disposing waste (248 tpd)

Option	Electricity Power [MW]			GHG Emission [kg CO ₂ -eq/s]		
	Generation	Requirement	Excess	Gross	Eskom Saving	Nett
LF - no flare	0.00	0.00	0.00	14.23	0.00	14.23
LF - flare	0.00	0.00	0.00	5.63	0.00	5.63
LF - electricity	7.77	0.00	7.77	5.63	2.14	3.49
TDP & Ash LF (no flare)	9.90	5.17	4.74	5.44	1.30	4.14
TDP & Ash LF (flare)	9.90	5.17	4.74	3.37	1.30	2.06
TDP & Ash LF (electricity)	11.78	5.17	6.61	3.37	1.82	1.55
TDP & Brickworks	9.90	5.17	4.74	3.01	1.30	1.71
TDP & Ash Fixate	9.90	5.17	4.74	2.00	1.30	0.70

Notes: **LF** – landfill; **electricity** – electricity generation; **TDP** – thermal desorption process; **Ash LF** – ash to landfilling

Socio Economic development

A-Thermal currently employs 109 employees. The project will create about 80 new work opportunities. Of the current staff complement, about 85 % reside in the surrounding communities of Tembisa, Olifantsfontein or Clayville and it is expected that the majority of new personnel will also come from these areas. Secondary employment opportunities will include the promotion of small businesses as a result of the MRF, which may include recycling and transportation. In addition, A-Thermal offers internships for graduates and matriculants.

ALTERNATIVES CONSIDERED

The property on which or location where it is proposed to undertake the project

The site is located on Erf 980, Clayville Ext 12. There are no alternatives considered in respect to property since the project proposes an upgrade to the existing plant located and authorised on the aforementioned site.

The design or layout of the activity

A-Thermal provided two alternative locations for the placement of the proposed stack:

- Option 1: Behind warehouse: 25°56'34.46"S, 28°13'30.61"E (elevation 1508 m)
- Option 2: Next to Lapa: 25°56'33.10"S, 28°13'26.17"E (elevation 1506 m)

The scrubber design specification meets the emission limits as specified in the AEL (Category 8.1). The emission rates of the various air pollutants were therefore calculated based on the mass and energy calculations.

A stack height of at least 35 m would be required to satisfy the hourly and daily average criteria for the metal groups. For location option 2, the calculations indicate that a stack height of 30 m would be required to satisfy the NAAQS requirements. In this regard Option 2 was selected.

Use of other technologies for treatment of waste and energy/ power generation

Several other technologies were considered. These include:

- Incineration;
- Encapsulation;
- Other technologies for the treatment of health care waste, namely:
 - Burning in single chamber incinerators;
 - Wet thermal treatment (autoclaving);
 - Chemical disinfection;
 - Microwave irradiation

Considering the available alternative technologies, none of these technologies provided the same benefits (for example, energy generation) as can be derived from the proposed project and therefore, it is concluded that the current technology of thermal treatment is still regarded as the preferred technological alternative due to the ability to break down hazardous waste into simpler, nontoxic substances to produce electricity.

PUBLIC PARTICIPATION PROCESS FOLLOWED

The following process was undertaken to facilitate the public participation for the proposed project:

Newspaper Advertisement

An advertisement, notifying the public of the Environmental Authorisation application and Basic Assessment process, and requesting I&APs to register their comments with Exigo, was placed in the Tembisan and Rekord Centurion newspapers on 10 May 2019. The advertisement was placed in accordance with regulation 41(2) (c) of the EIA Regulations of 2014 (as amended).

A second round of advertising is scheduled in the same newspapers on 9 June 2021.

Site notices

In order to inform surrounding communities and adjacent landowners of the proposed development, site notice boards in accordance with regulation 41(2)(a) and 41(3) of the EIA Regulations were placed at the entrance to the site on 10 May 2019.

A second round of advertising is scheduled in the same newspapers on 9 June 2021.

Direct Notification of Identified I&AP's

Key stakeholders, who included the following sectors, were informed by means of hand deliveries, emails, faxes or registered post on 10 May 2019 of the proposed development:

- The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site
- Landowners in the surrounding area
- Directors and Members of the Olifantsfontein Business Forum of the surrounding area
- Ekurhuleni Metropolitan Municipality
- Department of Water and Sanitation (DWS)
- Department of Environmental Affairs (DEA)
- Gauteng Department of Agriculture and Rural Development
- Gauteng Department of Roads and Transport
- South African Heritage Resources Agency (SAHRA)
- Gauteng Department of Economic Development
- Department of Public Work

The I&APs are also notified of the public meeting and invited to attend.

Consultation Meetings

The following consultation meetings were held:

- Greater Midstream Forum

The minutes of the meetings are included in Appendix 10.

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Draft Basic Assessment Report (BAR)

The EIA Regulations specify that I&AP's must have an opportunity to comment, in writing, on all reports or plans submitted to such party during the public participation process. A period of 30 days (9 June 2021 until 12 July 2021) will be made available to allow for public comment on the Draft BAR. The availability of the Draft BAR will be announced via personal notification letters distributed to registered I&AP's. The following methods will be made available for I&AP's to access the reports:

- Published on the Dropbox website;
- Downloadable presentations will be made available;
- Hard copies and electronic copies were distributed upon request (reports will be sanitized).

Public Open Day:

A public open day will be held on Wednesday, 23 June 2021 from 14:00 to 20:00 at the Protea Hotel in Midrand. I&AP's will be invited to register and attend the meeting.

Final Basic Assessment Report

The final BAR will be updated after the draft review to incorporate the comments received and issues raised by I&APs.

Summary of issues raised by I&APs

Table 2: Information from I&APs

#	Key issue from I&AP	DBAR reference	Outcome
1	More information required on the technical process, upgrades and compliance to the MES.	Section 3.2	Information is provided.
2	Sustainability of the project.	Section 3.2.11	The driving factors for the project are: <ol style="list-style-type: none"> 1. Reduction of waste to landfill as part of government policy and objectives; 2. Increase of waste recycled i.e. as part of the circular economy; 3. Reduction of greenhouse gas emissions (GHG) compared to disposal of waste to landfill; 4. Generation of electricity using non-fossil fuels; 5. Socio-economic development through direct local investment, creation of new jobs and permanent skilled positions;
3	Authorisations required for the upgrade.	Section 3.1	Information is provided.

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4	<p>Specialist studies required:</p> <ul style="list-style-type: none"> ○ Public Health Risk Assessment ○ Traffic Impact Assessment ○ Geotechnical Assessment ○ Air Quality Impact Assessment and impact from traffic 	<ul style="list-style-type: none"> ○ Included in the Air Quality Impact Assessment: Appendix 16 ○ Appendix 14 ○ A dolomite study has been completed ○ Appendix 16 	<p>Refer to specialist reports provided.</p>
5	<p>Impacts on air quality including pollution, odours, dust and NO₂.</p>	<p>Section 10.1.1.8 and 10.1.2.1</p>	<ul style="list-style-type: none"> • The Specialist Report determined that air quality from emissions generated from the plant can be managed and mitigated by implementation of an Air Quality Monitoring Programme, which includes a continuous emission monitoring system (CEMS), the abatement equipment for power generation, the increased stack height to 30 m, and the ongoing compliance to the Air Emissions Licence currently in place. • In terms of cumulative impacts from routine emissions, the Specialist Report stated that “the predicted changes at the sensitive receptors are small compared to the contributions from other sources and it is expected to essentially remain the same” (Airshed, 2021) • On a bigger scale, air quality in terms of nuisance odour in the area will improve due to reduction of material to landfill, air quality in terms of GHG emissions will improve due to less material at a landfill producing methane. Lastly, air quality in terms of offset from fossil fuel operations (e.g. coal mining) will improve, since power generation is made from non-fossil fuel sources instead of the requirement to mine. Specifically, this will be dust, SO₂, NO₂. For electricity from coal mining there are two parts contributing to air quality: the mining effect and then the combustion effect.
6	<p>Cumulative impacts on air quality.</p>	<p>Air Quality Impact Assessment (Appendix 16)</p>	<p>The impact is negligible, with expected improvements from diversion from landfill</p>

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7	Impact on residential areas, located close to an industrial area.	Section 10.1.2.1	Refer to issue number 5 above.
8	Impact on ecology.	Section 10.1.1.1, 10.1.1.2, 10.1.1.3 and 10.1.1.4	Impact on Ecology can be mitigated to low.
9	Impact on safety and security in the area.	Section 10.1.1.10 and 10.1.2.4	he mitigation methods are: all staff have Criminal Check Report before employment. A-Thermal belongs to the Olifantsfontein Business Forum (OBF), and in addition has an OBF Security Radio for communication with other members in the area. The project will generate additional jobs and employment to provide skills and income.
10	Potential for effluent and waste products.	Section 3.2.6, 3.2.7, 3.2.8	The plant is a zero-effluent discharge (ZED) facility.
11	Impact on development characteristics of the area.	Section 10.1.1.10, 10.1.2.4 and 10.1.2.1	Information is provided.
12	Desirability in local, provincial and national policy context.	Section 5.1	Refer to issue number 2 above.
13	Positive impacts: Employment opportunities	Section 10.1.1.10 and 10.1.2.4	<ul style="list-style-type: none"> • The project will create short-term (construction) and long-term (manufacturing and utilities) jobs. • The project will create job opportunities for the previously disadvantaged, including women and the youth.

SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

A summary of the environmental impacts is included as follows:

Construction Phase

The outcome of the impact assessment showed that all negative impacts of low to moderate significance prior to mitigation, including impacts on ecology, soils, water resources, noise, air quality and heritage can be mitigated to low or negligible. In addition, the project is expected to have a number of positive socio-economic impacts during construction including a positive impact on the economy as well as employment opportunities.

Operation Phase

During the operational phase, impacts of high and moderate significance prior to mitigation are predicted to be mitigated to low or negligible, as explained below. This includes impacts on air quality, surface water, groundwater and traffic. In addition, the project is expected to have a number of positive socio-economic impacts including moderate to high positive impacts on the economy, employment opportunities, overall reduction in greenhouse gas emissions, and power generation from non-fossil fuels.

PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES

Please refer to Section 11.1.1 below Also note the following objectives for the project:

Construction Phase

- Exposure of soils to rainfall and wind during construction can be mitigated by ensuring effective stormwater management, rehabilitation of disturbed areas and implementation of stringent erosion and dust control practices.
- Clearing of vegetation for development resulting in direct habitat modification and habitat fragmentation can be mitigated by the removal of vegetation on the development footprint area only and rehabilitation of disturbed areas with indigenous vegetation.
- Continued movement of personnel and vehicles on and off the site during the construction phase, resulting in spread of alien invasive species can be mitigated through rehabilitation of disturbed areas, and eradication of invasive species.
- Construction of infrastructure resulting in negative effects of activities on the ecosystem can be mitigated by means of raising awareness and providing environmental training to employees.
- Poor management and disposal of solid waste resulting in soil and water pollution can be mitigated through the implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility.
- Movement of vehicles on site during construction, demolition of buildings resulting in generation of dust can be controlled by applying effective dust suppression methods.

Operation Phase

- Release of contaminated stormwater into the surroundings resulting in surface water and groundwater pollution can be mitigated through the implementation of an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste.
- Air Quality from emissions generated from the plant can be managed and mitigated by implementation of an Air Quality Monitoring Programme, which includes continuous emission monitoring system (CEMS), abatement equipment for power generation, the increased stack height, and the ongoing compliance to the Air Emissions Licence currently in place.
- Incorrect storage of fuel (resulting in surface water and groundwater pollution) can be mitigated through secondary containment system such as the bunding of storage areas to contain potential spills and dirty water runoff.

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- Incorrect storage of by- products (resulting in surface water and groundwater pollution) can be mitigated by implementing an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste as prescribed in established procedures.
- Incorrect storage of waste and spillages of chemicals (resulting in surface water and groundwater pollution) can be mitigated through the implementation of an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste as prescribed in established procedures. Storage will be done as per current license and legal requirements including the National Norms and Standards for the Storage of Waste.
- With regard to an increase of traffic, holding and queuing of additional trucks can be mitigated through the correct design width of the incoming and outgoing lanes (e.g. 4.5m road width clearance), a separate pedestrian gate, and stacking distance of 22m from the road reserve of Keramiek Road.

MONITORING PROGRAMMES**Air Quality Monitoring Programme**

- The Air Quality Monitoring Programme will continue according to the requirements applicable to Category 8.1¹ - Thermal Treatment of Hazardous and General Waste.
- An amendment to A-Thermal's current Air Emission Licence to reflect the upgrade to power generation.

Groundwater Monitoring Programme

- Continuous evaluation of the existing monitoring network will take place to monitor groundwater quality over time. The monitoring for groundwater are to detect significant changes in background groundwater quality, detect adverse groundwater impacts caused by the project activities as soon as possible, compare the observed changes in groundwater levels, spring flow, and groundwater quality to those predicted in the environmental and social impact assessment, to provide information to refine and improve the calibration and predictions of the groundwater flow model, and to provide information that can be used to guide continuous improvement in groundwater management approach and actions.
- The current groundwater monitoring programme will continue.

Surface Water Monitoring Programme

- During the first annual rain event, as is currently being implemented, a surface water sample must be taken to analyse possible pollutants in the stormwater.
- The stormwater management system will be regularly monitored and maintained; especially any discharge and damaged areas must be repaired if and when required. No substances other than uncontaminated rainwater may be channelled via the stormwater drainage system.

¹ Listed Activities and associated minimum Emission Standards identified in terms of Section 21 of the National Environmental Management Air Quality Act, 2004 – GNR 893 published in the Government Gazette 37054 on 31 March 2010

REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

The proposed upgrade should be authorised as there are no fatal flaws foreseen for the project, it is aligned with government's National Waste Management Strategy 2020, promotes economic growth, and that the impacts associated with the proposed upgrade can be managed and mitigated effectively to prevent any harm to the environment and/or risk to neighbouring communities.

This application is for an *upgrade* of the existing waste management activities which already occur at the site, and for which there is an existing Waste Management Licence.

The specialist studies support the opinion that the proposed upgrade is beneficial to the community and the collective environment in terms of waste management.

Specifically, it is noted by an additional study in the Air Quality Assessment, that the thermal treatment of waste types at the A-Thermal facility in Olifantsfontein produces less GHG than any other treatment/disposal methods currently available.

As stated in Section 5.1.1, energy recovery is in line with government policy relating to the recovery / beneficiation of products from wastes and hazardous wastes, since waste-to-energy initiatives are robust and effective alternative energy options to reduce CO₂ emissions and replace the use of fossil fuels. Energy recovered from the process will assist with supplementing of power shortages currently experienced in South Africa.

The proposed upgrade supports internationally accepted principles of best environmental practice and sustainable waste management, that will contribute to the minimisation of waste to landfill, whilst improving the current gas cleaning technology, already utilised at the facility. The facility produces no effluent and as such poses no risk of generating or discharge of wastewater. The proposed upgrades will enable implementation of government policies for waste management options that are consistent with the principles of the waste management hierarchy.

As indicated above, the assessment concludes that the impacts identified in respect of the proposed upgrade will predominantly have a positive influence on the natural environment and will promote socio-economic development by stimulating growth in the local economy, creating job opportunities near existing labour pools, and uplifting the local community through skills development and community sponsorships.

From the Socio-Economic study performed, a number of desirable outcomes were determined, from a Location point. These are shown in Table 3 below:

Table 3: Project Desirability from a Localisation Perspective (Urban-Econ, 2020).

Aspect	Comment
Utilisation of an existing site	The upgrade of the A-Thermal facility will be on the existing site.
Optimisation of the use of existing resources and infrastructure	The area is well-developed and has adequate access to basic services, reducing the need for public investment to realise the project.
Creating job opportunities close to labour pools and contribution to the correction of the historically distorted spatial patterns	The project will bring additional employment opportunities closer to the areas of the large labour pool that is located on the outskirts of the metros and is further removed from the areas of high concentration of economic opportunities. The majority of A-Thermal’s workforce is from Tembisa.
Creating job opportunities for women, youth and other disadvantaged	The site’s proximity to Tembisa allows A-Thermal to provide job opportunities to the women and youth of previously disadvantaged communities such as Tembisa.
Reducing the need to transport potentially hazardous material	Ekurhuleni is the manufacturing hub of South Africa. Significant volumes of hazardous material are produced in Ekurhuleni by industries that need to be transported and disposed of. The project site is well placed to reduce the need to transport hazardous material over long distances, reducing the risk associated with the transportation of these materials.
Complementing other uses in the area	Carbon is an important component in several manufacturing industries, such as petrochemical industries producing polymers, fibres, paints, solvents and plastics, as well as metal smelting, industrial diamond production, etc. The production of carbon will complement local downstream businesses in Ekurhuleni and may develop or expand value-chain opportunities.
Alignment with planning for the area	The proposed spatial development plan for the area promotes spatial integration and overlap between disadvantaged areas and areas of economic activity, as well as an investment towards dense townships that are on the margins of cities, which is the case of the study area. Overall, the project site is located in the area designated as an industrial zone. It also aligns with industrial development, environmental protection and urban-development objectives of the area. The project may further promote the creation of a new functional core node and corridors in the northwest of Ekurhuleni to serve the population more efficiently, as delineated by the Ekurhuleni Spatial Development Framework.
Encouragement of environmental sustainability	The project promotes the sustainability of the environment through the reduction of hazardous material. In the process, the project ‘recycles’ the heat required for the incineration process to generate electricity. The project further reduces the waste that would have gone to landfills and produce carbon which in turn reduce greenhouse gas emissions.
Generation of the highest socio-economic returns	The proposed project is expected to create sustainable employment opportunities not only at the site but also in the sectors that will provide services and goods for the facilities located at the development (transportation, accommodation, trade, personal services, etc.). these are expected to contribute to improving the integration of economic and social activities in the area.
Promoting or contributing to create a more integrated settlement	The proposed project will contribute to integrated development in the area by encompassing job opportunities close to existing commercial and residential areas in the surrounding environment.

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SCOPE OF ASSSSMENT AND BASIC ASSESSMENT REPORT

1 Contact Person and correspondence address

1.1 The EAP who prepared the report

Consulting Company: Exigo Sustainability (Pty) Ltd (Exigo)

Name of the Practitioner: Catherine Da Camara

Tel No.: 012 751 2160

Fax No. : 086 607 2406

e-mail address: catherine@exigo3.com

1.2 Expertise of the EAP

1.2.1 The qualifications of the EAP

Table 1-1: EAP expertise

EAP	Qualifications	Years' experience
Catherine Da Camara	BSc. Hons (Animal, Plants and Environmental Sciences); Pr.Sci.Nat, EAPASA Registered	18 years

Qualifications and CV's are attached as APPENDICES

Appendix 1: EAP's Qualifications.

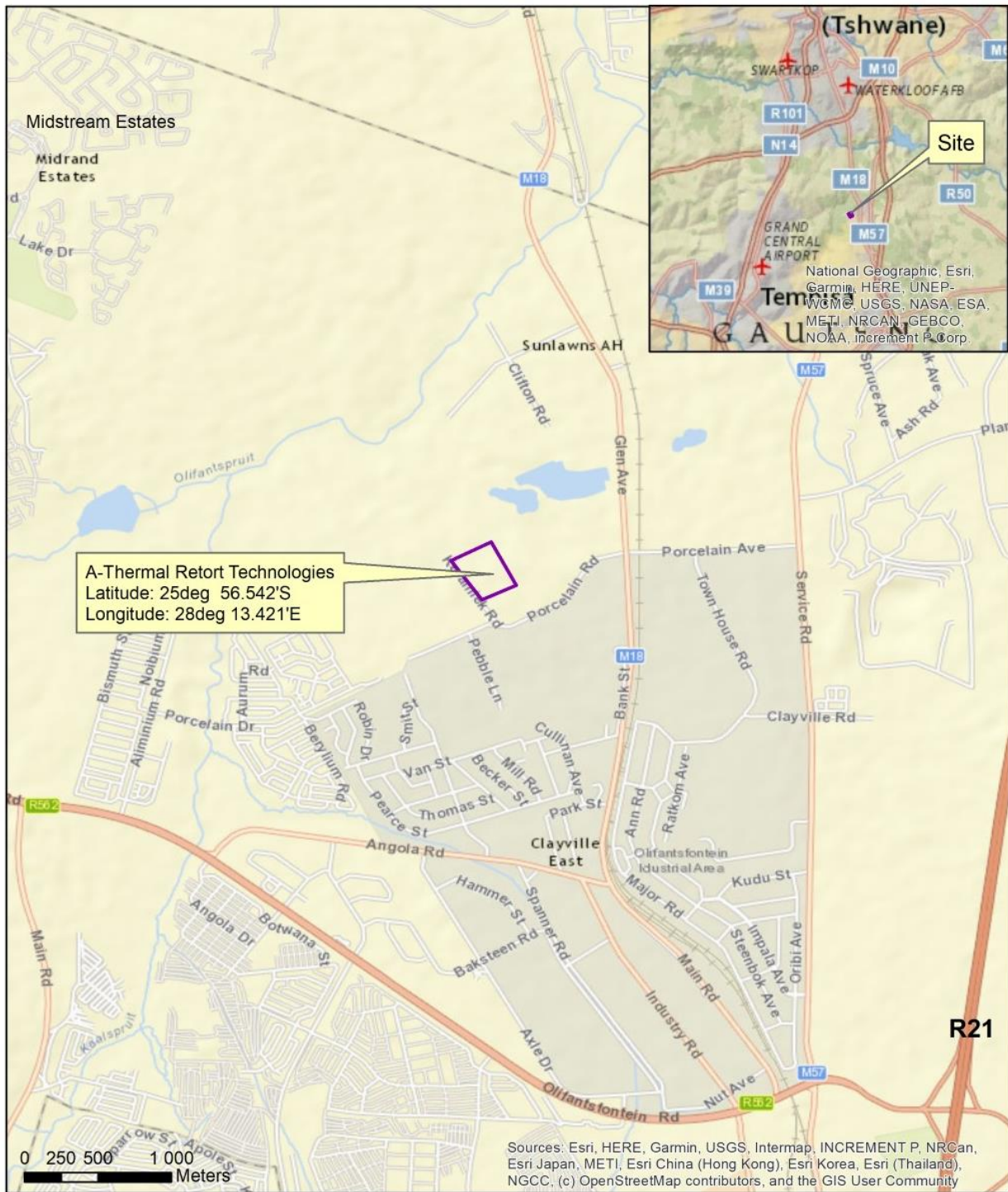
2 Location of the overall activity

Farm Name:	Erf 980, Clayville Ext 12
Physical Address	28 Keramiek Street, Clayville, Olifantsfontein
Metropolitan Municipality:	Ekurhuleni Metropolitan Municipality
Distance and direction from nearest town	The closest communities include Clayville immediately to the south and south-west of A-Thermal, Marwyn Agricultural Holdings (AG) 1000m to the east, Sunlawns AG 1200m to the north and Midstream development 1700m to the north-west.
21 digit Surveyor General Code for each farm portion	T0JR00360000098000000

2.1 Locality map

Please refer to Appendix 3: Locality Map, Figure 2-1, Figure 2-2 and Figure 2-3.

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Legend A-Thermal	Locality Map		N 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406	
	Client A-Thermal Retort Technologies	Project A-Thermal BA		Version 1
	Scale: 1: 35 000	Compiled by C Da Camara		
	Date 2020-02-13	Datum WGS 84		Projection

Figure 2-1: Locality Map

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Legend A-Thermal	Locality Map		 N 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406	
	Client A-Thermal Retort Technologies	Project A-Thermal BA		Version 1
	Scale: 1: 35 000	Compiled by C Da Camara		
	Date 2020-02-13	Datum WGS 84		Projection

Figure 2-2: Locality (Aerial map)

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Legend A-Thermal Zone 5 (Industrial)	Aerial Map of the site		N 	 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406
	Client A-Thermal Retort Technologies	Project A-Thermal BA		
	Scale: 1: 8 000	Compiled by C Da Camara	Projection	
	Date 2020-02-13	Datum WGS 84		

Figure 2-3: Locality within industrial area (Zone 5 of the Gauteng Environmental Management Framework)

3 Description of the scope of the proposed overall activity.

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site

Refer to the layout plan included in Figure 3-1 below and also included in Appendix 4.

3.1 Listed and specified activities

Table 3-1: Listed Activities Applied for in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended) and the Environmental Impact Assessment Regulations, 2014 (as amended)

Indicate the number and date of the relevant notice:	Activity No.(s) (in terms of the relevant or notice):	Wording of the relevant Government Notice	Applicability to the project
GN R 327 (07 April 2017)	LN 1 Activity 1	<p>The development of facilities or infrastructure for the generation of electricity from a renewable resource² where—</p> <ul style="list-style-type: none"> (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; <p>excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs—</p> <ul style="list-style-type: none"> (a) within an urban area; or (b) on existing infrastructure. 	<p>The facility will produce a maximum of 42 MW thermal energy, based on the calorific value of the wastes received. It must be noted that the waste feed is variable, and therefore throughput, steam generation and electricity generation may vary.</p> <p>Approximately 42 MW thermal heat is available. With an efficiency of 30-33 % of a steam boiler system, approximately 14 MW electricity can be produced.</p>

² The White Paper on the Renewable Energy Policy (2013) states that: **Biomass energy** (from organic matter) can be used to provide heat, make liquid fuels, gas and to generate electricity. Fuelwood is the largest source of biomass energy, generally derived from trees. Other types of biomass include plants, residues from agriculture or forestry, and **organic components in municipal and industrial wastes**. Landfill gas is considered to be a biomass source.

It can be concluded that the proposed activity of generating energy from waste can be classified as a renewable resource.

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GN R 327 (07 April 2017)	LN 1 Activity 27	<p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</p> <ul style="list-style-type: none"> (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan 	The area of expansion is approximately 2 ha.
GN R 327 (07 April 2017)	LN 1 Activity 34	<p>The expansion [or changes to] of existing facilities or infrastructure for any process or activity where such expansion [or changes] will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding—</p> <ul style="list-style-type: none"> (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or (iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day. 	The proposed upgrade in abatement technologies and capacity of thermal treatment and related processes will require a variation to the Atmospheric Emissions Licence (AEL).

Table 3-2: Activities Applied for in terms of the National Environmental Management: Waste Act, 2008 and the Environmental Impact Regulations, 2014 (as amended)

INDICATE THE NO. & DATE OF THE RELEVANT NOTICE:	ACTIVITY NUMBERS (AS LISTED IN THE WASTE MANAGEMENT ACTIVITY LIST) :	Wording of the relevant Government Notice	Applicability to the project
No. 921 (29 November 2013)	Category A – Activity 13	The expansion of a waste management activity listed in Category A or B of the Schedule which does not trigger an additional waste management activity in terms of the Schedule.	The project includes the proposed upgrade in abatement technologies and capacity of thermal treatment and related processes in order to facilitate energy recovery.

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3.2 Description of the activities to be undertaken

A-Thermal is proposing to upgrade its existing operations. The proposed upgrade is to allow for the following:

- Energy recovery: For the feasibility of power generation, the treatment capacity will be increased. The treatment capacity will be increased by 200 tons per day of general and hazardous wastes through a thermal process with heat recovery.
- The proposed project includes additional abatement technologies in line with international standards. The plant footprint area will be expanded to include the area as indicated in Figure 3-1, above, in order to allow for the energy recovery plant and the upgrade of abatement facilities.

3.2.1 Background

A-Thermal Retort Technologies first received an environmental authorisation in November 2004 to operate a Thermal Desorption Plant at the existing site.

Since 2004, A-Thermal has successfully treated hazardous substances including pharmaceutical waste, within the stack emissions limits prescribed by international standards and the then Department of Environmental Affairs and Tourism (DEAT) limits. Thermal desorption (pyrolysis) is considered a Best Available Technology (BAT) by US EPA and EU IPPC Directive for hazardous waste destruction.

The range of hazardous waste streams treated by A-Thermal includes, amongst others, Type 0 hazardous waste, chemical waste, as well as health care risk waste in the form of pharmaceutical waste. Pharmaceutical health care waste includes pharmaceutical products, vaccines and medicinal chemicals that are no longer usable for human or animal treatment, or that have become outdated, contaminated or are no longer required, as well as items contaminated with cytotoxic chemicals (Hodge, 2009).

In 2009 the company received approval from the then Department of Agriculture, Conservation and Environment (DACE) to extend the range of health care risk waste they treated on site using a retort (rotary kiln/thermal desorption plant) and autoclave³. The retort and autoclave are heated using the heat energy derived from hot gases in the thermal desorption plant.

The expansion in 2009 allowed for the following:

³ **Autoclaving** is the exposure of waste to saturated steam under pressure in an enclosed container. Preparation of material for autoclaving requires segregation to remove unsuitable material and shredding to reduce the size of the individual pieces for greater treatment efficiency. Small autoclaves are common for sterilization of medical equipment but waste management autoclaves can be a relatively complex and expensive systems requiring careful design, appropriate segregation of materials and a high level of operation and maintenance support. The output from an autoclave is non-hazardous material that can normally be land-filled with municipal waste. There is also a wastewater stream that needs to be disposed of with appropriate care and control. Large autoclaves may require a boiler with stack emissions that will be subject to control.

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- A new rotary kiln was built which treats anatomical waste and sharps;
- An autoclave was installed to treat infectious waste; and
- The existing thermal desorption plant provides heat that will be used to generate steam in a boiler, to be used in the autoclave.

3.2.2 Proposed project

A-Thermal is proposing to upgrade its existing operations to allow for energy recovery and to provide additional abatement technologies in-line with international standards.

For the viability of power generation, the treatment capacity will be increased by 200 tons per day of general and hazardous wastes through the existing thermal process with an additional component for heat recovery. The use of supplementary fuels may be required for start-up and during abnormal operating conditions, for example if the feed material does not meet the minimum required calorific heat input. The purpose is to provide a stable energy (heating value) source for stable reactor operation (Airshed, 2021). The flue gas will pass through scrubbers keeping the exit temperature relatively high at approximately 130 °C.

The electricity will be produced using established boiler and steam turbine technology. The boiler required will need approximately 40 bar operating pressure (medium pressure) and will be procured from a South African manufacturer. A medium pressure boiler and steam turbine is considered standard, established technology for power generation. The power produced will be used on site at A-Thermal and may also be provided to neighbouring industries or residences, if permitted.

The thermal reactor will operate at 850 - 1100 °C. Air is introduced for oxidation of the organic compounds to carbon dioxide (CO₂) and water (H₂O). The gas in the chamber has a residence time of at least two seconds in a turbulent gas flow, to ensure complete destruction of the organics, with a destruction efficiency of 99.9999 %. The gas will pass through scrubbers for gas cleaning before being discharged to atmosphere. Heat recovery through a boiler will be incorporated. Refer to Figure 3-2 for the process flow diagram.

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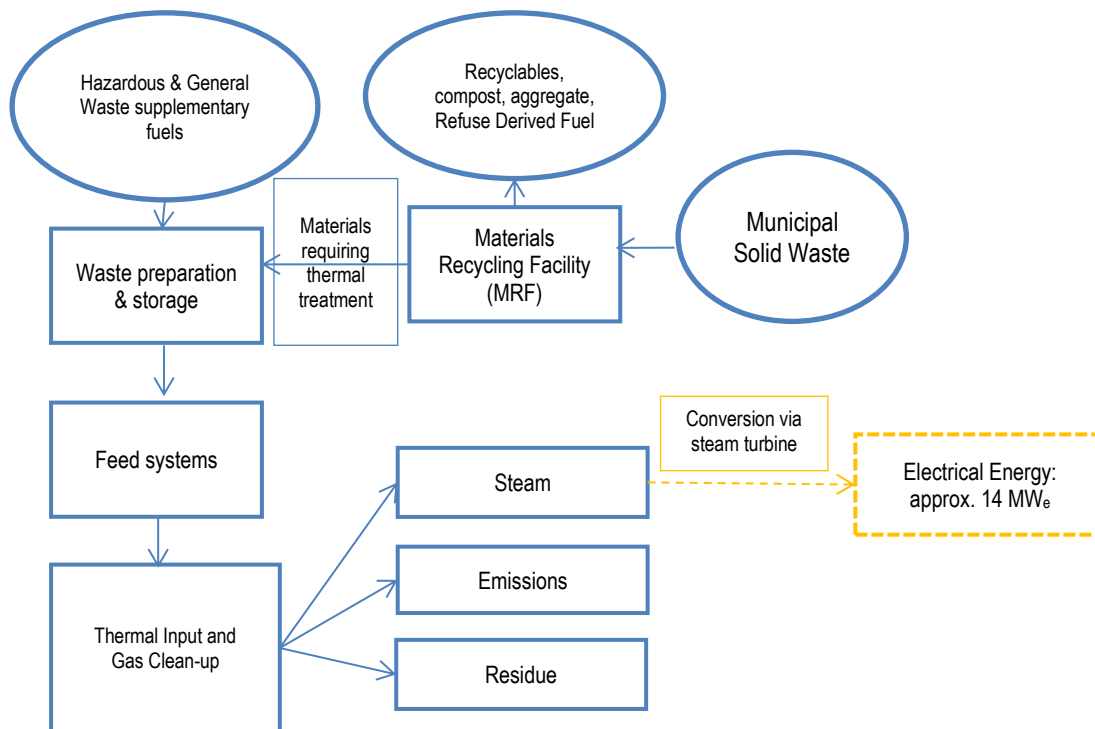


Figure 3-2: Flow Diagram

The scrubber design specification is required to meet the emission limits as specified in the AEL (Category 8.1). For the proposed upgrade, the emission rates of the various air pollutants were therefore calculated based on the mass and energy calculations (providing volumetric flow rate and exit gas temperature) and the limit values provided by the Minimum Emission Standards (MES) in the Listed Activities and associated Minimum Emission Standards, published in Government Gazette 33064 on 31 of March 2010 with a revision of the schedule on the 22 November 2013.

A-Thermal has adopted a zero waste to landfill mentality and as such, utilises the services of various recyclers that collects recyclable materials from site including steels, aluminium and cardboard. Landfilling of waste is a last option. The proposed upgrade will aid both government and industries by providing an alternative to the disposal of waste to landfill.

3.2.3 Energy Recovery

The facility will produce a maximum of 42 MW thermal energy, based on the calorific value of the wastes received. It must be noted that the waste feed is variable, and therefore throughput, steam generation and electricity generation may vary.

For power generation, the calorific value has been approximated at a weighted average range of 11-18 MJ/kg, set at 12.2 MJ/kg (HHV). Approximately 42 MW thermal heat is available. With an efficiency of 30-33 % of a steam boiler system, **approximately 14 MW electricity can be produced.**

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The power production is from waste sources; however the use of supplementary fuels (such as recycled oils) may be required for start-up. The electricity will be produced using established boiler and steam turbine technology. The power produced will be used on site at A-Thermal and may also be provided to neighbouring industries or residences, if permitted. The following figures show the current plant process, and where the energy recovery step is located.

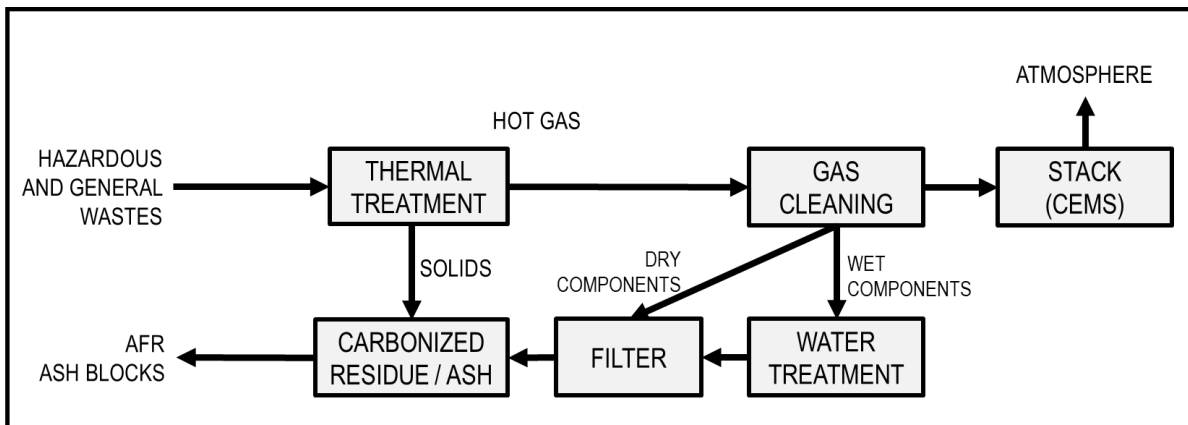


Figure 3-3: Block diagram of plant: current process.

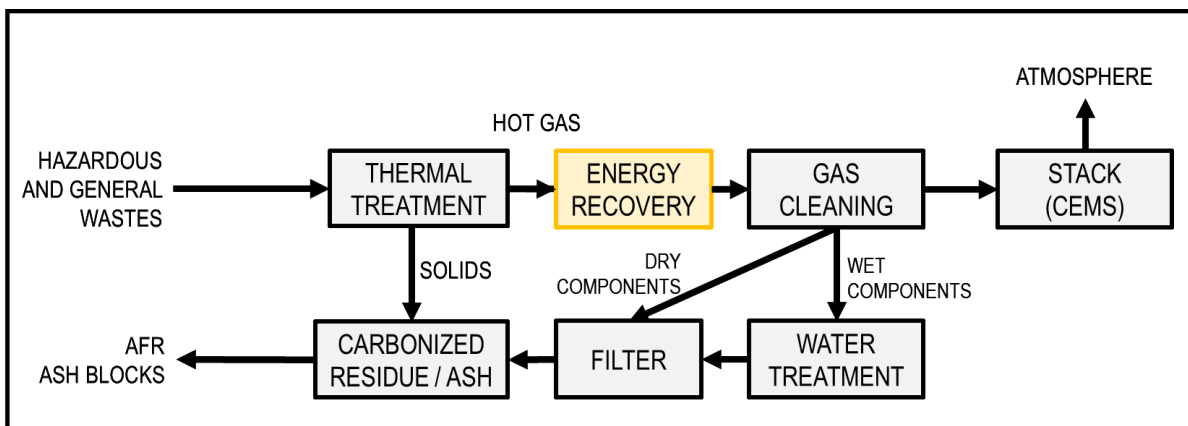


Figure 3-4: Block diagram of plant: with energy recovery (steam boiler).

A-Thermal registered with the Independent Power Procurement programme (IPP) in 2015.

3.2.4 Abatement technologies

As part of the upgrade of the plant, A-Thermal will be upgrading the gas abatement technologies.

“Gas abatement” is the generic term used to describe the reduction of pollutant species from a gas stream in order to meet emission concentration limits.

Gas conditioning will prepare the hot gas from the thermal treatment step for energy recovery. The boiler is required for energy recovery and reduces the gas temperature to approximately 150 °C. The boiler will

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also provide primary particulate removal due to dust fallout. The scrubber is utilised for removal of acid gases.

As part of the upgrade for energy recovery, an additional bag filter is required. This allows the temperature of the gas stream being kept above 130 °C, this will result in no visible plume. The plume is created from water vapour present at temperatures below 100 °C.

The continuous emission gas analyser monitoring system (CEMS) and the Programmable Logic Controller (PLC) automation system ensures that waste is fed when both plant and emission parameters are within specification.

3.2.5 Upset Operational Air Emissions

In terms of operational procedure, A-Thermal currently employs an interlocking feed system, which would similarly be applied for the proposed Project. The system is based on a continuous gas analyses and reactor temperature monitoring. If the gas concentrations reach 90 % of the MES limit, the feeds are stopped. Likewise, the waste feed is interlocked to temperature conditions to ensure no material is fed when the temperature is too low. The secondary control measures include sorbent inject rate according to emission requirements (for SO₂ and HCl), and preventative maintenance procedures (Airshed, 2021).

3.2.6 Water and Carbon Products

Products from the plant include salts and carbon residues. Water used in the plant becomes saturated with salt. A-Thermal purifies the water by removing salts which are formed in the scrubbing process. The salt is classified and handled as a Type 1 or 2 waste. The purified water is re-utilised in the plant. The plant is a zero-effluent discharge (ZED) facility.

The carbon residue arising from the thermal retorting process has been classified in accordance to the Waste Classification Management Regulations (2013). The residue is defined as solid carbon residue and is classified as a Type 3 waste. The residue is handled according to the A-Thermal Waste Management Procedure (C-ATH-SHEQ-OP-07) which states the following:

- The residue is handled as hazardous until the laboratory analysis proves compliance with the required parameters as described in Post Treatment Sampling Procedure C-ATH-SHEQ-OP-06.
- Alternative Fuel Resource (AFR) and ash blocks are produced on site using the carbon residue. The product is then made available to different markets for sale and distributed. The process is managed in line with A-Thermal's quality assurance system.
- Waste is stored in accordance with the National Norms and Standards for the Storage of Waste (2013) and the residue is stored in skips which is in an area that is lined and bunded.

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The manufacture of refuse derived fuel (RDF) from the various waste streams is incorporated. This is an integral part of the recycling facility to ensure additional beneficial product RDF can be made from wastes received.

3.2.7 Resource use

The project will use the following resources:

- **Water:** The process currently uses municipal water at about 40 kl per day. Water is re-used in the system and therefore approximately 50 % more water will be required for the upgrade. Water is supplied by the Ekurhuleni Local Municipality. The plant will be able to accept waste water from other industries to reduce load on resources.
- **Electricity:** The current allocation is 2000 kVA for start-up at 11 kV. Eskom has indicated that the site may upgrade to 5000 kVA at 11 kV if required. The energy recovered from the treatment of waste will be used to power the facility as well as process equipment, and potentially allow the distribution of surplus energy to local industry. Eskom is required for start-up and maintenance periods.
- **Effluent:** Wastewater will be treated (re-used) in the thermal desorption plant. Therefore, there is no discharge of effluent.
- The use of supplementary fuels (such as recycled oils) may be required for start-up.

3.2.8 Waste Handling (Raw/ Feed Materials)

Waste (raw material) is pre-screened for acceptance by the Technical Sales department before it is delivered to site. Waste will be transported using vehicles registered with the Department for the transportation of hazardous and general waste. The waste delivered must meet the criteria of the Acceptance of Waste Terms and Conditions Form. Waste is containerized or covered to minimize odour impacts. The offloaded waste is then screened according to an itemized Treatment Request Form (TRF) prior to being weighed in. The screening ensures that the original expected delivery matches the load that has arrived. The waste is then tested by a Laboratory Technician to ensure that the waste conforms to the waste generators declaration and determines the correct dangerous goods classification prior to storage. The waste is then appropriately stored and a Goods Received Note (GRN) is then issued, which indicates that the waste has been received. A-Thermal complies with the Norms and Standards for the Storage of Hazardous Waste. Waste streams are stored according to the chemical compatibility, which is a condition of the Norms and Standards. All employees required to handle waste on site are Hazmat trained.

The current procedures described above will be utilised for material handling and for hazardous wastes in future as well. There are some additional aspects that will be implemented for the proposed upgraded facilities:

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- The weight of the general waste deliveries (by sealed skip or truck) is determined by a weighbridge. The waste is off-loaded into separate bays that are allocated to the type i.e. General Waste.
- General Waste deliveries are off-loaded in a sealed building that has an extraction system to control potential fugitive odour emissions. The extraction system feeds the air into the plant and therefore odours are eliminated. This is a condition of the Norms and Standards, Section 9 (1).
- Bulk liquid/sludge/solid deliveries: specific waste types are stored in dedicated bays, based on classification by laboratory analysis.
- The focus of the General Waste received is to recycle and recover waste material.
- There will be continued compliance to the Norms and Standards for the Storage of Waste.

3.2.9 Stormwater Management

Refer to the Stormwater Management Plan (Appendix 12). Waste storage areas and waste sorting areas are located under roofs. Any storage areas that are not under roofs are concrete lined and bunded to ensure that no contaminated water enters the stormwater. Water from bunded areas reports to a sump and water is re-used in the plant.

Three Triple Separators will be installed as shown in Addendum 1 of the Stormwater Management Plan. The Separators will ensure that no dirty water such as oil leaks from trucks etc. will contaminate the stormwater run-off.

Any tanks that are located in open areas are bunded to 110 % of the tank capacity. Any potentially contaminated water contained and collected in the bunds and the triple separators is to be used in the plant.

3.2.10 Employment Opportunities

A-Thermal currently employs 109 employees and the project will create about an additional 80 new work opportunities. Of the current personnel, about 85 % reside in the surrounding communities of Tembisa, Olifantsfontein or Clayville and it is expected that the majority of new personnel will also come from these areas. Secondary employment opportunities will include the promotion of small businesses as a result of the Materials Recycling Facility (MRF) which may include recycling and transportation businesses. In addition, A-Thermal offers internships for graduates and matriculants.

3.2.11 Motivation

Energy recovery is in line with government policy (National Policy on the Thermal Treatment of General and Hazardous Waste GNR 777 of 2009; Municipal Waste Sector Plan: Challenges with Waste Service Provision in South Africa GNR 270 of 2012; National Waste Management Strategy GNR 344 of 2012) relating to the recovery / beneficiation of products from wastes and hazardous wastes. The energy recovered from the treatment of waste will be used to power the facility as well as process equipment, and potentially allow

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the distribution of surplus energy to local industry. This is in line with the move towards power supply by the private sector to assist in the easing of the power shortfall currently taking place in South Africa.

Economic development, population growth and rapid urbanisation continues to contribute to an increase in waste generation, placing continued pressure on South Africa's landfill sites. According to the DFFE, 98 million tonnes of waste is deposited across South Africa's 826 landfill sites every year (Engineering News, 2018).

Of the total amount of waste generated, a maximum of only 10% is recycled or recovered for other uses, whilst at least 90% is landfilled or dumped (State of Waste Report issued by the Department of Environmental Affairs, 2017). The report highlights that approximately 94% of the 48 million tons of hazardous waste generated in 2017 was also directed to landfill sites. Hazardous waste types include mercury containing, asbestos containing, brine, fly ash, waste oils, sewage sludge and materials considered as miscellaneous waste. These hazardous wastes generate a wide range of toxins that are hazardous to the environment and human life, and need to be carefully treated according to strict hazardous waste regulations.

Metropolitan municipalities in Gauteng have not licenced a new landfill facility for 24 years, and the few remaining landfill sites are filling up and approaching closure at a rapid and increasing rate (Association for Water and Rural Development Website, February 2019). It is calculated that existing landfill sites in Johannesburg have an approximate lifetime of 6 years available (EWN Article, 2018). Waste to Energy is therefore a much-needed solution for waste management in Gauteng.

In addition, there are more stringent restrictions on waste streams that are disposed to landfill. One of the most recent significant developments has been the DFFE placing a ban on all forms of liquid waste (Stubbs, 2020),

Waste-to-energy initiatives are robust and effective alternative energy options to reduce CO₂ emissions and replace the use of fossil fuels. Greenhouse gas (GHG) emissions calculations show that thermal desorption results in lower GHG emissions than landfilling (refer to Section 18).

The proposed upgrade supports internationally accepted principles of best environmental practice and sustainable waste management, that will contribute to the minimisation of waste to landfill, whilst improving the current gas cleaning technology, already utilised at the facility. The above upgrades will enable implementation of government policies for waste management options that are consistent with the principles of the waste management hierarchy.

The reduction of waste to landfill and waste beneficiation are direct objectives of the recently published National Waste Management Strategy 2020, GN 56 of 2021, 28 January 2021:

- Section 3.4 Expected Outcomes: Prevent waste, and where waste cannot be prevented ensure 45 % of waste is diverted from landfill within 5 years.

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- Section 9.1 National Government: “The DFFE through Chemicals and Waste Economy (CWE) Phakisa are constantly seeking new and improved technologies to meet the objectives of the Department’s National Waste Management Strategy (NWMS). Through engagements with private sector, various government departments, waste specialists as well as tertiary institutions the CWE Phakisa is currently focusing on the following, but not limited to:
 - Biological Treatment (Anaerobic Digestion / Fluidised Bed Reactors);
 - Material Recovery Facilities and palletisation;
 - Composting and re -use of household biomass;
 - Waste-to- Energy plants;
 - Pyrolysis; and
 - Use of ash, sludge and animal matter as a soil ameliorant and input to high agricultural production land.

The above technologies will be implemented through internal sources of funding leveraging from the Green Fund as well as the Infrastructure Fund to the Municipalities that are aligned to the objectives of the programme. Furthermore, CWE Phakisa supports research and innovation such as in the development of roads using plastic and waste to energy projects using biomass, sludge and non - recyclable waste.”

- Section 9.4 Private Sector: “The involvement of the private sector is therefore critical to the implementation of the NWMS.”

3.2.12 CO₂ Emissions calculations

Historically, the availability of non-developed land has made landfilling the most popular and cheapest method of waste disposal. However, the Integrated Waste Management Policy and the National Waste Management Strategy seek to minimise the waste stream going to landfills, while extracting maximum value from the waste stream at all stages of collection and disposal. This is partially driven by the fact that the availability of existing landfill space is becoming smaller and new landfills are not readily being developed. A well-engineered thermal treatment design with emission controls to maintain emissions within the limits, and following the intended operational procedures offers a good opportunity of waste reduction. Furthermore, since the proposed project includes energy recovery, the process can also be viewed as a form of recycling, albeit not usable material but energy in this instance. For the purposes of comparing the advantage of the proposed project (thermal desorption process with energy recovering) over landfilling, greenhouse gas inventories were established for the two operations.

A summary of the GHG emissions calculated for the various options for disposal of the 248 tpd waste is provided in Table 3-3 and Table 3-4. According to these calculations, the best option would be the proposed

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Project with fixating of the carbon in the ash (0.70 kg CO₂-eq/s). This is followed by treatment in the thermal desorption process with the ash disposed on a landfill fitted with gas collection and electricity generator (1.55 kg CO₂-eq/s). The usage of the ash from the thermal desorption process in the clamp kilns at a brickworks assume that this would not affect the quality and specification of the bricks. It also does not incorporate the GHG emissions that would be saved by replacing more conventional fuel (coal) in the brickmaking process. The worst option was calculated to be landfilling without any gas collection and LFG usage (i.e., flare or electricity generation).

Therefore, a reduction of 70 % in CO₂-e emissions is achieved, as a minimum value, by implementation of the project.

Table 3-3: Calculated GHG emissions for various options of disposing waste

1 kg general waste:	kg CO ₂ -e generated	Reduction of CO ₂	Carbon capture
To landfill (no flare/elec)	+ 5.0	0 % (base case)	0 %
To thermal desorption	+ 1.9	70 % reduction	39 %

Table 3-4: Calculated GHG emissions for various options of disposing waste (248 tpd)

Option	Electricity Power [MW]			GHG Emission [kg CO ₂ -eq/s]		
	Generation	Requirement	Excess	Gross	Eskom Saving	Nett
LF - no flare	0.00	0.00	0.00	14.23	0.00	14.23
LF - flare	0.00	0.00	0.00	5.63	0.00	5.63
LF - electricity	7.77	0.00	7.77	5.63	2.14	3.49
TDP & Ash LF (no flare)	9.90	5.17	4.74	5.44	1.30	4.14
TDP & Ash LF (flare)	9.90	5.17	4.74	3.37	1.30	2.06
TDP & Ash LF (electricity)	11.78	5.17	6.61	3.37	1.82	1.55
TDP & Brickworks	9.90	5.17	4.74	3.01	1.30	1.71
TDP & Ash Fixate	9.90	5.17	4.74	2.00	1.30	0.70

Notes: **LF** – landfill; **electricity** – electricity generation; **TDP** – thermal desorption process; **Ash LF** – ash to landfilling

4 Policy and Legislative Context

The legislation in the following table is relevant to the project.

Table 4-1: Summary of legislation applicable to the application

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
The Constitution of the Republic of South Africa (Act 108 of 1996)	Minister for Justice and Constitutional Development	18 December 1996
National Waste Management Strategy 2020 (GN 56 of 2021)	Department of Forestry, Fisheries and the Environment (DFFE)	28 January 2021
The Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	Ministry of Public Administration and Justice	9 March 2001
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	Department of Forestry, Fisheries and the Environment (DFFE) and Gauteng Department of Agriculture and Rural Development (GDARD)	27 November 1998
Environmental Impact Assessment Regulations, 2014 (as amended)	Department of Forestry, Fisheries and the Environment (DFFE)	4 December 2014 as amended on 7 April 2017
The National Heritage Resources Act (NHRA) (Act No 25 of 1999)	South African Heritage Resources Association (SAHRA)	28 April 1999
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Department of Agriculture	1 June 1983
National Environmental Management Biodiversity Act (NEMBA: Act 10 Of 2004)	Department of Forestry, Fisheries and the Environment (DFFE) and Gauteng Department of Agriculture and Rural Development (GDARD)	2004
The National Forest Act (Act 84 of 1998)	Department of Forestry and Fisheries (DAFF)	1998
Gauteng Nature Conservation Bill	Department of Forestry, Fisheries and the Environment (DFFE) and Gauteng Department of Agriculture and Rural Development (GDARD)	2014
Gauteng Conservation Plan 3.3	Department of Forestry, Fisheries and the Environment (DFFE) and Gauteng Department of Agriculture and Rural Development (GDARD)	2011
Gauteng Environmental Management Framework (GEMF)	Department of Forestry, Fisheries and the Environment (DFFE) and Gauteng Department of Agriculture and Rural Development (GDARD)	2014
City of Ekurhuleni Metropolitan Municipality Integrated Development Plan (IDP) 2017/18 to 2020/21	Ekurhuleni Metropolitan Municipality (EMM)	3 April 2017
The National Environmental Management, Waste Act, 2008 (Act No.59 of 2008)	Department of Forestry, Fisheries and the Environment (DFFE)	10 March 2009

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The White Paper on Integrated Pollution and Waste Management (2000)	Department of Forestry, Fisheries and the Environment (DFFE)	17 March 2000
National Policy on the Thermal Treatment of General and Hazardous Waste GNR 777 of 2009	Department of Forestry, Fisheries and the Environment (DFFE)	24 July 2009
Municipal Waste Sector Plan: Challenges with Waste Service Provision in South Africa GNR 270 of 2012	Department of Forestry, Fisheries and the Environment (DFFE)	30 March 2012
National Waste Management Strategy, 2020	Department of Forestry, Fisheries and the Environment (DFFE)	28 January 2021
The White Paper on the Renewable Energy Policy (2003)	Department of Minerals and Energy (DMR)	November 2003

Table 4-2: Description of compliance with the relevant legislation, policy or guideline

Legislation, policy of guideline	Description of compliance
The Constitution of the Republic of South Africa (Act 108 of 1996)	This report has been prepared, submitted and considered within the constitutional framework set by inter alia section 24 and 33 of the Constitution.
National Waste Management Strategy 2020 (GN 56 of 2021)	The 2020 strategy has the concept of the "circular economy" at its centre. The circular economy is an approach to minimising the environmental impact of economic activity by reusing and recycling processed materials to minimise: (a) the need to extract raw materials from the environment; and (b) the need to dispose of waste. The circular economy is built on innovation and the adoption of new approaches and techniques in product design, production, packaging and use -industrial symbiosis, for instance, is a way of preventing waste in industrial production by redirecting waste from one production process to serve as raw materials for another production process. South Africa is experiencing <u>severe constraints in terms of the availability of landfill space</u> , as well as challenges in operating and decommissioning landfills in a manner that is compliant with licensing conditions. For this reason, <u>diverting waste from landfill is a key imperative for the country's NWMS</u> . South Africa's strategy for diversion of waste from landfill is based on building a secondary resources economy around the beneficiation of waste as part of the circular economy. This is through among others, include the treatment and recovery of soil nutrients and energy from organic waste by composting and energy recovery.
The Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	The provisions of this legislation will be heeded throughout the public participation process.
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	The Basic Assessment process followed is in compliance with the National Environmental Management Act: NEMA, 1998 (Act No. 107 of 1998), as amended. An integrated application for environmental authorization was submitted to the DFFE on 9 June 2021.
Environmental Impact Assessment Regulations, 2014 (as amended)	The Basic Assessment process followed is in compliance with the Environmental Impact Assessment Regulations of 2014 (Government Notice No R983 of December 2014), as amended.

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	This report has been prepared, submitted and considered in line with Appendix 1 of the EIA Regulations (GNR 326)
The National Heritage Resources Act (Act No 25 of 1999) (NHRA)	The legislation was taken into account during the compilation of the Draft Basic Assessment Report.
Gauteng Conservation Plan 3.3	The C-Plan was heeded during the compilation of the Draft Basic Assessment Report. The project will not impact on any Critical Biodiversity Areas (CBA's) or Ecological Support Areas (ESA's).
Gauteng Environmental Management Framework (GEMF)	<p>The GEMF is seen as part of a pro-active framework that will inform planning on provincial and municipal level. The Environmental Management Zones (EMZ) were derived from the desired state, the environmental sensitivity as well the unique control areas as identified in sections 1, 2 and 3. The EMZs were presented to the Gauteng Planning Forum where it was generally accepted as a suitable contribution to facilitate appropriate development in Gauteng. The EMZs also took the Gauteng Growth and Management Perspective, 2014, into account and is therefore aligned to the general development policy for Gauteng. Five EMZs were identified and overlaying those a further six Special Management Areas were identified where specific planning and policy measures are necessary to achieve the development objective of those areas.</p> <p>The site falls into Zone 5: Industrial and large commercial focus zone</p> <p>Intention The intention with Zone 5 is to streamline non-polluting industrial and large-scale commercial (warehouses etc.) activities in areas that are already used for such purposes and areas that are severely degraded but in close proximity to required infrastructure (such as old and even current mining areas).</p> <p>Conditions</p> <ul style="list-style-type: none"> • Development in this area must be sustainable in respect to the capacity of the environment and specifically the hydrological system to absorb additional sewage and stormwater loads of increased densities; • The General Waste Minimisation Plan for Gauteng, 2009, must be consulted in respect to the implementation of the identified waste minimisation options; and • Development in this area must identify any unmapped wetlands, especially seep areas that may occur on any site and when necessary apply for the required water use licence.
City of Ekurhuleni Metropolitan Municipality Integrated Development Plan (IDP) 2017/18 to 2020/21	The IDP was heeded during the compilation of this Draft Basic Assessment Report (DBAR).
The National Environmental Management, Waste Act, 2008 (Act No.59 of 2008)	This is the primary law regulating waste management in South Africa. The objectives of the National Environmental Management, Waste Act, 2008 include: minimising the consumption of natural resources; avoiding and minimising the generation of waste and reducing, re-using, recycling and recovering of waste; and promoting and ensuring the effective delivery of waste services.

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<p>The White Paper on Integrated Pollution and Waste Management (2000)</p>	<p>This is a guiding policy on pollution prevention, waste minimisation, impact management and remediation. The policy introduced the concepts of pollution prevention and waste minimisation, and reflected Government's intention to move away from uncoordinated pollution control and waste management to a holistic and integrated system. A number of priorities and goals were identified, such as setting standards and the regulation of certain activities, including waste incineration and treatment of organic hazardous waste. is a guiding policy on pollution prevention, waste minimisation, impact management and remediation.</p>
<p>National Policy on the Thermal Treatment of General and Hazardous Waste GNR 777 of 2009</p>	<p>This policy presents Government's position on thermal waste treatment as an acceptable waste management option in South Africa, and provides the framework within which thermal waste treatment technologies shall be implemented in the country. This includes incineration of general and hazardous waste in dedicated incinerators or other high temperature thermal treatment technologies.</p> <p>Incineration and co-processing are internationally proven technologies for the treatment of general and hazardous waste, as well as the recovery of energy and raw materials. Not only do these options present a significant opportunity to recover resources (energy and raw materials), it would also facilitate a move away from waste disposal to landfill, particularly of organic waste. It is therefore appropriate that South Africa incorporates these thermal waste treatment technologies into national waste management policy.</p> <p>South Africa has an intensive, growing industrial and manufacturing economy which results in the generation of general and hazardous waste that is increasing at an estimated rate of 2 – 3% annually.</p> <p>The disposal of general and hazardous waste to landfill is currently the primary option for waste management in the country. At present, thermal waste treatment options provide a limited opportunity for waste management, as only a small number of commercial and site specific hazardous waste incinerators exist, and these are used to treat specific waste streams.</p> <p>In many instances, the disposal of waste to landfill <u>is not the best</u> environmental option in terms of the waste management hierarchy. Waste treatment, which includes incineration, and the recovery of resources from waste, often provides a more environmentally sustainable solution.</p> <p>The use of properly designed and operated thermal treatment facilities is considered best available technology for a variety of general and hazardous waste streams. These thermal waste treatment technologies are accepted as complementary tools that divert waste from landfills and recover economic value from waste. International experience has shown that combining energy and resource recovery with effective waste management, as achieved through the co-processing of waste as Alternative Fuels and Raw Materials (AFR) specifically, can be particularly attractive and cost-efficient, especially for emerging economies having insufficient waste treatment capacity.</p> <p>A-Thermal complies with the requirements outlined in this policy.</p>

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<p>Municipal Waste Sector Plan: Challenges with Waste Service Provision in South Africa GNR 270 of 2012</p>	<p>The Municipal Waste Sector Plan contains government’s strategy to effectively address the backlogs in terms of municipal solid waste service delivery and infrastructure relating to waste management once implemented.</p> <p>The State of the Environment Report (DEAT, 2006) suggests that approximately 15 Mt/a general waste is generated while the research paper towards the development of the National Waste Management Strategy (Purnell, 2009) estimated that general waste (domestic and trade waste) disposed at landfills in 2006/7 amounted to 24.1 million tons/annum. The metropolitan municipalities of South Africa (City of Johannesburg, City of Tshwane, City of Cape Town, Nelson Mandela Municipality, Ekurhuleni Municipality and eThekweni Municipality) alone are estimated to dispose of 8.9 million tonnes of municipal solid waste during 2005 (Von Blottnitz et al., 2006).</p> <p>Waste generation in South Africa is expected to increase, as a result of population and economic growth (DEAT, 1999), at an expected rate of 2-3% per annum (Fiehn & Ball, 2005).</p> <p>The vision of the Waste Sector Plan includes the implementation of waste minimisation, reuse and recycling initiatives in collaboration with the private sector. One of the objectives of this sector plan are to reduce the amount of general and hazardous waste disposed in landfills in the country.</p>
<p>The White Paper on the Renewable Energy Policy (2004)</p>	<p>The White Paper intends to promote renewable energy and integration of renewable energies into the mainstream energy economy. One source of energy recognised in the policy is biomass from organic matter, which includes residues from agriculture or forestry, and organic components in municipal and industrial wastes. Energy from waste is accordingly one of the renewable energy resources included in the policy. The White Paper recognises that almost all of South Africa's waste with notable energy content is disposed of to landfill sites.</p>

Table 4-3: Description of compliance with the relevant Air Quality legislation, policy or guideline (Airshed, 2021).

Legislation, policy of guideline	Description of compliance
<p>Listed Activities and Minimum National Emission Standards (MES)</p>	<p>Thermal Treatment of Hazardous and General Waste is a Listed Activity under Section 21 of the NEM:AQA and therefore also require an Air Emissions Licence (AEL) to operate. The New Plant MES for <i>Category 8.1 - Thermal Treatment of Hazardous and General Waste</i> are given in Table 2-1. The Project will be designed to meet these MES limits.</p>
<p>Atmospheric Emissions Reporting Regulations (NAERR)</p>	<p>The <i>National Atmospheric Emission Reporting Regulations (Government Gazette No. 38633)</i> came into effect on 2 April 2015. The purpose of the regulations is to regulate the reporting of data and information from an identified point, non-point and mobile sources of atmospheric emissions to an internet-based National Atmospheric Emissions Inventory System (NAEIS). The NAEIS is a component of the South African Air Quality Information System (SAAQIS). Its objective is to provide all stakeholders with relevant, up to date and accurate information on South Africa's emissions profile for informed decision making.</p> <p>As per the regulations, A-Thermal is registered on the NAEIS system as they are currently operating. A-Thermal, as a data provider, must submit the</p>

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	<p>required information for the preceding calendar year to the NAEIS by 31 March of each year. Records of data submitted must be kept for a period of 5 years and must be made available for inspection by the relevant authority.</p>
Gauteng Waste Information System (GWIS)	<p>The GWIS was instituted in order to make data and information of waste available to the public and organs of state. A further objective of the system was to make available waste information for education, research and development, public health and disaster management. The information required for input into the GWIS includes the quantity of waste disposed, recycled or treated, the type of waste and the source of the waste. A-Thermal is registered with GWIS with number GPF-00-011.</p>
National Ambient Air Quality Standards (NAAQS)	<p>The initial NAAQS were published for comment in the Government Gazette on 9 June 2007. The revised NAAQS were subsequently published for comment in the Government Gazette on the 13th of March 2009. The final NAAQS was published in the Government Gazette on the 24th of December 2009 (Government Gazette 32816) and additional standards for particulate matter less than 2.5 μm in aerodynamic diameter (PM_{2.5}) was published on the 29th June 2012. The standards were developed for those pollutants that are most commonly found in the atmosphere, that have proven detrimental health effects when inhaled and are regulated by ambient air quality criteria. These generally include CO, NO₂, SO₂, benzene, Pb, PM₁₀, PM_{2.5}, and ground level ozone (O₃).</p> <p>Air Quality Modelling for the purpose of the project was undertaken in order to determine the stack height required for the plant to be in compliance with the NAAQS.</p>
National Dust Control Regulations (NDCR)	<p>The NDCR were published on 1 November 2013, with the purpose of prescribe general measures for the control of dust in all areas including residential and non-residential areas. According to these regulations the dustfall rates at the boundary or beyond the boundary of the premises where it originates cannot exceed 600 mg/m²/day in residential and light commercial areas; or 1 200 mg/m²/day in areas other than residential and light commercial areas.</p>
Air Quality Management Plans (AQMP) – the Highveld Priority Area (HPA)	<p>The <i>Highveld Airshed Priority Area</i> (HPA) was declared the second national air quality priority area (after the Vaal Triangle Airshed Priority Area) by the Minister of Environmental Affairs at the end of 2007 (HPA 2011). This required that an AQMP for the area be developed. The Project is located in the Ekurhuleni Hot Spot (HPA 2011) and the particulate emissions from the Project are likely to further contribute to the existing compromised air quality of the HPA. The DEA published the AQMP for the Highveld Priority Area on the 2nd of March 2012 (<i>Government Gazette No. 35072</i>). Included in this management plan are seven goals, each of which has a further list of objectives that must be met.</p> <p>Since the project is located in the HPA, any means of mitigating air pollution emissions from the plant, such as the improved gas abatement technology proposed for the project, would be beneficial to the air quality in the HPA. Also, seen in the broader sense, the electricity generation from the process using waste which would otherwise be disposed of in landfills, is done under cleaner conditions than conventional fossil fuel plants, as the emission limits are significantly lower, for example, a particulate matter limit of 10 mg/Nm³ for the project compared to 50 mg/Nm³ for a new solid fuel combustion installation for steam or electricity generation.</p>

5 Need and desirability of the proposed activities.

5.1 Guideline on Need and Desirability

In 2014 the DEA published the Guideline on Need and Desirability, Integrated Environmental Management Guideline Series 9. The project has therefore also been evaluated against the criteria presented in the guideline. Also refer to Table 5-1.

5.1.1 Review of national, provincial and government objectives

A review was undertaken of the proposed project with the national, provincial and government objectives (Refer to Table 4-2 and Table 4-3). The review resulted in the following conclusion:

The reviewed documents demonstrate that government policy aims towards minimising the consumption of natural resources; avoiding and minimising the generation of waste and reducing, re-using, recycling and recovering of waste. Government's position on thermal waste treatment is that it is an acceptable waste management option in South Africa. This includes incineration of general and hazardous waste in dedicated incinerators or other high temperature thermal treatment technologies.

The use of properly designed and operated thermal treatment facilities is considered best available technology for a variety of general and hazardous waste streams. Thermal desorption, incineration and co-processing are internationally proven technologies for the treatment of general and hazardous waste, as well as the recovery of energy and raw materials. Not only do these options present a significant opportunity to recover resources (energy and raw materials), it would also facilitate a move away from waste disposal to landfill, particularly of organic waste.

The White Paper on the Renewable Energy Policy (2004) intends to promote renewable energy and integration of renewable energies into the mainstream energy economy. One source of energy recognised in the policy is biomass from organic matter, and organic components in municipal and industrial wastes. Energy from waste is accordingly one of the renewable energy resources included in the policy. The White Paper recognises that almost all of South Africa's waste with notable energy content is disposed of to landfill sites.

Evidently, the proposed project is well aligned with government's general outlook. In summary, the proposed project does not contradict any of the government objectives and is more likely to contribute to the development in the specified priority areas particularly related to waste minimisation as well as to promote renewable energy.

Thermal Treatment of Hazardous and General Waste is a Listed Activity under Section 21 of the NEM:AQA and therefore requires an AEL to operate. A-Thermal has an AEL. The proposed upgrade will be designed to meet the MES limits for Category 8.1 - Thermal Treatment of Hazardous and General Waste and A-Thermal will be required to submit a variation to their AEL.

5.1.2 Retainment and creation of permanent and temporary employment

A-Thermal currently employs 109 employees and the project will create about an additional 80 new work opportunities. Of the current personnel, about 85% reside in the surrounding communities of Tembisa, Olifantsfontein or Clayville and it is expected that the majority of new personnel will also come from these areas.

The upgrade of the A-Thermal plant will also require temporary employment of construction workers, foremen, and engineers on site. Approximately 60 employment opportunities will be created for a period of 12 to 16 months and 80 new permanent positions.

5.1.3 Improvement in Air Quality

As part of the upgrade of the plant, A-Thermal will be upgrading the gas abatement technologies (refer to Section 3.2.4).

5.1.4 Reduction in Carbon Emissions

Greenhouse gas (GHG) emissions calculations show that thermal desorption results in lower GHG emissions than landfilling (refer to Section 3.2.12).

5.1.5 Cleaner method of generation of electricity

Seen in the broader sense, the electricity generation from the process using hazardous waste which would otherwise be disposed of in landfills, is actually done under 'cleaner' conditions than conventional fossil fuel plants, as the emission limits are significantly lower for thermal desorption plants (Airshed, 2021). In addition, the project will include generation of electricity which will lessen the impact on the national grid.

5.1.6 Reduction in waste to landfill

Disposal of hazardous waste to landfill is not recommended and should only be used as a last resort option. Well-designed hazardous waste sites have protective seals to keep hazardous chemicals from escaping into the ground. However, if a leak occurs, hazardous chemicals can contaminate groundwater in the region. Landfills can also emit harmful gases into the atmosphere. Hazardous waste landfill operators are required to seal their facilities with double liners and use other methods to keep hazardous materials from escaping into the environment⁴.

A-Thermal can currently process 48 tpd of a mix of general and hazardous waste. With the proposed upgrade, this will be increased by approximately 200 tpd to 248 tpd total. At A-Thermal, hazardous waste is permanently destroyed and therefore this completely removes the danger that waste poses to human health and the environment. This is a great advantage over disposal of waste to landfill and, as described in Section 5.1.1, is supported by government policies in South Africa. As discussed in Section 3.2.11 economic development, population growth and rapid urbanisation continues to contribute to an increase in waste

⁴ <https://sciencing.com/hazardous-waste-landfill-advantages-disadvantages-23695.html>; 26/05/2021; 09:24.

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generation, placing continued pressure on South Africa’s landfill sites, both in terms of general and hazardous waste.

A-Thermal has also recently completed a project that will see the plant produce a carbonised residue by-product from the various and variable forms of hazardous waste processed at the facility. The carbonized residue has similar properties to coal and can be used as an alternative form of fuel that can be sold as a by-product.

A-Thermal also has a feeding system which allows for the safe treatment of any and all flammable liquids. Waste Generators cannot put liquid hazardous waste into a hazardous waste landfill. This new feeding system allows for the safe treatment of any and all combustible or flammable liquids which includes solvents. This brings relief to customers who are now faced with more stringent landfill restrictions regarding liquid wastes with high calorific value.

5.1.7 Project Desirability from a Localisation Perspective

From the Socio-Economic study performed, a number of desirable outcomes were determined, from a Location point. These are shown in Table 6-1.

Table 5-1: Project Desirability from a Localisation Perspective (Urban-Econ, 2020).

Aspect	Comment
Utilisation of an existing site	The upgrade of the A-Thermal facility will be on the existing site.
Optimisation of the use of existing resources and infrastructure	The area is well-developed and has adequate access to basic services, reducing the need for public investment to realise the project.
Creating job opportunities close to labour pools and contribution to the correction of the historically distorted spatial patterns	The project will bring additional employment opportunities closer to the areas of the large labour pool that is located on the outskirts of the metros and is further removed from the areas of high concentration of economic opportunities. The majority of A-Thermal’s workforce is from Tembisa.
Creating job opportunities for women, youth and other disadvantaged	The site’s proximity to Tembisa allows A-Thermal to provide job opportunities to the women and youth of previously disadvantaged communities such as Tembisa.
Reducing the need to transport potentially hazardous material	Ekurhuleni is the manufacturing hub of South Africa. Significant volumes of hazardous material are produced in Ekurhuleni by industries that need to be transported and disposed of. The project site is well placed to reduce the need to transport hazardous material over long distances, reducing the risk associated with the transportation of these materials.
Complementing other uses in the area	Carbon is an important component in several manufacturing industries, such as petrochemical industries producing polymers, fibres, paints, solvents and plastics, as well as metal smelting, industrial diamond production, etc. The production of carbon will complement local downstream businesses in Ekurhuleni and may develop or expand value-chain opportunities.
Alignment with planning for the area	The proposed spatial development plan for the area promotes spatial integration and overlap between disadvantaged areas and areas of economic activity, as well as an investment towards dense townships that are on the margins of cities, which is the case of the study area.

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	Overall, the project site is located in the area designated as an industrial zone. It also aligns with industrial development, environmental protection and urban-development objectives of the area. The project may further promote the creation of a new functional core node and corridors in the northwest of Ekurhuleni to serve the population more efficiently, as delineated by the Ekurhuleni Spatial Development Framework.
Encouragement of environmental sustainability	The project promotes the sustainability of the environment through the reduction of hazardous material. In the process, the project 'recycles' the heat required for the incineration process to generate electricity. The project further reduces the waste that would have gone to landfills and produce carbon which in turn reduce greenhouse gas emissions.
Generation of the highest socio-economic returns	The proposed project is expected to create sustainable employment opportunities not only at the site but also in the sectors that will provide services and goods for the facilities located at the development (transportation, accommodation, trade, personal services, etc.). these are expected to contribute to improving the integration of economic and social activities in the area.
Promoting or contributing to create a more integrated settlement	The proposed project will contribute to integrated development in the area by encompassing job opportunities close to existing commercial and residential areas in the surrounding environment.

6 Motivation for the overall preferred site, activities and technology alternative

6.1 Details of all alternatives considered

6.1.1 The property on which or location where it is proposed to undertake the activity

The site is located on Erf 980, Clayville Extension 12. There are no alternatives with regards to the property on which the project will be located as the plant is already existing.

6.1.2 The design or layout of the activity

A-Thermal provided two alternative locations for the placement of the proposed stack:

- Option 1: Behind warehouse: 25°56'34.46"S, 28°13'30.61"E (elevation 1508m)
- Option 2: Next to Lapa: 25°56'33.10"S, 28°13'26.17"E (elevation 1506m)

The stack diameter considered in the design specification was given as 1.6 m.

The scrubber design specification is to meet the emission limits as specified in the AEL (Category 8.1). The emission rates of the various air pollutants were therefore calculated based on the mass and energy calculations (providing volumetric flow rate and exit gas temperature) and the limit values provided by the Minimum Emission Standards (MES) in the Listed Activities and associated Minimum Emission Standards which were published in the Government Gazette on the 31st of March 2010 (Government Gazette No. 33064)) with a revision of the schedule on the 22 November 2013 (Government Gazette No. 37054).

The results of the air quality modelling are included in Section 10.1.2.1.



Figure 6-1: Stack location alternatives (Airshed, 2021)

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Ground level concentrations were calculated for all the pollutants for stack heights from 25 m to 45 m above ground level.

A stack height of at least 35 m would be required to satisfy the hourly and daily average criteria for the metal groups. For location option 2, the calculations indicate that a stack height of 30 m would be required to satisfy the NAAQS requirements. In this regard Option 2 was selected.

6.1.3 The technology to be used in the activity

The following technological alternatives were considered:

6.1.3.1 Thermal Treatment (current project)

In thermal treatment, a high-temperature reducing atmosphere (that is, one with no or limited presence of oxygen present) is used to convert organic matter and other hazardous waste materials into a volatile vapor phase (European Commission, 2006). The volatile vapor is then fully oxidised in a thermal reactor to form products of carbon dioxide and water. The hot gas is used to heat water into steam in a boiler, and the steam is used either directly or in a turbine for energy recovery. The cooled gas is scrubbed using the gas abatement equipment to clean the gas from pollutants in order to meet the MES concentrations.

6.1.3.2 Incineration

With this option, there are higher gas flows as the waste materials form a small component to the overall process, in effect being diluted. Therefore, despite possibly meeting concentration limits, there is still a very high mass emission of pollutants that then deposit and accumulate into the environment, for example, mercury and lead. In addition, this option results in higher CO₂ emissions than the current project (thermal treatment).

6.1.3.3 Encapsulation

This is the enclosing of the waste materials in a container and leaving on land or underground. There is limited capacity for this and it is very expensive. Similar to landfill, the hazardous components are still present. There is no beneficiation e.g. electricity production.

6.1.3.4 Other technologies considered

Several other technologies exist to treat or dispose of health care waste (Dr Hodge, 2009). They include:

- Burning in single chamber incinerators;
- Wet thermal treatment (autoclaving);
- Chemical disinfection;
- Microwave irradiation

Not all these technologies can be used for the treatment or the disposal of all categories of health care or other waste.

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Therefore it is concluded that the current technology of thermal treatment is still regarded as the preferred technological alternative due to the ability to break down hazardous waste into simpler, nontoxic substances.

6.1.4 The option of not implementing the activity (No-Go Alternative)

Should the project not go ahead, the following benefits will not be realised:

- The additional employment opportunities will not be realized. An additional 80 permanent positions at various levels will be created as a result of the upgrade of the plant.
- Secondary employment opportunities will not be realised, including the promotion of small businesses as a result of the Materials Recycling Facility (MRF) which may include recycling businesses and transportation.
- The potential to divert waste from landfill will not be realized. With this option, hazardous components will not be treated and rendered safe to the environment. This means that they will still pose a risk to both society and the environment. In addition, waste will be diverted to landfill and, as described in Section 5.1.1, this will be contradictory to government policies in South Africa, sustainable development principles as well as the waste hierarchy.

7 Details of the Public Participation Process Followed

Public Participation is one of the most important aspects of the environmental authorisation process. This stems from the requirement that people have the right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the competent authority to make informed decisions and result in improved decision-making as the views of all parties are considered.

The Public Participation Process:

- Provides an opportunity for interested and affected parties (I&AP's) to obtain clear, accurate and comprehensive information about the proposed activity, its alternatives or the decisions and the environmental impacts thereof;
- Provides I&AP's with an opportunity to indicate their viewpoints, issues and concerns regarding the activity, alternatives and/or the decisions;
- Provides I&AP's with the opportunity of suggesting ways of avoiding, reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enables an applicant to incorporate the needs, preferences and values of the affected parties into the activity;
- Provides opportunities to avoid and resolve disputes and reconcile conflicting interests;
- Enhance transparency and accountability in decision – making.

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Public Participation therefore allows I&AP's the opportunity to give their viewpoints and influence the process and the decisions of the competent authority.

The following process was undertaken to facilitate the public participation for the proposed project (refer to Appendix 13 for the Consultation Report and Public Participation documentation). The registration period was completed, however public review of the Draft Basic Assessment will still take place (refer to Section 7.5)

7.1 Newspaper Advertisement

An advertisement, notifying the public of the Environmental Authorisation application and Basic Assessment process, and requesting I&APs to register their comments with Exigo, was placed in the Tembisan and Rekord Centurion newspapers on 10 May 2019. The advertisement was placed in accordance with regulation 41(2) (c) of the EIA Regulations of 2014 (as amended).

A second round of advertising is scheduled in the same newspapers on 9 June 2021.

7.2 Site notices

In order to inform surrounding communities and adjacent landowners of the proposed development, site notice boards in accordance with regulation 41(2)(a) and 41(3) of the EIA Regulations were placed at the entrance to the site on 10 May 2019.

A second round of advertising is scheduled in the same newspapers on 9 June 2021.

7.3 Direct Notification of Identified I&AP's

Key stakeholders, who included the following sectors, were informed by means of hand deliveries, emails, faxes or registered post on 10 May 2019 of the proposed development:

- The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site
- Landowners in the surrounding area
- Directors and Members of the Olifantsfontein Business Forum of the surrounding area
- Ekurhuleni Metropolitan Municipality
- Department of Water and Sanitation (DWS)
- Department of Environmental Affairs (DEA)
- Gauteng Department of Agriculture and Rural Development
- Gauteng Department of Roads and Transport
- South African Heritage Resources Agency (SAHRA)
- Gauteng Department of Economic Development
- Department of Public Work

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7.4 Consultation Meetings

The following consultation meetings were held:

- A meeting was held with the Greater Midstream Forum. The City of Ekurhuleni Ward Councillor was also invited to the meeting however, sent apologies.

The minutes of the meetings are included in Appendix 13.

7.5 Draft Basic Assessment Report (BAR)

The EIA Regulations specify that I&AP's must have an opportunity to comment, in writing, on all reports or plans submitted to such party during the public participation process. A period of 30 days (9 June 2021 until 12 July 2021) will be made available to allow for public comment on the Draft BAR. The availability of the Draft BAR will be announced via personal notification letters distributed to registered I&AP's. The following methods will be made available for I&AP's to access the reports:

- Published on the Dropbox website;
- Downloadable presentations will be made available;
- Hard copies and electronic copies were distributed upon request (reports will be sanitized).

Public Open Day:

A public open day will be held on Wednesday, 23 June 2021 from 14:00 to 20:00 at the Protea Hotel (Midrand).

I&AP's will be invited to register and attend the meeting.

7.6 Final Basic Assessment Report

The final BAR will be updated after the draft review to incorporate the comments received and issues raised by I&APs.

7.7 Summary of issues raised by I&APs

The following key issues were raised by I&AP's during the registration period (refer to Table 7-1):

- More information required on the technical process, upgrades and compliance to the MES.
- Sustainability of the project.
- Authorisations required for the upgrade.
- Comments on the Basic Assessment process such as specialist studies required:
 - Public Health Risk Assessment
 - Traffic Impact Assessment
 - Geotechnical Assessment
 - Air Quality Impact Assessment and impact from traffic

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- Impacts on air quality including pollution, odours, dust and NO₂.
- Cumulative impacts on air quality.
- Requirement to reduce air quality impacts (according to the Highveld Priority Area Air Quality Management Plan).
- Impact on residential areas, located close to an industrial area.
- Impact on ecology.
- Impact on safety and security in the area.
- Potential for effluent and waste products.
- Impact on development characteristics of the area.
- Desirability in local, provincial and national policy context.

Positive Impacts:

- Employment opportunities.

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Table 7-1: Summary of issues raised

Organisation/Company/Individual	Contact Person	Contact Details	Date	Notification	Comments	Response
Local Authorities						
Ekurhuleni Metropolitan Municipality (Air Quality Management and Climate Change) Erf 501 Portion 0	Samukelo Futshane	Private Bag X1069 Germiston 1400 Tel: 011 999 3525	10/05/2019	Email	No comments received to date.	n/a
Ekurhuleni Metropolitan Municipality (EMM)	Derek Edwin Thomson (Ward Councillor: Ward 1)		10/05/2019	Email	No comments received to date.	n/a
Ekurhuleni Metropolitan Municipality (EMM) Legislative Compliance Department of Environmental Resource and Waste Management	Anél Hietbrink	Postal: P.O.Box 25,Edenvale, 1610 Physical:Edenvale Civic Centre cnr Hendrik Potgieter and Van Riebeeck Street, Edenvale	10/05/2019	Email	Email: On 13 May 2019 Ms Hietbrink asked that the City of Ekurhuleni be registered as an Interested and Affected Party. Once the DBAR is available for comment, please submit one (1) hard copy and one (1) soft copy to the following address: FOR ATTENTION: Mrs Nomvula Flara Acting Divisional Head: Legislative Compliance Environmental Resource & Waste Management Department	Email: On 14 May 2019 Ms Da Camara replied to Ms Hietbrink and stated that she has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project, as well as the availability of the relevant environmental reports for review and comment, as they become available.

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Organisation/Company/ Individual	Contact Person	Contact Details	Date	Notificatio n	Comments	Response
					City OF Ekurhuleni Edenvale Civic Centre cnr Hendrik Potgieter & Van Riebeeck Street Edenvale C/O Sifiso Ndwandwe – Room 201)	
Ekurhuleni Metropolitan Municipality (EMM) Legislative Compliance Department of Environmental Resource Management	Sifiso Ndwandwe Environmental Legal Administrator		10/05/2019	Email	No comments received to date.	n/a
Ekurhuleni Metropolitan Municipality (EMM) Ward councillor	Tracey Lourenco				No comments received to date.	n/a

Organisation/Company / Individual	Contact Person	Contact Details	Date	Notificatio n	Comments	Response
Government Departments						
Department of Water and Sanitation (DWS)	Mr M Keet Acting Chief Director: Gauteng Region	Private Bag X995 PRETORIA 0001 Tel: (012) 392 1306/7 Fax: (012) 392 1304	10/05/2019	Email	No comments received to date.	n/a
Department of Water	Kabedi Mashilo	Fax: +27 86 538 6300	10/05/2019	Email	No comments received to date.	n/a

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Organisation/Company / Individual	Contact Person	Contact Details	Date	Notification	Comments	Response
and Sanitation (DWS)	(Cert. Nat. Sci)	Address: Erf 2141, 71 Arsenic Street, Clayville X 26, Olifantsfontein.				
Gauteng Department of Agriculture and Rural Development	Musa Ntsanwisi	Tel: 011 240 2791	10/05/2019	Email	No comments received to date.	n/a
Gauteng Department of Roads and Transport	L Maloka (Senior Manager: Transport)	PO Box X83 Marshalltown 2017 Tel: (011) 355 7000 GPRoads.Transport@gauteng.gov.za	10/05/2019	Email	No comments received to date.	n/a
South African Heritage Resources Agency (SAHRA)	Andrew Salomon (Heritage Officer: Gauteng and Free State)	111 Harrington St, Zonnebloem, Cape Town, 8001 Postal Address: P.O. Box 4637 Cape Town 8000	10/05/2019		The Heritage Impact Assessment and Draft BAR will be uploaded on SAHRIS. No comments received to date.	n/a
Gauteng Department of Economic Development	Economic & Development Planning	Private Bag X091 Marshalltown 2107 Tel: 011 355 8000 Fax: 011 355 8730	10/05/2019	Fax	No comments received to date.	n/a
Department of Public Works	Head Office: Public Works	Private Bag X65	10/05/2019	Email	No comments received to date.	n/a

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Organisation/Company / Individual	Contact Person	Contact Details	Date	Notification	Comments	Response
	Office of the DG DG: Mr Mziwonke Dlabantu	Pretoria 0001 Tel: 012 406 1000				
Department of Public Works	Mr Mbuyi Dondashe (Acting)	Private Bag X229 Pretoria 0001 Tel: 012 310 5954	10/05/2019	Email	No comments received to date.	n/a

Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
Adjacent Landowners and Occupiers					
Flo-Tek		10/05/2019	Hand delivery	No comments received to date.	n/a
Glass Decorations Cc		10/05/2019	Hand delivery	No comments received to date.	n/a

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
Norcross S A Pty Ltd / Tile Africa	Dr Jenny Hall	10/05/2019	Hand delivery and email	<p>Email: On 20 May 2019 Dr Jennifer Hall sent an email to Catherine Da Camara requesting to be registered on the database and informed Ms Da Camara that Norcross SA has asked her to represent them in the matter, and requested that she be registered as the contact person.</p> <p>She also asked that Ms Da Camara attach the form which was attached to your previous e-mail in Word format so that she can complete it before 10 June 2019.</p>	<p>Email: On 21 May 2019 Ms Da Camara replied to Dr Hall, thanking her for her email and stated that she has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project, as well as the availability of the relevant environmental reports for review and comment, as they become available. Ms Da Camara attached a registration form.</p>
On the Dot Logistics		10/05/2019	Hand delivery	No comments received to date.	n/a
Compass House Pty Ltd	Jaco Kleinhans Plant Engineer	10/05/2019	Hand delivery and email	<p>Email: On 15 May 2019 Mr Jaco Kleinhans sent an email requesting to be registered on the project.</p> <p>He asked if the project is in Phase 1 at point 2 in the PPP?</p> <p>Is the BID available for distribution and please will you send me a copy. Once we have reviewed it we will be in a better position to comment.</p> <p>Also please let me know when the open day will be.</p>	<p>Email: On 16 May 2019 Ms Da Camara sent an email stating that Mr Kleinhans has been registered on the project as an Interested and Affected Party and he will be kept updated on all future developments on the project.</p> <p>We are currently in Phase 1 of the public participation process, and the letter that I distributed is a Background Information Document (BID).</p> <p>In the next phase we will send out a notification for the public review of the Draft Basic Assessment Report and at</p>

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
					the same time we will also inform you of the date of the Public Open Day.
				On 27 May 2019 Mr Kleinhans submitted the following comments via email: Herewith our comments wrt the Notification from A Thermal – some of these might be answered by the BA? Or some of these questions should rather be asked during the BA review.	On 1 July 2019 Ms Da Camara responded via email: Thank you for your comments, please refer below for our responses, and additional information will be provided in the Draft Basic Assessment Report (DBAR). You will be notified when the report will be available for public review.
				Notification send out on 10 May refers	
				1. Under Introduction – paragraph 3 it reads “ this Notification letter “ . If compared to the process diagram on page 4, Phase 1 list printed advertisements, Written notices, BID distribution. The email received from Ms Da Camara received on 16 May states that this Notification letter is in fact the BID. This cause some confusion as it is not clear if step 1 and 2 of Phase 1 was in fact completed? Please can the corrected BID be distributed? Or the notice be updated to reflect that this is in fact the BID and redistributed.	As stated in the previous email; we are currently in Phase 1 of the Public Participation process which is the Public Registration Phase. We have placed two newspaper advertisements, one in the Centurion Rekord, and another in the Tembisan, on 10 May 2019. The reference to a BID in the notification letter should rather have stated “notification letter”. However, the notification letter contains the same information as a BID and therefore does not need to be re-distributed.
				2. Please can Compass get a copy of the printed advertisements or be notified of the papers this was published in?	This has been emailed.

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				3. Project description – in paragraph 1 it states that A-Thermal currently treats general, hazardous and municipal waste.	Noted.
				4. Project description – in paragraph 2 – it is staged that the upgrade is to the treatment process and abatement technologies	Noted.
				5. Project description – in paragraph 3 – states that the energy generated will be used by the facility itself and local distribution.	Noted.
				6. Project description – in paragraph 4 adds additional approvals – sorting, recycling , RDF manufacturing	A-Thermal has an existing WML. The upgrade will trigger the following activity: Category A – (13) The expansion of a waste management activity listed in Category A or B of the Schedule which does not trigger an additional waste management activity in terms of the Schedule. Therefore A-Thermal is applying for authorisation for this activity as part of its WML.
				<p>This means that this Notification is not only for the upgrade at the retort plant as stated in its heading but for the -</p> <ul style="list-style-type: none"> • Upgrade of Treatment process • Upgrade of abatement technologies • Generation of power WTE • Manufacturing of RDF • Recycling • Sorting 	Noted. The heading gives an overall description of the proposed project which is to upgrade the plant, and the detail of the proposed project is described in the body of the letter.

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				7. Page 2 paragraph states that the gas cleaning technology will be upgrades – what is the current status of the equipment and in what way will it be upgrades ? In what way will it comply to the MEL?	A-Thermal currently complies and will comply with the minimum emission limits as per their Air Emissions License (AEL). Additional equipment will be added to enable power generation. Further information will be provided in the DBAR.
				8. The diagram on page 2 makes note of an upgrade to the treatment capacity ? Please clarify as under Project description it was stated that the treatment process will be upgraded .	<p>The treatment capacity and process will be upgraded. The proposed upgrade is to allow for the following:</p> <ul style="list-style-type: none"> • Energy recovery: For the feasibility of power generation, the treatment capacity will be increased and will be a mix of general and hazardous wastes. • Additional equipment will be added to enable power generation. <p>Further information will be provided in the DBAR.</p>
				This raises the question	Please refer to above question. Further information including the detail of the upgrades, will be provided in the DBAR.
				if the process will be upgraded , please clarify what the process is at this stage and what the upgrades will be?	
				If the treatment capacity will be upgraded , what is the current capacity and what is the newly proposed capacity ? In what market was the need for increased capacity identified ? Hazardous or general waste ?	
				9. Authorisations required – WML – will this be a change or upgrade to the existing WML L170.3R2?	A-Thermal has an existing WML. The upgrade will trigger the following activity:

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					<p>Category A – (13) The expansion of a waste management activity listed in Category A or B of the Schedule which does not trigger an additional waste management activity in terms of the Schedule.</p> <p>Therefore A-Thermal is applying for authorisation for this activity as part of its WML.</p>
				10. Preliminary specialist studies	
				Social impact assessment needs to be included	Please provide the reason for requiring a Social Impact Assessment.
				Public Health Risk Assessment needs to be done - The area have expressed their concerns on several forums about the public health risk following an incident in 2015 where a facility burned down and impacted the neighbours productivity and put their staff at risk. What have the facility done to mitigate a reoccurrence with the proposed upgrade ?	<p>A public health risk screening is currently being done as part of the Air Quality Impact Assessment. The significance of the air quality impact in the study area is quantified by assigning the health risk criteria for each of the pollutants.</p> <p>The facility will be built in accordance with the relevant standards, laws and municipal by-laws which speak directly to mitigating risk to productivity, neighbouring sites and any staff risks.</p> <p>Further information will be provided in the DBAR.</p>
				Public Health Risk Assessment - Should the facility go off line what additional or backup capacity does this facility have – how will the waste be disposed of within the regulated time frames ? ?	<p>The waste will be stored according to the National Norms and Standards for the Storage of Waste.</p> <p>A-Thermal has internal redundancy and agreements in place with external service providers, and in the event that the facility cannot process the waste, the waste will be removed off site to the external service providers. These agreements will remain in force as per current or future license requirements.</p>

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				Geotechnical report - Any construction and changes to the existing buildings may trigger the need for a Dolomite stability assessment	A dolomite study has been undertaken.
				Traffic impact assessment - Importing large volumes of MSW and Haz waste will result in a massive increase on the existing traffic in Porcelain road, the road infrastructure is already under pressure with poor lighting , no lines , no traffic calming measures in place . A Local staff member was badly hurt on the corner of Ceramic read a few weeks ago due to vehicles not conforming to traffic rules. An increase in local traffic will further impact on this.	A Traffic Impact Assessment has been undertaken. The increase in the number of vehicles has been addressed in the Traffic Impact Assessment.
				Traffic impact assessment - The closure of the end of Porcelain resulted in an increase of Taxi traffic in the area – brining in large numbers of waste transport trucks will add to the local traffic volumes .	A Traffic Impact Assessment is being undertaken and will be included in the DBAR. The increase in the number of vehicles is being addressed in the Traffic Impact Assessment.
				Traffic impact assessment – large trucks can not pass under the train bridge in Porcelain – resulting in additional pressure of the M18. This road is already under severe pressure with EMPD manning the M18 & R562 intersection daily.	A Traffic Impact Assessment is being undertaken and will be included in the DBAR. The intersection of Porcelain Road and M18 (Glen Road) will be assessed in the Traffic Impact Assessment.

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				<p>AQI – several AQI assessments in the area over the years have indicated that vehicle traffic is one of the main contributors to the poor air quality – what will the impact of the additional trucks be bringing waste to this facility ?</p>	<p>An Air Quality Impact Assessment has been undertaken and will be included in the DBAR.</p>
				<p>11. MSW Waste to energy projects have not been successful in South Africa – what studies will be done to prove that this unit will be successful? A failed project will have a negative impact on the environment.</p>	<p>The project has been aligned with the recent requirement for Independent Power Producers (IPP) and all legislation regarding diversions of waste to landfill. A-Thermal has a track record in the industry of thermal treatment of waste and has been operating since 1996.</p>
				<p>12. Large volumes of waste is needed to make WTE projects successful – what will the impact be of large volumes of decomposing MSW stored on site be, health risk, odour ?</p>	<p>This will be addressed in the DBAR.</p>
PSA	Mrs Jeanette Botes	10/05/2019	Hand delivery	<p>On 31 May 2019 Mrs Botes submitted the following comments: How will the upgrade of the plant affect the ecology? How many more people will be employed and what impact will that have on safety and security in the area?</p>	<p>Email: On 31 May 2019 Ms Da Camara sent an email stating that Mrs Botes has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project.</p> <p>She stated that Exigo are currently undertaking an Ecological Assessment of the site. Further information regarding the ecology and the number of employees, safety and security will be provided during the public review of the DBAR.</p>

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					There is a concern that the upgrade could bring more crime due to increased activities in the area. The mitigation methods are: All staff have Criminal Check Report before employment. A-Thermal belongs to the Olifantsfontein Business Forum (OBF), and in addition has an OBF Security Radio for communication with other members in the area. The project will generate additional jobs and employment to provide skills and income.
Vesuvius South Africa Pty Ltd		10/05/2019	Hand delivery and email	No comments received to date.	n/a
Corobrik Pty Ltd	Gladness Moshoeshoe	10/05/2019	Hand delivery	No comments received to date.	n/a

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Olifantsfontein Business Forum	Sol Botha	10/05/2019	Email	<p>On 21 May 2019 Mr Sol Botha sent the following email to members of the Olifantsfontein Business Forum including:</p> <ul style="list-style-type: none"> • Corobrik, Porcelain St • Flotek, Ceramic St • Villa Crop Fountain Chemicals, Porcelain St • Vesuvius, Porcelain St • Compass Medical Waste, Pebble Lane • I G Chemicals, Pebble Lane • Primhill Construction, Pebble Lane • Metadynamics, Pebble Lane • PSA Plastics, Pebble Lane • Glass Decorations, Porcelain St 	n/a

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				<ul style="list-style-type: none"> • On The Dot, Porcelain St • West Engineering, Main Road • The Red Barn, Main Road • Omega Chemicals, Pebble Lane <p>Greetings, All OBF Members that are neighbors of A-Thermal Retort Technologies; Attached please find a notice regarding Public Participation for your information. Any enquiries regarding this matter can be addressed directly to Catherine Da Camara, Environmental Assessment Practitioner from Exigo 3. Her contact number is 012 751 2160; and this email is addressed to her. As our members' contact details are part of our intellectual property, we have blind copied you to honor our commitment thereto. Catherine is well known to the OBF, as she has assisted various other Companies within our area with similar matters. PS. Apologies for the late (time-wise) email. Our landline (adsl-line) has been stolen over a week ago, and was only restored late this afternoon. Kind Regards, Sol Botha 084 500 1352</p>	
Greater Midstream Forum	Paul Claassen	10/05/2019	Email	Email: On 16 May 2019 Mr Paul Claassen sent an email	On 17 May 2019 Ms Da Camara replied via email to Mr Claassen informing that he has been registered on the

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				<p>requesting to be registered on the project.</p> <p>He submitted the following comments on behalf of Midstream Estates:</p> <ul style="list-style-type: none"> • Impacts on Air Quality • Potential effluent • Impact on development characteristics of the area • Desirability in local, provincial and national policy context • We request a meeting with the air quality specialist before their proposal is submitted and brief finalised. 	<p>project. She also asked when he would be available for a meeting (4 or the 7 June 2019).</p>
<p>Greater Midstream Forum</p>	<p>Paul Claassen</p>			<p>Email:</p> <p>On 25 July 2019 Mr Paul Claassen submitted the following comments on behalf of Midstream Estates:</p> <p>The meeting we had on 7 June 2019 and subsequent meeting and discussions with Dr Lucian Burger, in respect to the above, refer.</p> <p>We provided all the information we have to Dr Burger to use in his specialist assessment as appropriate.</p> <p>The following are specific concerns that we have that need to be addressed:</p> <ul style="list-style-type: none"> • The manner in which the proposed changes to the facility will contribute to Goal 7 of the Highveld Priority Area (HPA) Air Quality Management Plan that “By 2020, emissions 	<p>On 29 July 2019 Ms Da Camara replied via email to Mr Claassen stating that his comments will be addressed as part of the draft Basic Assessment Report.</p> <p>Implementation of this project will result in a reduction of emissions from waste due to the following reasons: Through this project more waste will be diverted from landfill and there will be a nett reduction of emissions due to the waste being destroyed by the A-Thermal plant. The calculations show that there is a reduction in emissions by diverting the waste from landfill to A-Thermal.</p> <p>In terms of Goal 2 of the Highveld Priority Area (HPA) Air Quality Management Plan, the upgrade of the plant will</p>

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				<p>from waste management are 40% less than current” (2011).</p> <ul style="list-style-type: none"> • While the changes in the operations aims to achieve the new (2020) Minimum Emission Standard (MES), that would not necessarily mean that the total emissions contribution from the facility to the ambient air quality will be less, as higher throughput of waste to be treated over longer continuous periods could conceivably lead to significantly higher total emissions due to significantly longer emission periods (in compliance with the new more stringent MES) than the current somewhat intermitted emission periods (in compliance with the existing less stringent MES). • The two biggest concerns in the area are particulate matter concentrations and nitrogen dioxide concentrations (the Olifantsfontein hotspot in the HPA). While A-Thermal monitors nitrogen dioxide in the stack it is for some reason not reported together with the other substances. We therefore request that the potential impact of the emission of nitrogen dioxide be specifically addressed in the BAR. • The most severe pollution events in the area are experienced during cold wind still nights/early mornings where the vertical mixing of particulates is inhibited by meteorological and topographical factors 	<p>result in a reduction of emissions. In terms of Goal 5 there will be a nett reduction in Greenhouse Gas Emissions. The plant will be implementing renewable energy which is in line with Goal 5. In terms of Goal 7 the upgrade will result in an improvement in abatement technology.</p> <p>Ekurhuleni did not require this as part of quarterly emission reporting. However, NO₂ is reported in annual reporting and uploaded to NAEIS.</p> <p>Noted and it forms part of the final stack design</p> <p>Noted and it forms part of the final stack design</p>

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				<p>leading to a build up of pollutants in the stagnant air. It is important that this is taken into account and used as a guide to emission regulating and times of operation.</p> <ul style="list-style-type: none"> As explained previously we do from time to time experience direct contact with the emission plume emanating from the facility in the greater Midstream area at near ground level. This must be addressed in the design of the facility as well as conditions of operation. We will provide further comments and inputs when we receive the draft BAR for comments. 	
Greater Midstream Forum	Paul Claassen			<p>On 7 June 2019 a Focus Group Meeting was held with the Greater Midstream Forum. The key points are summarised as follows and minutes are attached in Appendix 13:</p> <ul style="list-style-type: none"> Mr Paul Claassen (PC) stated that if they go above 10 MW then it will require Nersa approval. He also stated that a concern that may be brought up by EMM is that the provision of power (business to business) will still require EMM to receive revenue. They still require revenue from private sales to industry, to offset the provision of cheap / free power to Tembisa. PC stated that Midstream also buys electricity directly from Eskom. 	<ul style="list-style-type: none"> Mr Nicolas Eleftheriades (NE) stated that A-Thermal will mainly provide electricity for themselves and possibly their neighbour across the road. Mr Martin Botha (MB) stated that the neighbours will be approached at a later stage in the process. A-Thermal is already registered as an Independent Power Producer (IPP). A-Thermal is a direct Eskom customer. There is no loss of income to local municipality. MB stated that in order to do power generation they will use different scrubbing systems. They will need to move from a wet to dry scrubbing system. In

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				<ul style="list-style-type: none"> PC stated that currently the main problem in the area is dust and NO₂. 	<p>addition, power generation will result in an increase in actual waste tonnage though the plant. A-Thermal is currently looking at 100 000 Am³/hr. This will be taken into account in the AQIA. MB explained the flow diagram of the current and proposed facilities. A-Thermal is currently permitted for the material recycling facility however, currently this is limited as they receive more hazardous waste than general waste at present.</p> <ul style="list-style-type: none"> In terms of the air emissions it is anticipated that Category 8.1 limits (current AEL) will continue to apply (i.e. most stringent limits in South African legislation). MB stated that compared to the alternatives, thermal treatment has less of an environmental impact, provided emission limits are met. A-Thermal is on the same track at international plants. Alternatives consist of the following: <ul style="list-style-type: none"> Landfill – Chemicals are not destroyed and maintain inherent risk to environment via soil, air and water pollution. Recycling – The majority of waste going through the thermal plant can't be recycled. Reuse – The majority of waste materials received have been contaminated, declared not fit for use, or are inherently hazardous in nature and therefore cannot be re-used. In terms of air emissions, the main source of emissions is the stack. The other two main impacts

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				<ul style="list-style-type: none"> Ms Karen Nienaber (KN) stated that there is risk in terms of odours and asked whether they currently measure odours and will they determine the impact of odours? Mr Ian Faller (IF) added that the area is an industrial area however, is moving towards being a residential area with Midstream and the townships. It is fine to meet the criteria and standards for industry however the marginal effect on the pure air versus what is acceptable in terms of industry will be a problem for residents. Residents are going to state that they didn't buy to live in an industrial area. PC stated that there were three events. One event at a restaurant included the smell of glue. He smelled it from home as well. Other residents also smelled it. He stated that this comes from A-Thermal as it is similar to the smell when you are at the facility. In slight low wind conditions, in the late afternoon and because the stack doesn't have high velocity there was most likely an inversion at that time. KN stated that the smell has a direct flow down to the rural area and up to the residential area. 	<ul style="list-style-type: none"> are nuisance odour from receiving materials and material handling, as well as dust (not from the stack) from solid material handling, notably ash and residue handling. NE stated that in terms of odour, everything received on site must be in sealed containers. Due to the nature of the waste streams, the current licence forces them to keep it sealed. He stated that they are aware of Midstream and want to be transparent. He stated that there needs to be co-existence. A-Thermal is looking at treating an additional 200 tons per day. If they receive authorisation, there will not be a visible plume from the stack. A-Thermal will be on a par with European plants for power generation where you will see the stack, but nothing coming out of it. He added that they already have measures in place to mitigate odours, they have a vacuum room that pulls air into the plant so that there is no residual odour. There is an opportunity to look at even better mitigation as part of the upgrade. NE stated that the AQIA will assess this and that one of mitigation steps would be increase the stack height.

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Organisation/Company/ Individual	Contact Person	Date	Notification	Comments	Response
				<ul style="list-style-type: none"> • PC stated that the Compass Plant has a fairly good AQIA. They included a cumulative impact assessment and it showed that they will have an impact on Midstream. They also did a stack height study. They stated that they will choose a stack height in the middle however Midstream is objecting and stating that they need to build the best stack height to mitigate as far as possible. • PC stated that an important document is the Air Quality Management Plan done by Airshed however, this has not really been implemented. For example, Consol wanted a five year extension to comply with the new standards. However, they are not meeting the current standard, but they are applying for extension for a more stringent standard. The authorities are not doing anything regarding this. • The Highveld Priority Area Air Quality Management Plan states that by 2022 there must be a 40% reduction in air pollutants coming from waste management activities in the area. Companies that are not meeting the current standard will not be able to meet the new standard. • PC stated that it is a concern that all the studies are done in different ways. Applicants acknowledge that the air quality is not as it 	<ul style="list-style-type: none"> • NE stated that A-Thermal currently complies and have plans to comply to the 2020 standard and have already done trial runs and can already comply to the 2020 standards. However, the main priority at present is power generation.

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				<p>should be but expect government to deal with it. Every company adds a minor impact however that means that the area will never reach the 40% reduction. He stated that it is the cumulative impact that is a concern and it is not known what the impact is. The other concern is the water quality in the river.</p> <ul style="list-style-type: none"> • IF asked what other waste products emulate from the plant? • PC asked whether mercury emanates from the plant as there is a rumour going round regarding this. • IF stated that it is important to manage perceptions. It might be different from reality and it becomes difficult to manage once the perception is created. Midstream is willing to get involved with the process with A-Thermal. People are spending a large amount of money and they feel that they have entitlement. They become concerned regarding air quality. The river is also a challenge as the air flows down the valley. 	<ul style="list-style-type: none"> • NE stated that A-Thermal does not have an effluent stream and the plant is water deficient. The water gets saturated with salt. A-Thermal purifies the water and a dry salt (NaCl) is formed which is sent to landfill. The salt is classified and treated as a Type 1 or 2 waste. CO₂ is also generated however, in comparison to landfill where methane is generated, the thermal treatment is a far better alternative to landfill. • NE confirmed that the plant does not treat mercury waste and refuse to treat mercury waste as the risk is too great. PC asked whether NE could write a half a page regarding this. • NE stated that A-Thermal can offer warm water to the ERWAT bio-digester. He stated that people are welcome to call A-Thermal if there are complaints of smell. • NE stated that due to A-Thermal having a single source it is unlikely to be them. He stated that there

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				<ul style="list-style-type: none"> • KN stated that residents pack up during the night and move due to the smell from unknown sources. The wind carries the smell up the valley to the residential area. • IF asked whether the impact of A-Thermal emissions combined with other emissions causes a chemical reaction in the air? • IF stated that this could be a delayed reaction resulting in the odour. • PC stated that during start up there is a black plume. 	<p>is continuous monitoring currently and will also be in place with the upgrade. A-Thermal however, keeps within the emission limits and therefore there cannot be an odour. If the limits are exceeded, then the feed automatically shuts off.</p> <ul style="list-style-type: none"> • Mr Lucian Burger (LB) stated that in the air the reactions are not as fast as in a landfill. It may take a few hours for the emissions to mix. Sulphates and nitrates could form. • LB stated that the pollution from various sources does sit within the valley and could be coming from anywhere including Tembisa. He stated that with regards to the stack emissions the plume was white which is water vapour. When A-Thermal implements dry scrubbing then they won't have the vapour pulling the plume down. • NE confirmed that there will no longer be a visible plume following the upgrades. • NE stated that they have managed to reduce that. And that the license allows for start-up.

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				<ul style="list-style-type: none"> PC stated that they are looking at a thermal camera to monitor the region. <p><u>Scope of work: Air Quality Impact Assessment</u></p> <ul style="list-style-type: none"> PC stated that there are many different studies been done but what the area needs is a baseline study to be done. The GMF went through 130 industries in the area and identified 49 potential industries that are polluting. They collected results from dust buckets and could determine where the dust is coming from. PC stated that they will have to consult with each industry to confirm the information. He provided this information to EMM however, never heard anything back from them. PC explained some of the industries just pay the fines instead of complying. 	<ul style="list-style-type: none"> LB stated that there are clearly two challenges, the one being the valley. This is a challenge to model as they will need to know the emission sources and how they operate, as well as A-Thermal's contribution to this. The next challenge is to model the cumulative impact. When it comes to particulates the biggest source will be informal settlements. The question is what will you do with the results of the study. It will most likely show that the particulates from A-Thermal will be totally insignificant. LB asked if they have detailed information to provide, and then if they have the data already, Airshed can put it in model. <p>LB went through the presentation explaining the proposed scope of work for the AQIA.</p> <ul style="list-style-type: none"> It is proposed to model four different waste stream scenarios.

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				<ul style="list-style-type: none"> • PC stated that there is weather data available from 2013. • PC provided Lucian with residential areas on a map. These were identified from another AQIA. • PC stated that it would be good to look at the cumulative impacts and to obtain data from different industries. • PC was willing to give the information as long as it remains confidential. 	<ul style="list-style-type: none"> • The current exit gas temperature is 65°C and with dry scrubbing will increase to 130°C. • Two alternative stack locations will be modelled. • The terrain is not complicated, but there is a valley. When there are calmer conditions then he may need to use a different model as AERMOD is not used for calm conditions. According to the regulations they need to use AERMOD but can use other models to illustrate different conditions. They will also need to add building dimensions. • There is no local meteorological station in the area. It was stated that A-Thermal has a weather station on site, however there is not three years of data. Midstream also has two meteorological stations on site. Lucian requires three year's data. • The calculations will be restricted to A-Thermal unless there is other information available for other industries. He will also require stack heights. • Upset conditions can be modelled, but it is better to rather put in measures to prevent it. • The surrounding sensitive receptors were indicated on a map.

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				<ul style="list-style-type: none"> It was agreed that if there is data available that it could be provided to Exigo and they will distribute. Confidential information can be sent straight to Airshed. PC stated that he can also provide contour data at a 5m meter interval. PC asked whether Airshed can show the emissions from their stack two years ago, what comes out of the stack now and what will come out of the stack in future, therefore, include its past, current and future emissions. 	<ul style="list-style-type: none"> LB asked whether they could collect the information and Airshed can do the calculations. NE confirmed that the data can be added to the model to determine the cumulative impacts for the area.
Interwaste	Hanre Crous	14/06/2019	Email	<p>On 14 June 2019 a notification letter was emailed to Interwaste, who are a member of the A-Thermal Environmental Monitoring Committee.</p> <p>On 18 June 2019 Mr Crous responded via email requesting to be registered on the project. He had the following comments: Technology Description Sustainability Performance etc Assessment required.</p>	On 18 June 2019 Ms Da Camara sent an email stating that Interwaste has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project, as well as the availability of the relevant environmental reports for review and comment, as they become available.
LEAP	Dr Gwen Theron	18/06/2019	18/06/2019	<p>Via email: On 18 June 2019 Dr Theron sent an email requesting to be registered on the project. She received the notification via the Olifantsfontein Business Forum.</p>	On 18 June 2019 Ms Da Camara sent an email stating that she has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project, as well as the

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					availability of the relevant environmental reports for review and comment, as they become available.
Individual	Sean Cullinan	18/06/2019	18/06/2019	Via email: On 18 June 2019 Mr Cullinan sent an email requesting to be registered on the project.	On 18 June 2019 Ms Da Camara sent an email stating that he has been registered on the project as an Interested and Affected Party and will be kept updated on all future developments on the project, as well as the availability of the relevant environmental reports for review and comment, as they become available.
Groundwork	Musa Chamane Waste Campaigner	01/07/2019	01/07/2019	Via email: On 1 July 2019 Mr Chamane sent an email requesting to be registered on the project.	On 1 July 2019 Ms Da Camara replied via email to state that we are still in the initial phase of notification of the Basic Assessment process and the Draft Basic Assessment Report has not yet been finalized. She also stated that she will register him on the project but he is also welcome to submit comments on the registration form.

8 The Environmental attributes associated with the site

8.1 Climate

Temperature

Air temperature is important, both for determining the effect of plume buoyancy and determining the development of the mixing and inversion layers. The monthly temperature trends are presented in Table 8-1. The warmest temperatures experienced from November to February, while the coolest temperature occur in June and July (Airshed, 2021).

Table 8-1: Monthly temperature summary (SAWS Irene weather data, 2015 to 2017)

Hourly Minimum, Hourly Maximum and Monthly Average Temperatures (°C) Irene weather station (2015 - 2017)												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	38.4	35.1	31.9	31.9	27.4	25.8	24.5	30.8	32.9	35.1	36.9	35.8
Minimum	11.2	12.9	9.5	9.5	5.8	1.9	1.9	0.8	7.4	6.9	7.9	13.4
Average	22.4	22.8	21.4	19.0	16.1	13.3	13.4	16.6	20.3	21.8	22.1	23.4

Rainfall and Humidity (Airshed, 2021)

Monthly rainfall and relative humidity obtained from Irene SAWS weather station is presented in Figure 8-1.

The SAWS Irene weather data recorded annual rainfall of 442 mm, 755 mm and 723 mm for the 2015, 2016 and 2017 period respectively. The amount of rainfall peaks during the summer months; and dips by late autumn, hitting its lowest during the winter months.

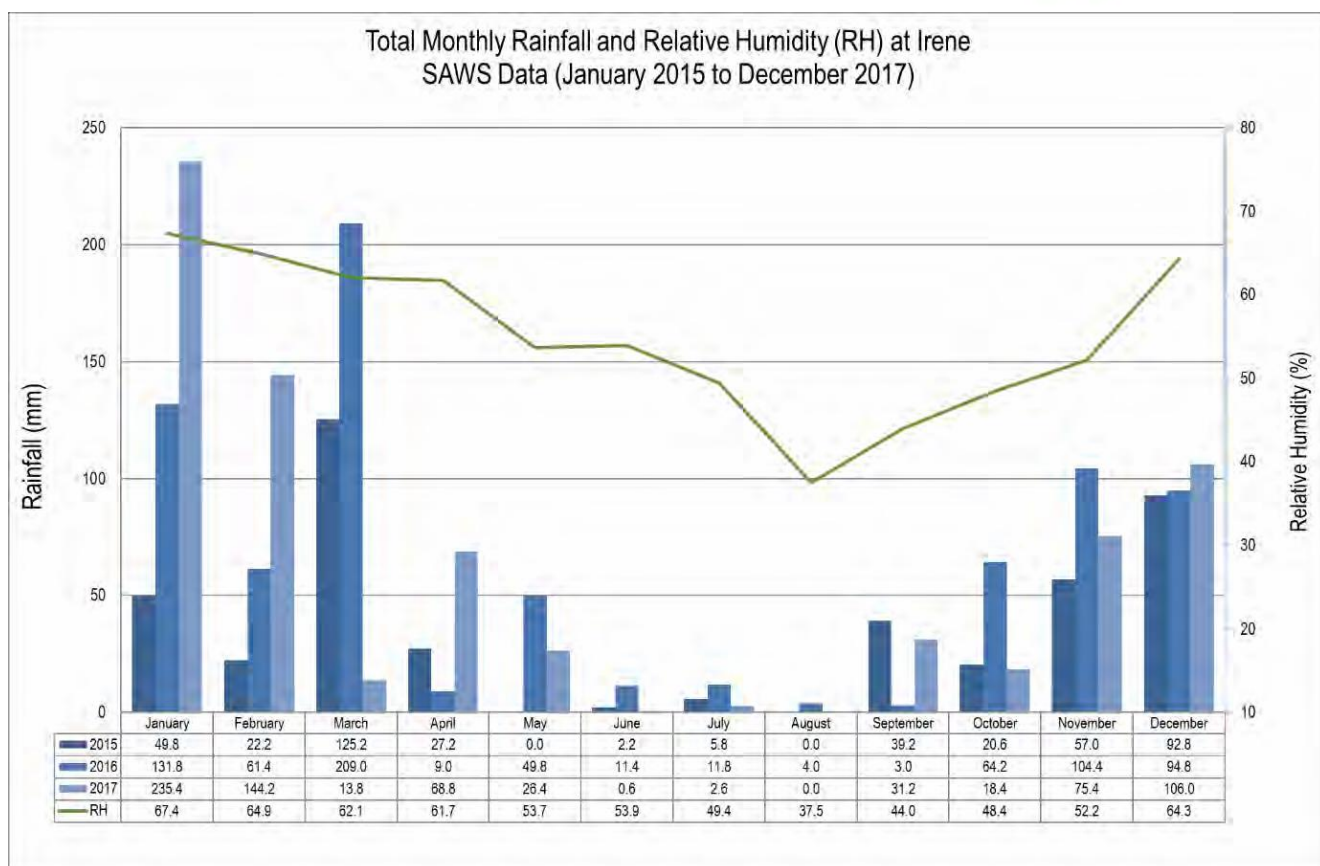


Figure 8-1: Monthly rainfall and relative humidity taken from SAWS Irene weather data, 2015 to 2017 (Airshed, 2021)

Relative humidity is the ratio of the actual water vapour content (moisture in the air) compared to the amount of water vapour required for saturation (maximum moisture the air can "hold") at a temperature and pressure. Humidity can influence the amount of precipitation recorded in a region and can also influence the impact of air pollution on visibility. For instance, a high relative humidity will significantly increase the adverse effects of pollution on visibility Tiwary & Colls (2010). The annual mean relative humidity recorded over the 2015, 2016 and 2017 period was ~ 52%, 56% and 56% respectively.

Wind Field (Airshed, 2021)

The wind field for the study area is described with the use of wind roses. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 5 and 7 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Calm conditions are periods when the wind speed was below 1 m/s. These low values can be due to "meteorological" calm conditions when there is no air movement; or, when wind speed is below the anemometer starting threshold (AST). The period, day-time and night-time wind roses are shown in Figure 8-2 for the Irene SAWS station, and seasonal wind roses are shown in Figure 8-3.

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The Irene station wind field was dominated by winds from the north, north-west and south-east, with winds of increased speeds more frequently originating to the south-east and north-west. Winds were infrequently from the south-west. Apart from the dominant northerly component appearing in both day- and night-time wind roses, daytime winds were more frequently observed from the north-wester, whereas south and south-easterlies for more frequent during the night.

Calm conditions occurred approximately 5% of the time; slightly more frequently at night. During the day, winds at higher wind speeds occurred more frequently from the north-westerly sector. Night-time airflow had winds most frequently from the south-easterly sector but at lower wind speeds. Calm conditions were most frequently recorded in autumn and most infrequently in spring.

The northerly wind component is shown to be less pronounced during autumn and winter, where southerly and south-easterly winds were more frequent. Spring time experienced significantly higher wind speeds, and these were predominantly from the north, although most wind directions recorded strong wind speeds. Calm wind conditions occurred more during summer (9%), compared to autumn (4.4%), winter (4.9%) and spring 93.4%).

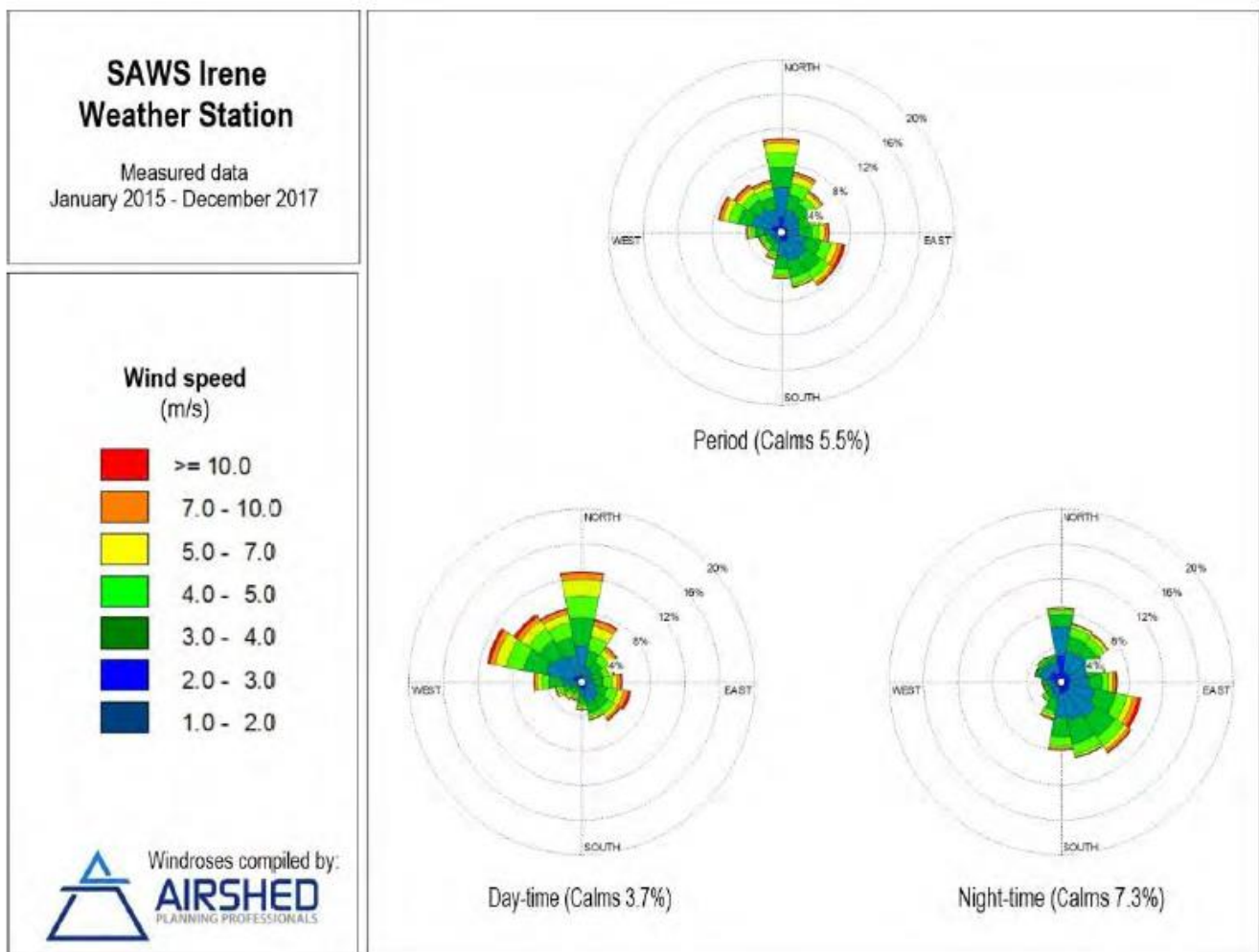


Figure 8-2: Period average, day-time and night-time wind roses (SAWS Irene weather data, 2015 to 2017).

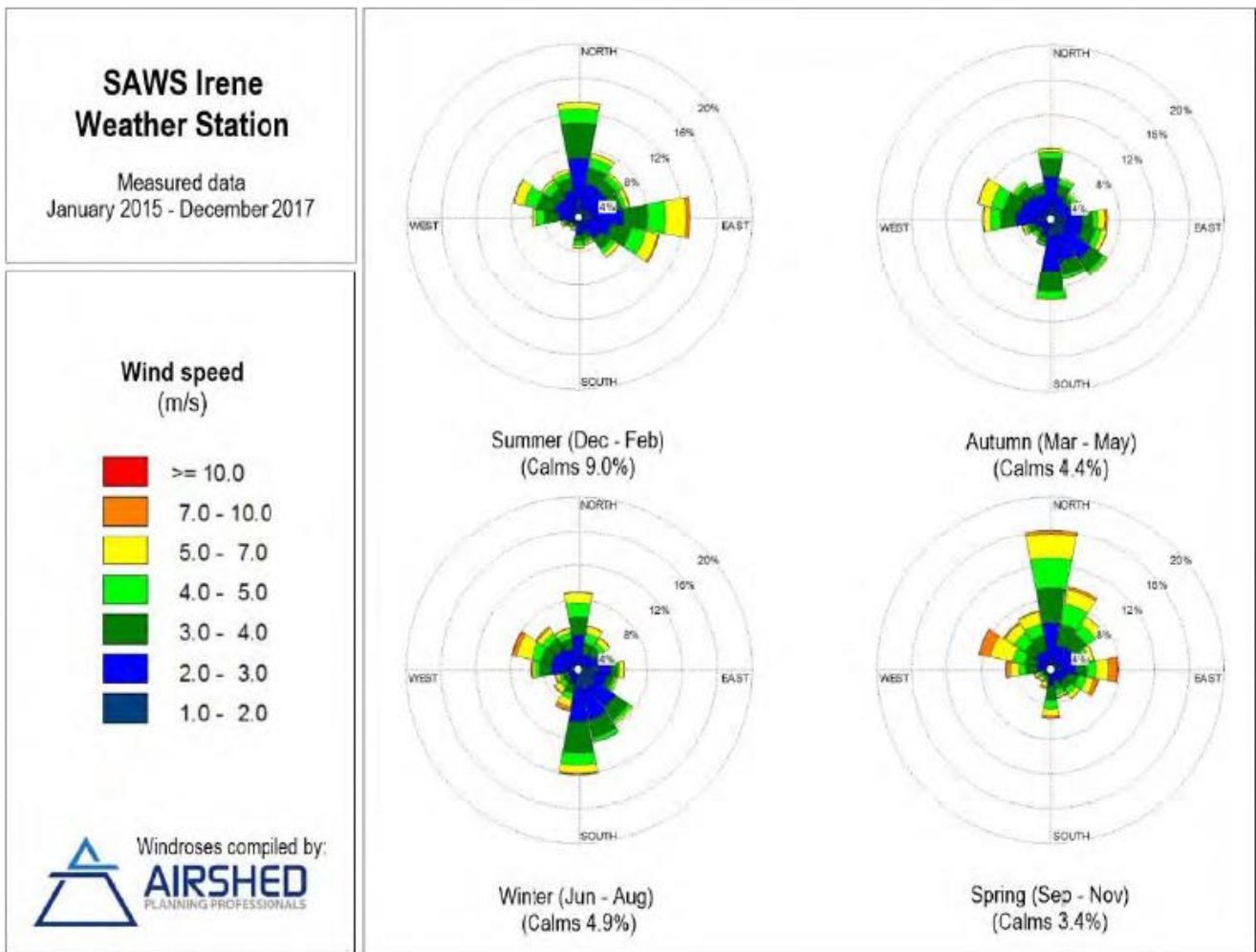


Figure 8-3: Seasonal wind roses (SAWS Irene weather data, 2015 to 2017)

8.2 Air quality (Airshed, 2021)

Ambient monitoring data in the region was obtained from the Olifantsfontein monitoring station operated by the Ekurhuleni Metropolitan Municipality for the period 2015 to 2018. Olifantsfontein monitoring station is located 4 km east-southeast of the A-Thermal Retort site (Figure 8-4). Various gaseous pollutants, including CO, NO₂ and SO₂ as well as VOCs, including benzene, toluene and xylene, were monitored. The station does not monitor particulate matter (PM₁₀ and PM_{2.5}) concentration levels.

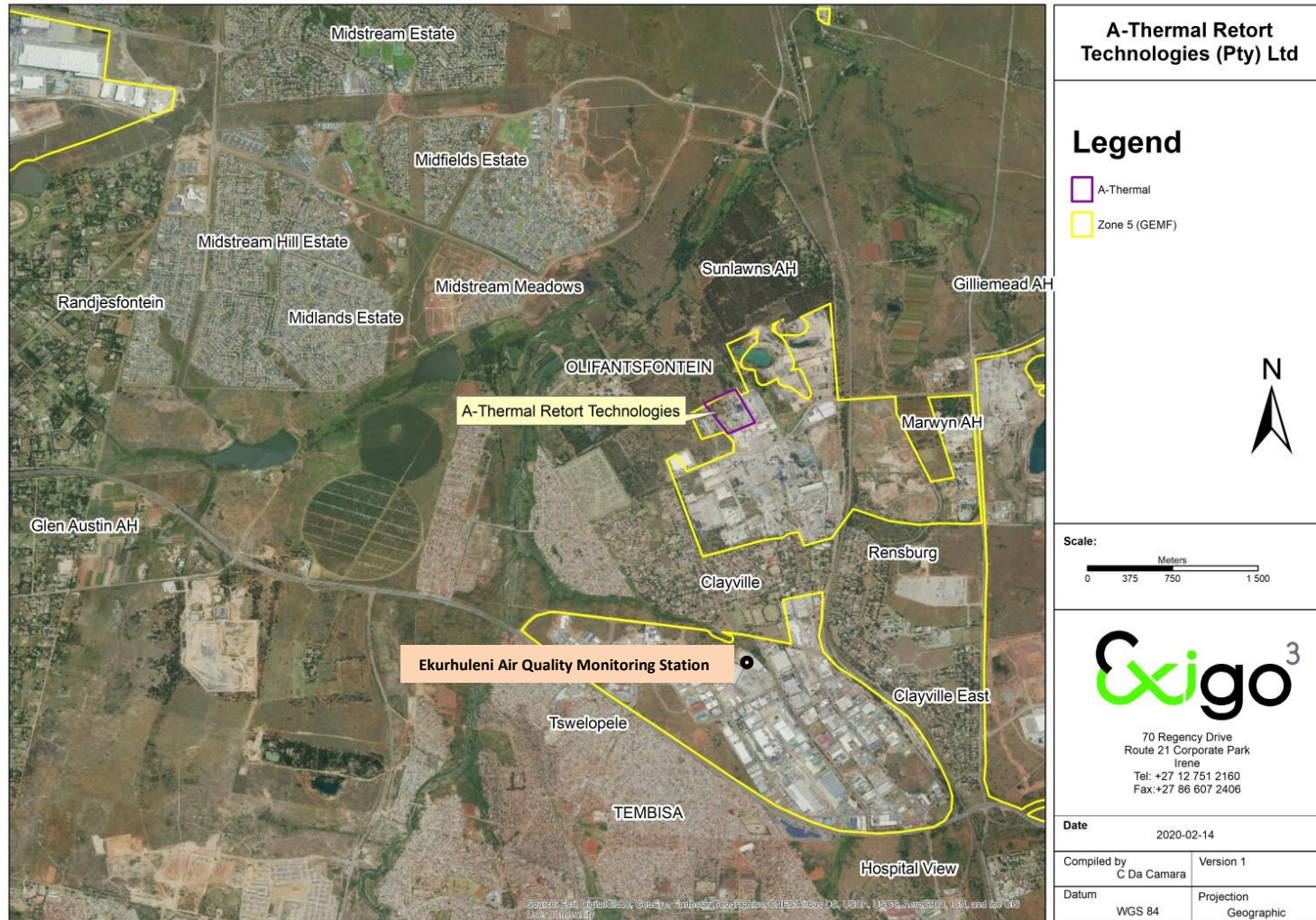


Figure 8-4: Location of residential areas near the Project site.

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Ambient hourly NO₂ concentrations from Olifantsfontein monitoring station indicated that observed hourly average data for 2017 and 2018 period were mostly below the NAAQS limit (106 ppb), with a few hourly spikes (4 hours) over the limit in 2017. The data complies with the ambient NO₂ standard at this station that allows 88 hourly exceedances.

Diurnal NO₂ and CO concentrations show profiles that are representative of vehicular traffic activities expected in the area. Low concentrations were recorded in the early hours of the morning followed by a gradual spike at 5 am until 9am, representing regular morning vehicular traffic. Low concentrations were maintained until 4 pm in the evening when a gradual spike was recorded, representing evening vehicular traffic.

Ambient hourly SO₂ concentrations from Olifantsfontein monitoring station for the 2016, 2017 and 2018 period were well below the NAAQS limit (134 ppb) for all three years and comply with the ambient SO₂ standard at this station.

Diurnal SO₂ concentrations shows a typical SO₂ concentration profile associated with industrial stack releases, displaying lower concentration during the night followed by an increase to reach a maximum near midday.

The *Highveld Airshed Priority Area* (HPA) was declared the second national air quality priority area (after the Vaal Triangle Airshed Priority Area) by the Minister of Environmental Affairs at the end of 2007 (HPA 2011). This required that an Air Quality Management Plan for the area be developed. The Project is located in the Ekurhuleni Hot Spot (HPA 2011).

8.2.1 Atmospheric Stability

The atmospheric boundary layer constitutes the first few hundred metres of the atmosphere. During daytime, the atmospheric boundary layer is characterised by thermal turbulence due to the heating of the earth's surface. Night-times are characterised by weak vertical mixing and the predominance of a stable layer. These conditions are normally associated with low wind speeds and lower dilution potential.

Diurnal variation in atmospheric stability, as calculated from measured data, and described by the inverse Obukhov length and the boundary layer depth is provided in Figure 8-5. The highest concentrations for ground level, or near-ground level releases from non-wind dependent sources would occur during weak wind speeds and stable (night-time) atmospheric conditions. For elevated releases, unstable conditions can result in very high concentrations of poorly diluted emissions close to the stack. This is called looping and occurs mostly during daytime hours. Neutral conditions disperse the plume equally in both the vertical and horizontal planes and the plume shape is referred to as coning. Stable conditions prevent the plume from mixing vertically, although it can still spread horizontally and is called *fanning*. For ground level releases, the highest ground level concentrations will occur during stable night-time conditions.

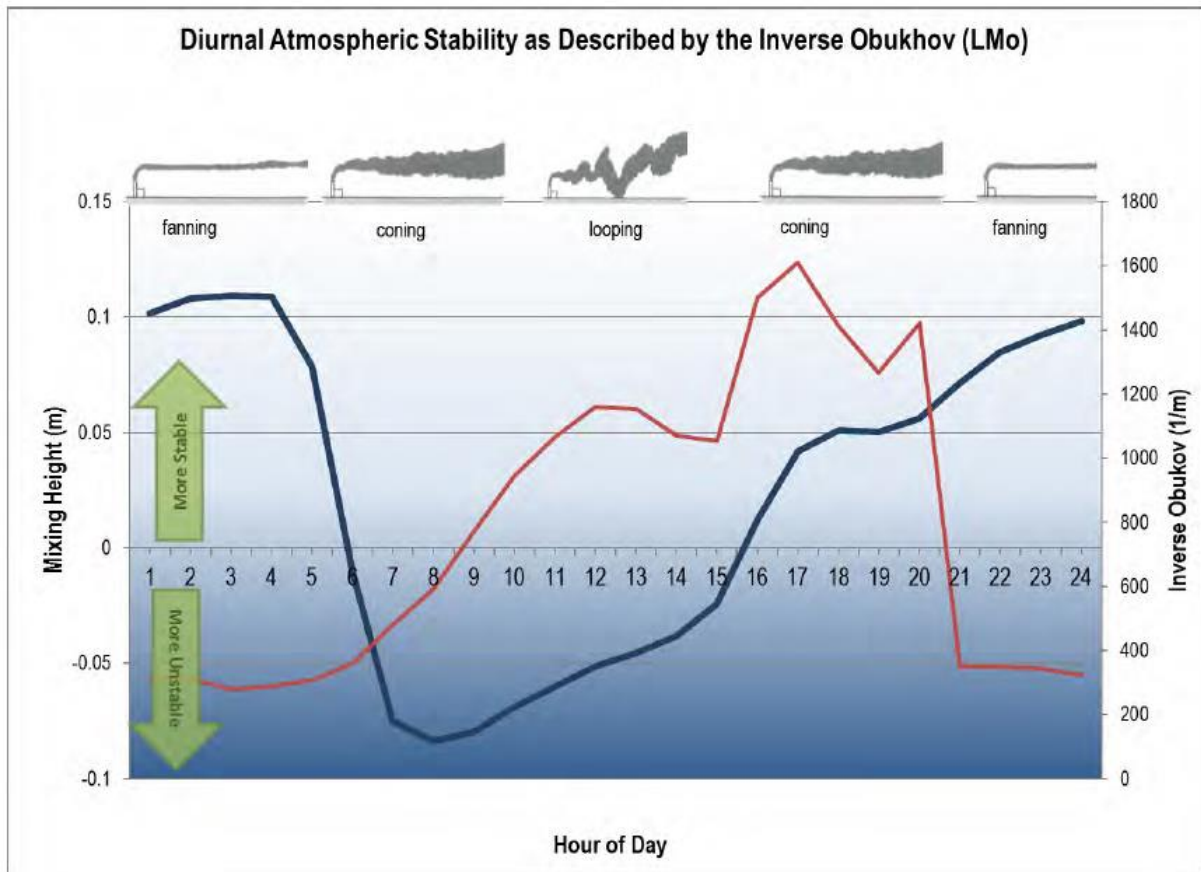


Figure 8-5: Diurnal atmospheric stability (AERMET processed SAWS Irene weather data, 2015 to 2017).

With very stable inversion conditions, especially during calm winter night-time periods, the surface radiates heat back to space rapidly and cools down at a faster rate than the upper layers. As a result, the lower cold layers get condensed and become heavy (denser). The sloping surface underneath makes them move towards the bottom where the cold layer settles down as a zone of low temperature while the upper layers are relatively warmer. This kind of temperature inversion can be strong in regions with high mountains or deep valleys. Although these conditions can also occur in the study area, especially towards and along the Kaalspruit, north of A-Thermal, the winds generated in this way are expected to be considerably weaker and with less turbulence than those developing with deep valleys, and correspondingly also less dilution potential. To illustrate the development of such a stable, night-time drainage flow, the GRAMM ('Graz Mesoscale Model') prognostic, meso-scale wind field model was utilised. Calm wind, stable night-time conditions are depicted in Figure 8-6. The drainage flows are clearly illustrated in the figure, showing how low-level emissions, such as ground level releases from evaporating ponds or emissions affected by building downwash, could be carried with the resulting drainage flows. Since these wind movements are relatively weak in this situation, air pollution trapped in the flow could remain fairly undiluted for considerable distances. The current stack height at A-Thermal is 18 m and the height of the surrounding buildings (165 m by 100 m) at the stack's location, approximately 12. Since the stack height is less than the rule-of-thumb "2½ times the height of the tallest building in the vicinity" (i.e. within 20 stack heights), plume downwash is possible under low exit gas velocities and moderate to high wind speeds.

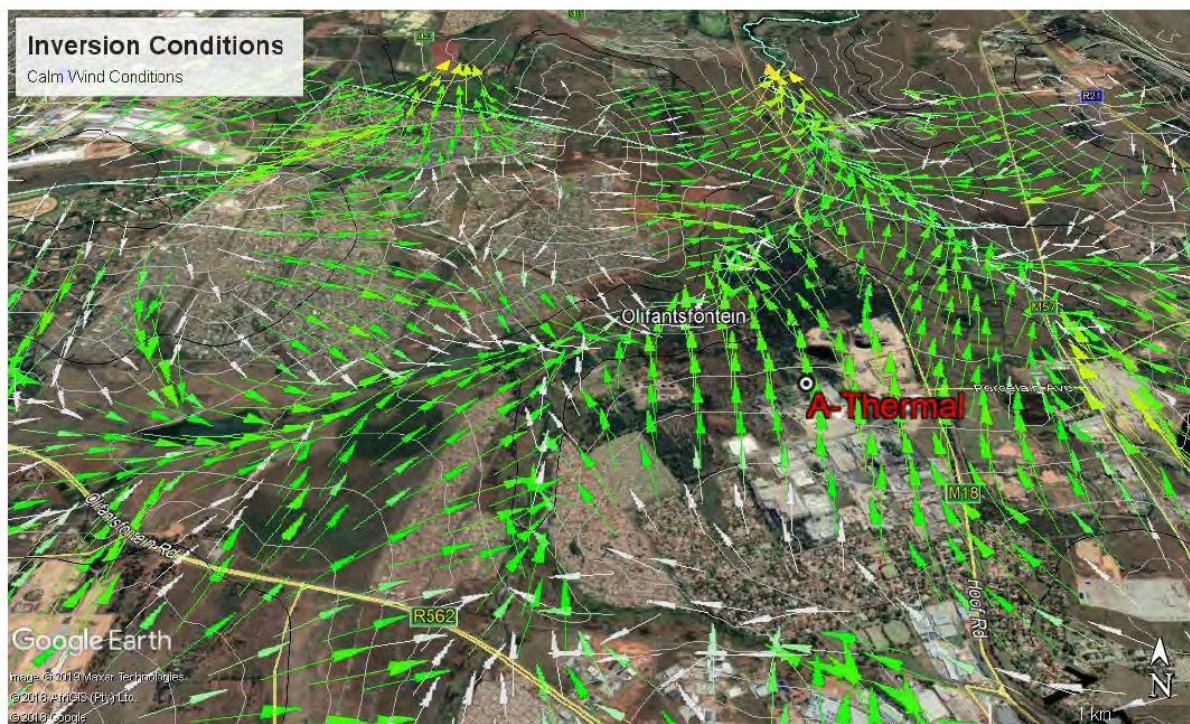


Figure 8-6: Simulated calm wind, stable night-time drainage flow conditions in part of the study area using the GRAMM prognostic wind field model (Airshed, 2021)

For more detail refer to the Air Quality Impact Assessment (Appendix 6).

8.3 Topography

Generally, the Midrand area is typical Highveld, a landscape characterised by gently sloping plains, separated by relatively deep valleys carved out by the Jukskei River, Kaalspruit, Olifantsspruit, Modderfonteinspruit and smaller watercourses. At places there are ensembles of large granite boulders, rocky outcrops and hillocks. Except where human settlement has occurred, the plains are generally treeless (Kruger, 2019).

According to the Environmental Potential Atlas of South Africa (ENPAT, 2000) the project area is classified as being “High Gradient Valley”. The slopes of the study area are classified as being between 1 and 12 degrees. The project area is characterised by slightly undulating to flat plains. The topography across the site occurs on slightly undulating plains at an elevation of 1480.

8.4 Landtype and soils

The land type unit represented within the study area include the Ab1 land type (Land Type Survey Staff, 1987) (ENPAT, 2001). The land type, geology and associated soil type is presented in Table 1 below as classified by the Environmental Potential Atlas, South Africa (ENPAT, 2000).

Soil associated with the site is largely red-apedal soils (loamy) of the Hutton soil.

Table 8-2: Land types, geology and dominant soil types of the proposed development site

Landtype	Soils	Geology
Ab1	Red-yellow apedal, freely drained soils, red, dystrophic and/or mesotrophic	Dolomite

8.5 Geology

According to the 1:50 000 Geological Series, Sheet No. 2528CC Lyttelton, the site is underlain by chemical sediments (dolomite and chert) of the Malmani Subgroup (Chiniespoort Group) of the Transvaal Supergroup. Two large outliers of Karoo-age sediments are indicated to the north and south of the property.

A variable thickness of overburden material mantles the hard rock geology. No rock was observed cropping out on site (Relly, Milner and Shedden, 2017).

8.6 Ground Water

For the purposes of the Dolomite Study (Relly, Milner and Shedden, 2017), boreholes were drilling by Hennie Erwee Drilling. Groundwater strikes were recorded at a depth of about 22m in three boreholes (BH’s 2, 3 and 4) at the time of drilling. Water level measurements in BH’s 4 and 5 were recoded as “mud” with no indication of depth.

The groundwater under the site lies in an unconfined aquifer, that is the groundwater will be generally contained in variety of secondary structures within the bedrock such as joints, cracks, fissures and faults. The bedrock in this area are generally poor yielders of water and would be classed as minor aquifers

During the site assessment, the three existing boreholes were located.

Table 8-3: Boreholes detail recording during site visit

Borehole Name	Coordinate WGS84		Depth (m)	Yield (l/s)	Casing Diameter	Condition/Comments
	Latitude	Longitude				
MBH01	-25.941937°	28.224260°	81	n/a	165mm	Dry/Not Sampled
MBH02	-25.941970°	28.224315°	50	n/a	165mm	Good and Sampled
MBH03	-25.942036°	28.224352°	21	n/a	165mm	Dry/Not Sampled

Refer to Appendix 11 for the groundwater monitoring results.

From the results, it can be seen that the general water quality of the underlying aquifers in the region contains water of good quality with most of the parameters below the respective detection limits. The DWS classifies water of portable human consumption as Class 2. It is not surprising to not that the amount of CaCO₃ is above the necessary threshold for Total Hardness, as the underlying aquifer region is a karst aquifer (dolomite).

The nitrate levels are also particularly high as can be seen from the table. Natural nitrate levels in groundwater are generally very low (typically less than 10 mg/l NO₃), but nitrate concentrations grow due to human activities, such as agriculture, industry, domestic effluents and emissions from combustion

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engines. Nitrates generally moves relatively slow in soil and groundwater: There is a lag time of approximately 20 years between the pollution activity and the detection of the pollutant in groundwater. (Lentech, 2001). The high levels of nitrates has been attributed to the agricultural activities happening around A-Thermal's facility. This report has found that agricultural activities are occurring on Farm portions 403 JR, 402 JR and 410 JR.

In relation to the anticipated pollutant constituents that were expected to emanate from A-Thermal Retort Technologies operation, the lab analysis showed negligible amounts. This indicates that the A-Thermal operations are not affecting groundwater.

8.7 Surface Water

The project area is situated within the quaternary catchment A21B (refer to Figure 8-7) in the Crocodile West and Marico Water Management Area (WMA). The Olifantspruit River occurs approximately 1km to the west of the site and is the only perennial river in the area. The study area is drained mainly by surface run-off (i.e. sheetwash) with surface water flowing into perennial and non-perennial streams of the study area. This water eventually drains into the Kaalspruit River. It must be noted that stream flow along the non-perennial drainage channels occurs only during and directly after heavy precipitation events, and may continue for a short period directly after a particularly good rainy season.

8.8 Natural Vegetation (Flora)

The developed site occurs within the Grassland biome. The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of Kwazulu-Natal and the Eastern Cape. The topography is mainly flat and rolling, but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level. Grasslands (also known locally as Grassveld) are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The most recent classification of the area by Mucina & Rutherford (2006) indicates that the site forms part of Carletonville Dolomite Grassland. Carletonville Dolomite Grassland is a vulnerable vegetation type in that only a small proportion is statutorily conserved. It is characterised by slightly undulating plains occasionally dissected by rocky ridges and a high diversity of geophytic plants.

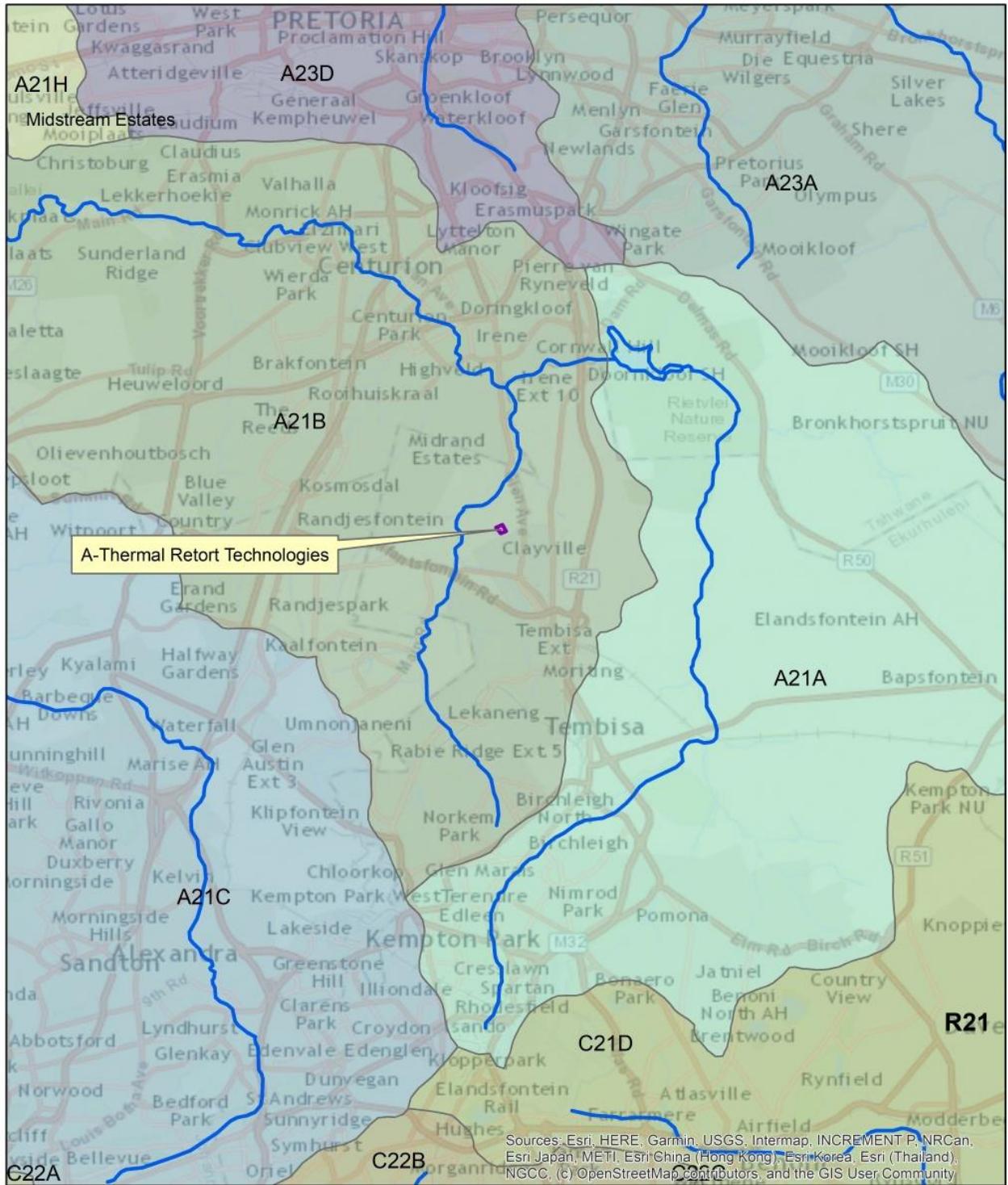
Vegetation Units

The following vegetation units were identified during the survey as presented in

Figure 8-8:

- Degraded grassland;
- Alien invasive bushclumps with degraded grassland;
- Man-made duckpond.

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Legend QUARTERN 	Catchment map		 N	 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406
	Client A-Thermal Retort Technologies	Project A-Thermal BA		
	0 1 500 000 6 000 Meters	Compiled by C Da Camara	Projection	
	Date 2019-05-07	Datum WGS 84		

Figure 8-7: Catchment Map



Legend A-Thermal VEG Degraded grassland Exotic bushclumps Man-made pond	Ecology map		 	
	Client A-Thermal Retort Technologies	Project A-Thermal BA		70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406
	0 20 40 80 Meters	Compiled by C Da Camara	Version 1	
	Date 2019-05-07	Datum WGS 84	Projection	

Figure 8-8: Vegetation Map of the study area

Alien invasives and exotic plant species

The following alien invasives and exotic plant species were recorded on site during this survey (Table 8-4):

Table 8-4: List of alien invasive species occurring in the project area

Species	Category
<i>Acacia mearnsii</i>	1b ⁵
<i>Argemone ochroleuca</i>	1b
<i>Cirsium vulgare</i>	1b
<i>Datura stramonium</i>	1b
<i>Eucalyptus camaldulensis</i>	1b
<i>Verbena bonariensis</i>	1b
<i>Xanthium strumarium</i>	1b

8.9 Critical Biodiversity & Ecological Support Areas of the Project Area

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

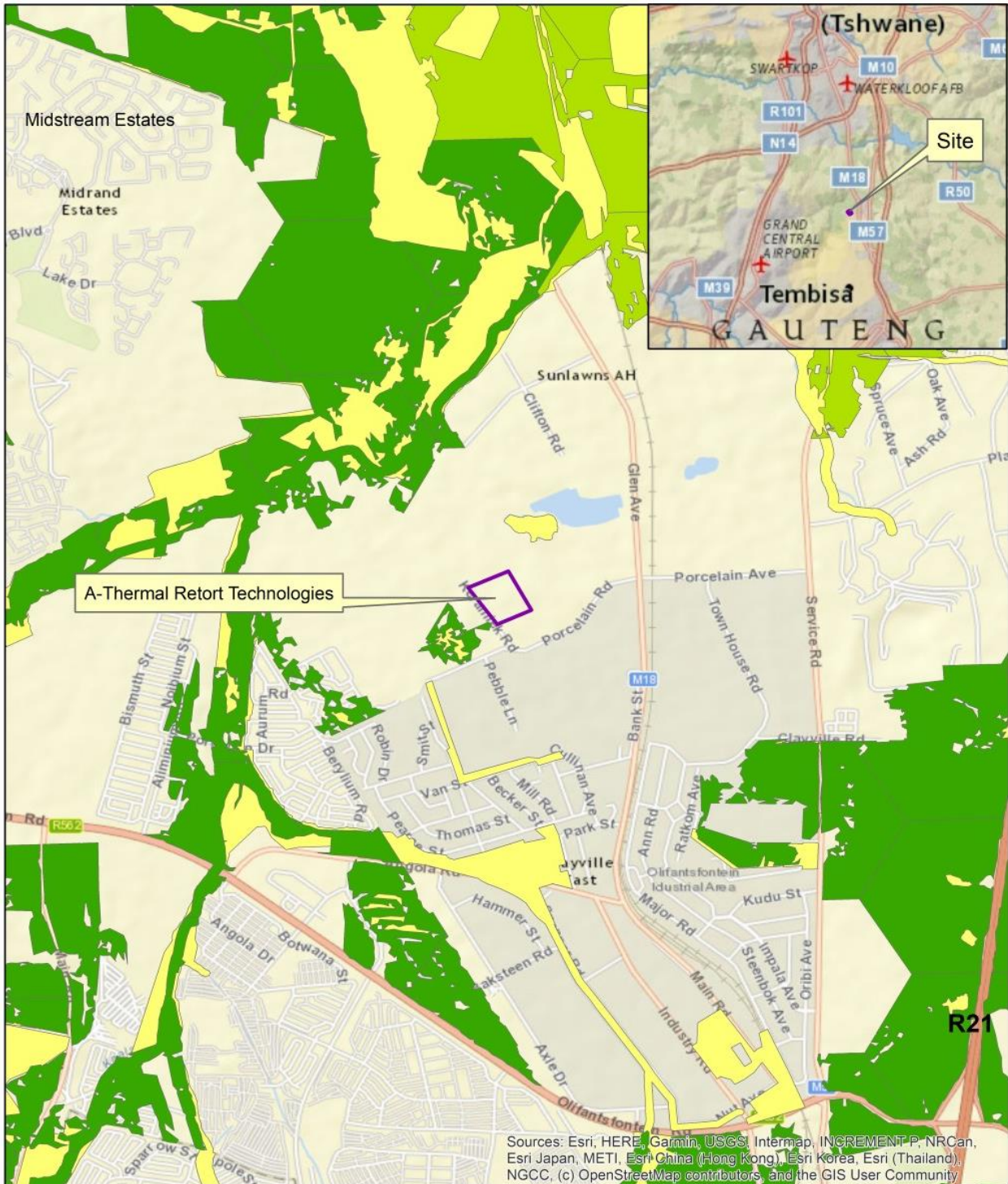
The primary purpose of a map of CBAs and ESAs is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector’s input into multi-sectoral planning and decision-making processes. The study area is not located within any CBA or ESA area as indicated in Figure 8-9.

8.10 Protected Areas Network and National Protected Areas Upgrade Strategy (NPAES)

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impacts on these areas are concerned. The Rietvlei Nature Reserve is located 10 kilometres north-east of the proposed development site. No NPAES occur in close proximity to the project area.

⁵ Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued

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Legend A-Thermal CPlan CBA.Important Area CBA.Irreplaceable Area CBA.Protected Area ESA.Ecological Support Area	C-Plan map		 N	 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406
	Client A-Thermal Retort Technologies	Project A-Thermal BA		
	0 250 500 1 000 Meters		Compiled by C Da Camara	Projection
	Date 2019-05-07	Datum WGS 84		

Figure 8-9: C-Plan Map showing Critical Biodiversity & Ecological Support Areas of The Project Area

8.11 Sites of archaeological and cultural interest

The history and archaeology of the greater Tshwane and Johannesburg areas is well known and the landscape around Pretoria is rich in archaeology of the Stone Ages, Iron Age Farmer Period, Historical Period as well as legacies of warfare. However, the proposed A-Thermal Retort Technologies Plant Upgrade Project area is situated in environments that have been transformed and degraded as a result of urbanisation and industrialization. No archaeological objects or sites, or features of heritage potential were noted during the site survey of the development footprint and it might be assumed that these areas have largely been sterilized of heritage remains, especially those dating to prehistorical times. Refer to the Archaeological Impact Assessment (Appendix 9).

8.12 Palaeontology

The project area is situated on the Malmani Subgroup rocks with the Vryheid formation to the east. Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity can generally be low to very high, and here locally high for the Malmani Subgroup (SG 2.2 SAHRA APMHOB, 2012). Fossils were not found during the walk through of the site.

8.13 Socio-economic Environment**Study area composition**

As shown in Figure 8-10, the Project is located in an industrial area surrounded by clay and brickworks towards the northeast (e.g. Corobrick), tile manufacturing (e.g. Johnson Tiles to the south-east and Tile Africa to the southwest), wastewater works (ERWAT) to the west, steel and foundry industries (Vesuvius) to the south) and a host of miscellaneous industries further south in Clayville Industrial (Airshed, 2021).

The closest residential area, Clayville is less than a kilometre (approximately 750 m) towards the southwest of the Project, as shown in Figure 8-11. Sunlawns AH is located at a similar distance towards the north of the Project. The Midstream complex (including Midstream Estate, Midstream Ridge, Midstream Meadows, Midlands Estate and Midstream Hill Estate) is located towards the northwest. Midstream Meadows is the closest (approximately 1.7 km). There are plans for Midstream to expand further east (i.e. Midstream Forest), between Midstream Ridge and Sunlawns AH, which would be approximately 1.5 km, north-northwest of A-Thermal (Airshed, 2021).

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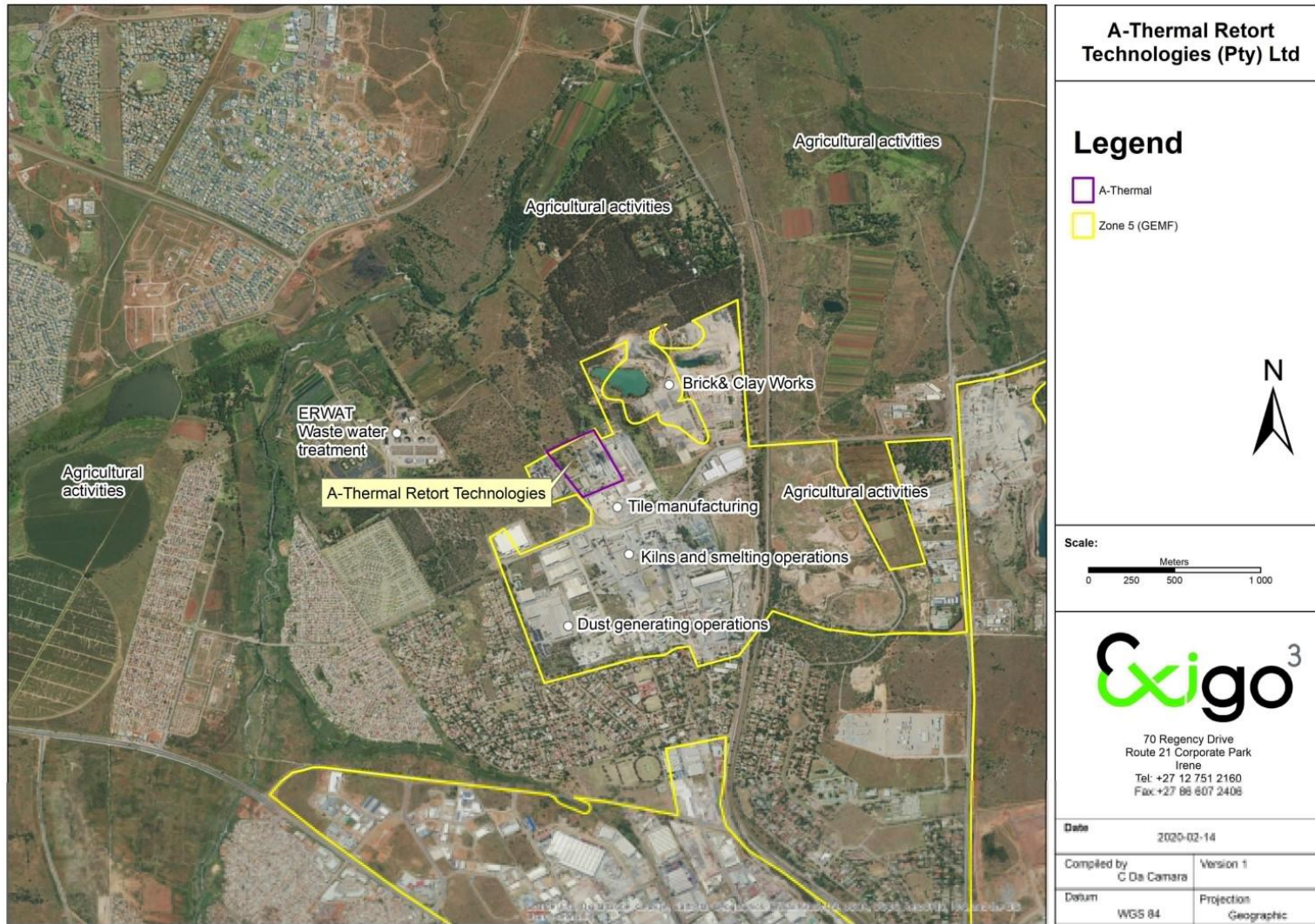


Figure 8-10: Locations of main industrial activities and agricultural operations (Airshed, 2021).

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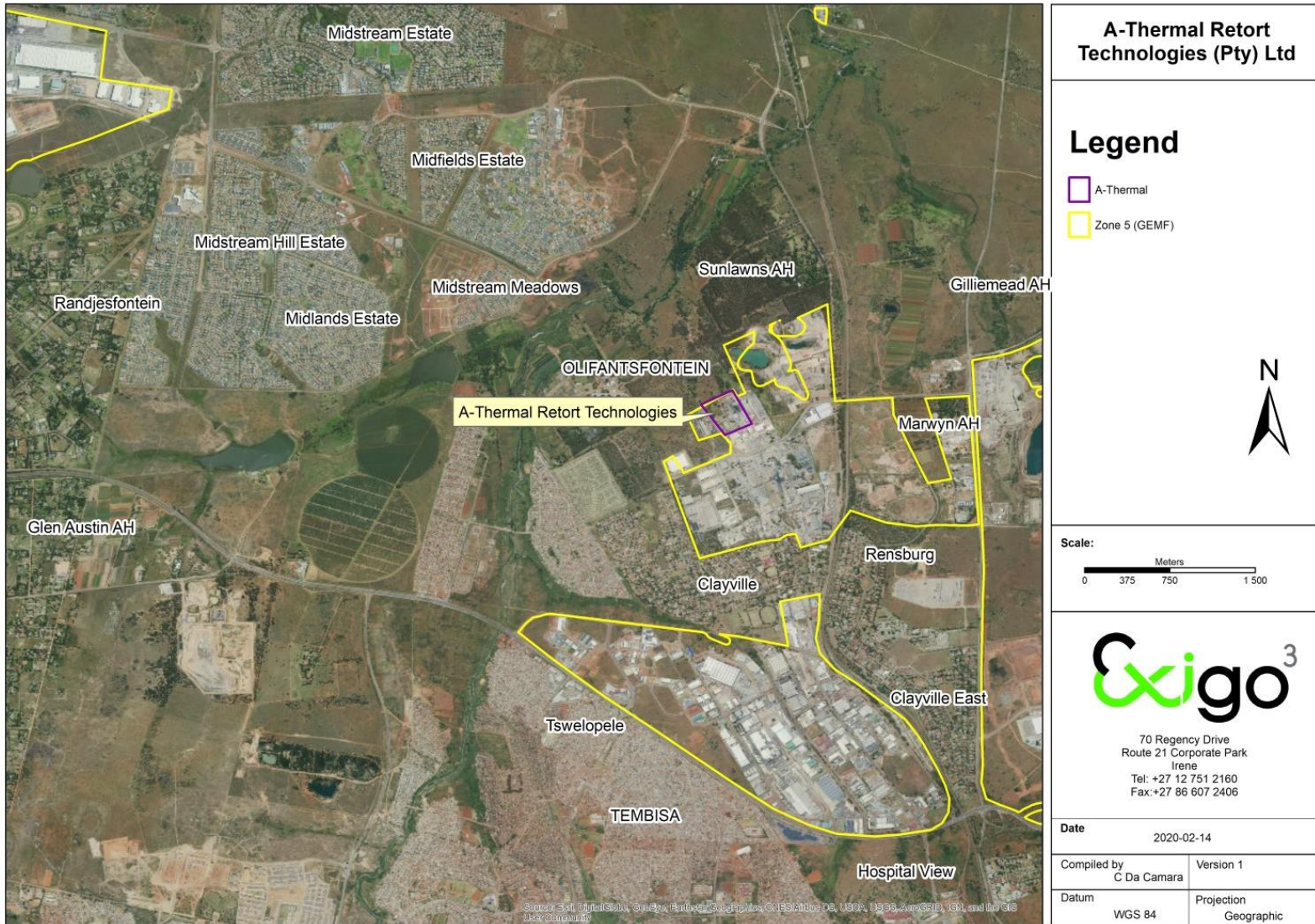


Figure 8-11: Residential areas around A-Thermal (Airshed, 2021)

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8.13.1 Demographic Profile

The population in Ekurhuleni Metropolitan Municipality is estimated to be about 4 million people comprising 1.27 million households in 2020. Figure 8-12 indicates the total population within the primary study area. The Clayville population increased from 4,933 in 2001 to 14,517 in 2011, but Clayville Ext. 12 / 16 experienced a dramatic decline from 310 in 2001 to 28 in 2011.

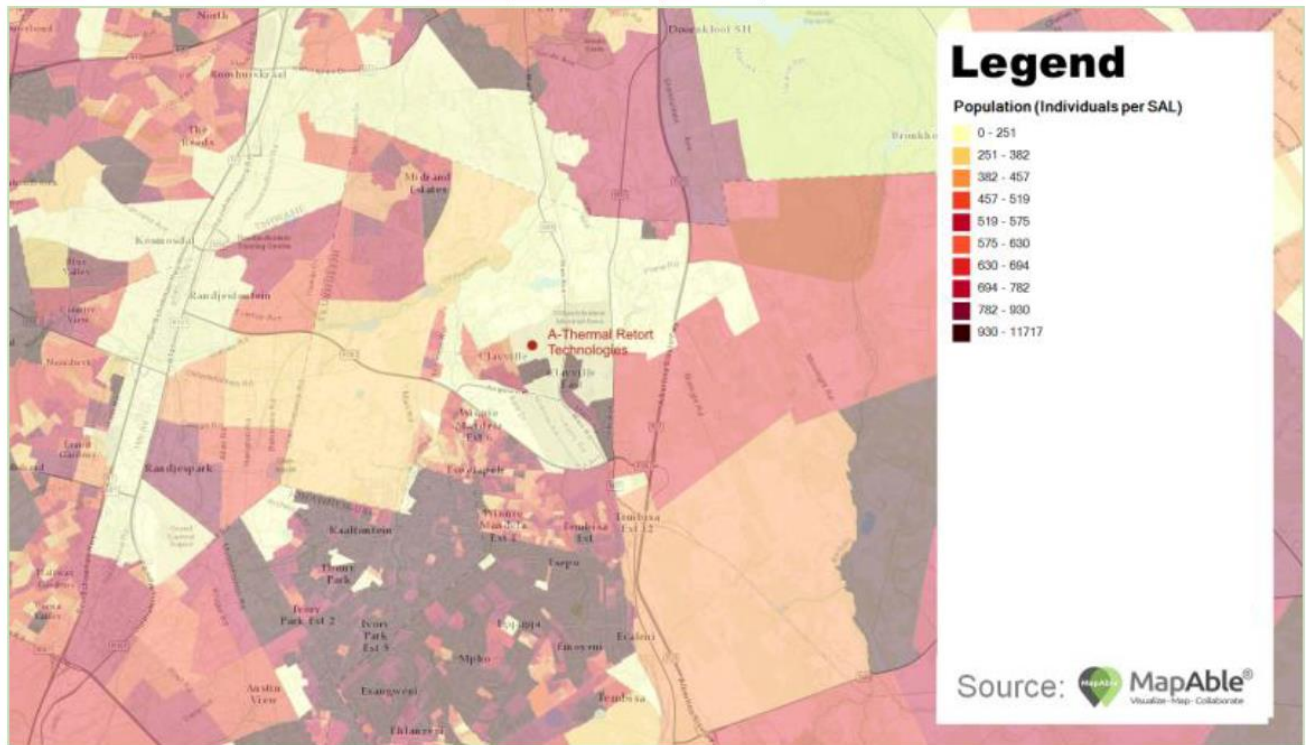


Figure 8-12: Total Population, 2011 (Urban-Econ, 2020).

8.13.2 Employment

Employment is the primary means by which individuals who are of working age may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being. The availability of labour and skills are critical components of any business. The Employment Rate in Ekurhuleni is estimated to be about 78.1% in Ekurhuleni and 77.7% in Kempton Park in 2020.

It is worth noting that amongst the formal employed in Ekurhuleni, skilled employment made up just over a quarter (27.8%) of the formal employed compared to about half (46%) that is semi-skilled and just over a quarter (26.3%) that is low-skilled. In Kempton Park, the skilled formal employed population makes up just over a fifth (21.3%) of the formally employed, while the semi-skilled makes up more than half (54%) and low-skilled about a quarter (24.7%) of the formally employed.

Informal employment refers to the employment of a person without establishing a working agreement, and the work is often temporary. The informally employed has slightly declined from 22.2% in 2012 to about 21.9%

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in 2020, while in Kempton Park, the informally employed slightly declined from 23% in 2012 to about 22.8% in 2020.

The unemployment rate is a measure of the prevalence of unemployment, which is generally calculated as a percentage of the number of unemployed by all individuals currently in the labour force. The Unemployment Rate in Ekurhuleni has improved from 40,33% in 2001 to 28,61% in 2011 at an annual growth rate of -3,38%. It is estimated the unemployment rate in Ekurhuleni is about 28.8% in 2020 (Urban-Econ, 2020).

8.13.3 Economy

The structure of the economy and the composition of its employment provides valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector are also important for the economic impact results' interpretation, as it allows the assessment of the extent to which the proposed activity would change the economy, its structure, and trends of specific sectors.

Gross value added (GVA) is the measure of the value added to goods and services produced in an area, industry or sector of an economy. GVA in Ekurhuleni has increased from R58 726,38 per capita in 2001 to R65 887,00 per capita in 2011 at an annual growth rate of 1,16%. Current price GVA in Ekurhuleni has increased from R235,4 billion in 2012 to about R291.8 billion in 2020, while Kempton Park's current price GVA has increased from 59.6 billion in 2012 to about R76.7 billion in 2020 (Urban-Econ, 2020).

9 Impacts and risks identified for each alternative including the nature, significance, consequence, extent, duration and probability of the impacts

Refer to Section 10.1 for impacts and risks identified including the alternatives.

9.1 Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on the Department of Environmental Affairs Guideline Document: EIA Regulations 2010. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability. This describes the likelihood of the impact actually occurring.

Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.

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Highly Probable: It is most likely that the impact will occur at some stage of the development.
 Definite: The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.

Duration. The lifetime of the impact

Short term: The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
 Medium term: The impact will last up to the end of the phases, where after it will be negated.
 Long term: The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
 Permanent: Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale. The physical and spatial size of the impact

Local: The impacted area extends only as far as the activity, e.g. footprint
 Site: The impact could affect the whole, or a measurable portion of the above mentioned properties.
 Regional: The impact could affect the area including the neighbouring residential areas.

Magnitude/ Severity. Does the impact destroy the environment, or alter its function.

Low: The impact alters the affected environment in such a way that natural processes are not affected.
 Medium: The affected environment is altered, but functions and processes continue in a modified way.
 High: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance. This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

Negligible: The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
 Low: The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
 Moderate: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
 High: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights will be assigned to each attribute:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4

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	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity will be rated without mitigation measures and with mitigation measures for both construction, operational and closure phases of the Platinum Mine development.

The findings of the impact assessment have been consolidated in the sections below. The impacts have been classified as impacts on the biophysical environment and impacts on the socio-economic environment. The impacts are further classified in terms of the phase of the development in which they are likely to occur, namely the construction phase and the operational phase.

9.2 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

Refer to Section 10.1 for impacts and risks identified including the alternatives.

9.3 Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects

Refer to Section 10.1 for impacts and risks identified including the alternatives.

9.4 The possible mitigation measures that could be applied and level of residual risk

Refer to Section 10.1 for impacts and risks identified including the alternatives.

9.5 The outcome of the site selection matrix

No site selection matrix was undertaken as there are no alternatives with regards to the property on which the project will be located due to the Plant already existing.

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9.6 If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such

There are no alternatives with regards to the property on which the project will be located as the A-Thermal Retort Technologies Plant already exists and an upgrade of the existing plant is proposed.

9.7 A concluding statement indicating the preferred alternatives, including preferred location of the activity

There are no alternatives with regards to the property on which the project will be located as the A-Thermal Retort Technologies Plant already exists and an upgrade of the existing plant is proposed.

10 A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity

In order to identify the potential impacts associated with the proposed prospecting activities the following steps were undertaken:

- The stakeholder consultation process is undertaken in a manner that is interactive and which provides landowners and identified stakeholders with the opportunity to provide input into the project. The local landowners and community have capabilities of providing site specific information which may otherwise not be available to the project team. Identified stakeholders have the opportunity to provide their comments on the project and any concerns that they may have. All comments and concerns are documented in the Consultation Report and captured in the Impact assessment.
- A detailed desktop investigation was undertaken to determine the environmental setting of the proposed project. Resources included the use of Geographic Information Systems and databases for the area, Municipal Integrated Development Plan etc.
- Specialist studies were undertaken to determine the impacts and associated management and mitigation measures.

The methodology of the ratings of impacts is described under Section 9.1.

10.1 A description of all environmental issues and risks that were identified during the environmental impact assessment process

10.1.1 Construction Phase

10.1.1.1 Direct habitat modification

The proposed development will result in modification of a small section of natural habitat in the footprint area compared to the larger area. Rehabilitation of some of these areas would be possible but there is likely to be long-term damage in these areas. Most habitat destruction will be caused during the construction process. The impact of the habitat destruction will be on the flora and fauna of the study area:

- The construction will lead to the loss of individual plants that will be cleared on the footprint areas;
- The construction activities can impact on surrounding vegetation by dust and altered surface run-off patterns;

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- The disturbance of the area could lead to an increase in the growth of alien vegetation.

10.1.1.2 Habitat fragmentation

The proposed development will inevitably result in natural movement patterns being disrupted and, to a varying degree depending on how different species react to these barriers will result in the fragmentation of natural populations. The development will be a definite impact in fragmenting the habitats of the area, although to a limited extent due to the already impacted area.

10.1.1.3 Spread and establishment of alien invasive species

The construction activities almost certainly carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project.

10.1.1.4 Negative effect of human activities on ecosystem

An increase in human activity on the site and surrounding areas is anticipated. The risk of snaring, killing and hunting of certain faunal species will increase. Increased access for labour during construction could result in the increased collection of medicinal plants, firewood, building wood, and other plant material. This could impact negatively on biodiversity through the general degradation of habitat quality.

If staff compounds are erected for construction workers, the risk of pollution because of litter and inadequate sanitation and the introduction of invasive fauna and flora are increased.

10.1.1.5 Increased Soil erosion and sedimentation

The construction activities associated with the development may result in widespread soil disturbance and is usually associated with accelerated soil erosion, particularly in areas receiving high rainfalls. Soil, sediments and associated contaminants are transported into streams, rivers and other water bodies, resulting in the loss or alteration of habitats for aquatic organisms, as well as changes in water quality. Soil erosion also promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous fauna and flora.

10.1.1.6 Soil and Water pollution

- Construction work will always carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or ground water.
- Poor management and disposal of waste can result in spillages of contaminants which can lead to soil or surface water pollution, or leaching of contaminants to the groundwater.

10.1.1.7 Generation of Noise

Movement of vehicles on site and through neighbouring properties may result in the generation of noise.

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10.1.1.8 Air pollution

The construction processes for the development will release dust and gasses, into the broader environment through vehicle emissions, dust from soil stockpiles and gravel roads. The environmental impacts of wind-borne dust, gases and topsoil stockpiles are primarily related to human health and ecosystem damage. The proposed development will typically comprise the following sources and associated air quality pollutants:

- Land clearing operations and scraping;
- Stockpiling (particulate matter);
- Materials handling operations (truck loading & unloading, tipping, stockpiling);
- Vehicle entrainment on paved and unpaved roads;
- Windblown dust-fugitive emissions (stockpiles);
- Vehicle exhaust emissions.

10.1.1.9 Impact on heritage resources

No archaeological objects or sites, or features of heritage potential were noted during the site survey of the development footprint and it might be assumed that these areas have largely been sterilized of heritage remains.

Fossils were not found during the walk through of the site.

10.1.1.10 Socio-economic impacts

The project will have the following positive Socio-economic Impacts during the construction phase:

- The project will have a positive short-term impact on the local and regional GVA.
- The project will create short-term (construction) jobs.
- The project will create job opportunities for the previously disadvantaged, including women and the youth.
- The facility upgrade will require new employees who, based on the current employee profile, are most likely to be from Tembisa. The project will therefore not only employ persons from the local community but will also assist with upskilling of these employees and therefore the local community.

Retainment and creation of permanent and temporary employment and subsequent positive effect on living standards

The upgrade of the A-Thermal plant will require temporary employment of construction workers, foremen, and engineers on site. Approximately 60 employment opportunities will be created for a period of 12 to 16 months.

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10.1.2 Operation Phase

10.1.2.1 Air Quality Impacts

Potential pollutants

Operational air emissions from the proposed project could potentially include criteria pollutants (SO₂, NO₂, CO, benzene, Pb, PM₁₀ and PM_{2.5}), acid gases including hydrochloric acid (HCl) and hydrofluoric acid (HF), ammonia (NH₃) as well as a number of organic and volatile metallic compounds.

Typical metals that may appear in the exhaust fumes include arsenic (As), antimony (Sb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), vanadium (V), mercury (Hg), cadmium (Cd) and thallium (Tl). The organic compounds may include a host of compounds, conveniently described as Total Organic Compounds (TOC).

Two organic compounds that are particularly of importance when assessing thermal treatment of wastes include dioxins and furans. Although these are normally emitted in very small quantities, they are considered to be very toxic and as a result treated separately when assessing emissions from these operations. Dioxins and furans (D/Fs) are a group of anthropogenic chemical compounds created as unintended by-products during combustion and industrial activities. D/Fs in hazardous waste combustion units are highly dependent on post-combustion temperature, time, and the presence of a reaction surface.

Results of Air Quality Impact Assessment

A stack height of at least 35 m would be required to satisfy the hourly and daily average criteria for the metal groups. For location option 2, the calculations indicate that a stack height of 30 m would be required to satisfy the NAAQS requirements. In this regard Option 2 was selected.

The following isopleth plots illustrate the difference in ground level air concentrations of key criteria pollutants including SO₂, NO₂ and PM₁₀.

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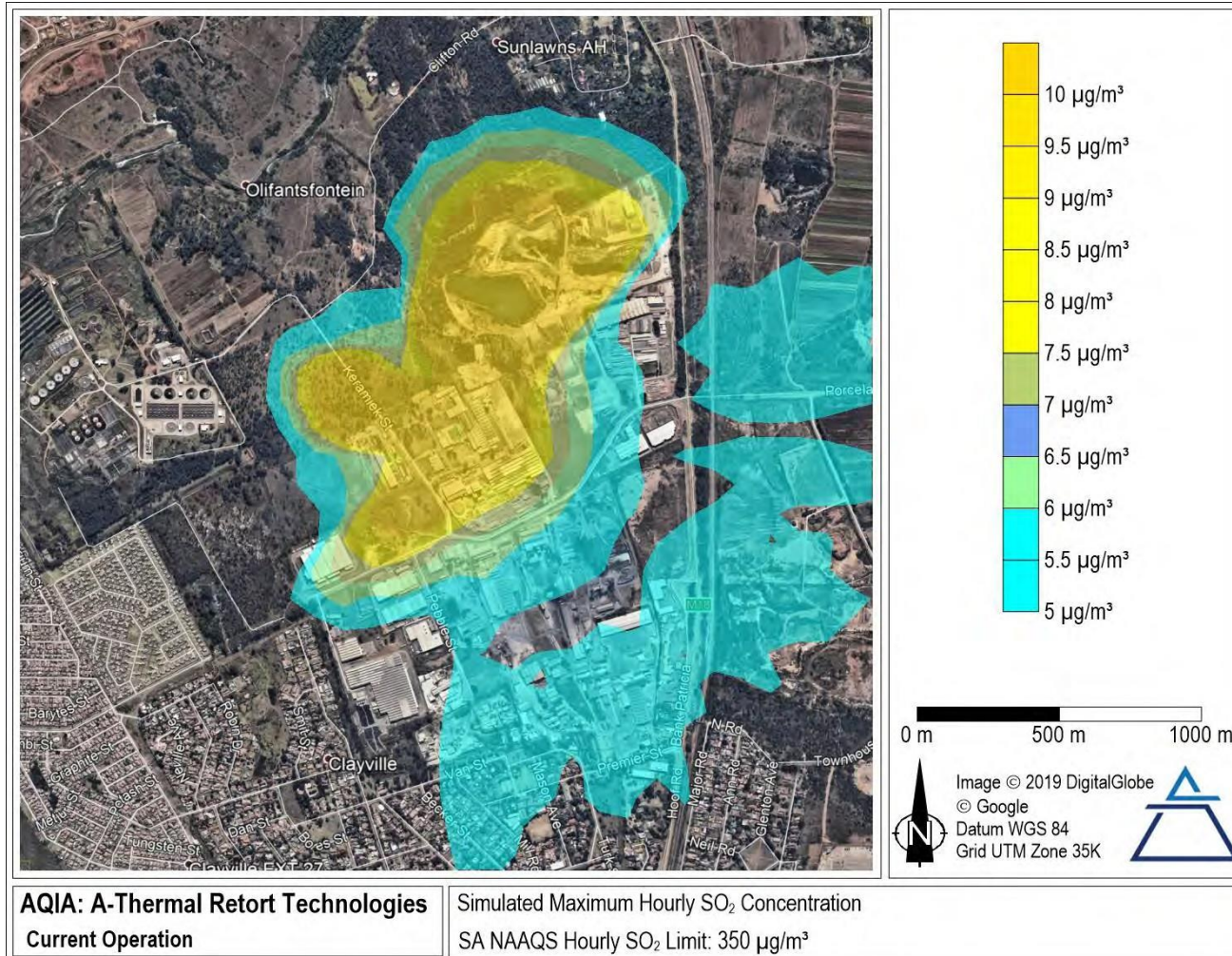


Figure 10-1: Current Operation - predicted maximum SO₂ hourly average concentration

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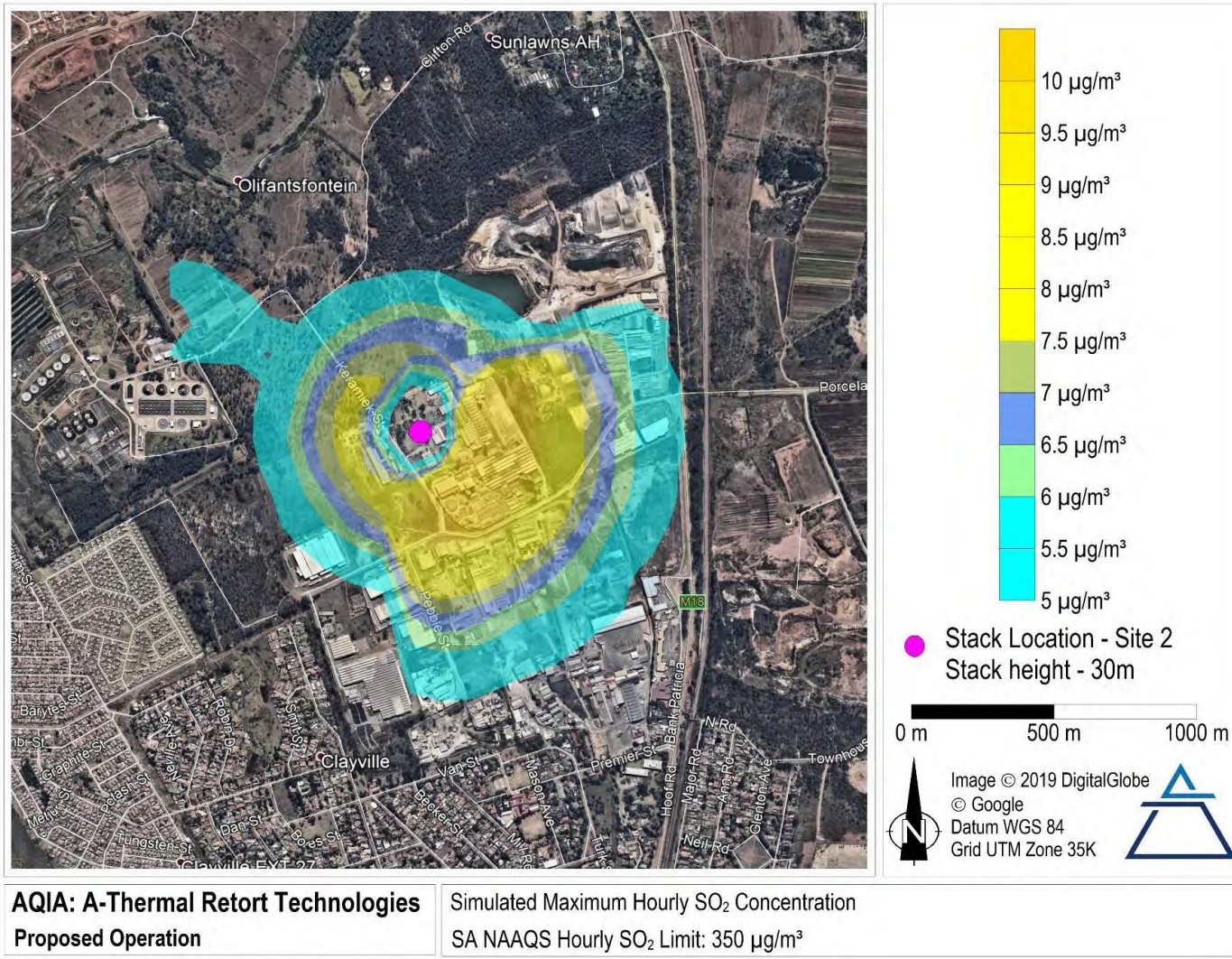


Figure 10-2: Proposed Operation (Option 2, stack height 30m) - predicted maximum SO₂ hourly average concentration.

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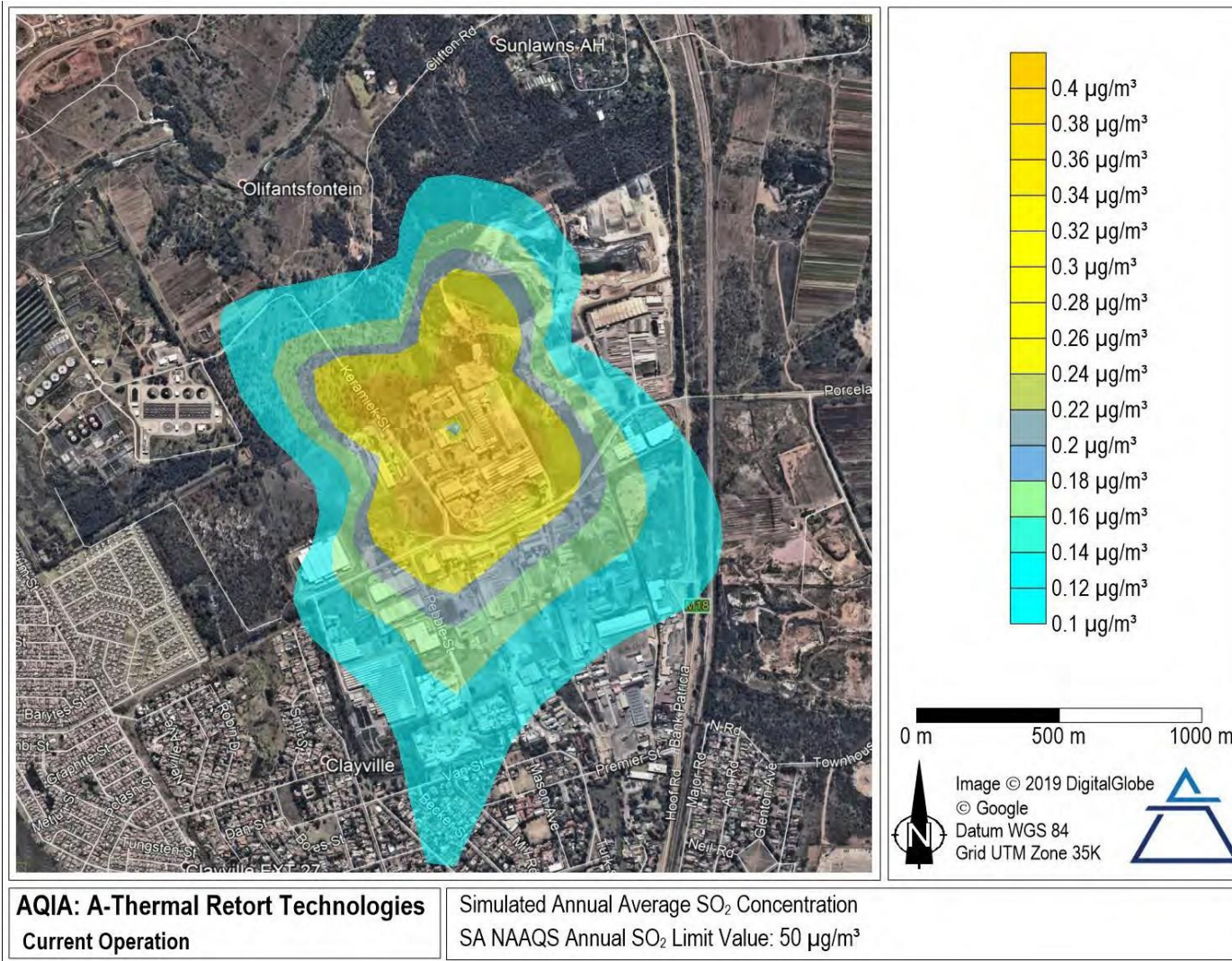


Figure 10-3: Current Operation - predicted SO₂ annual average concentration.

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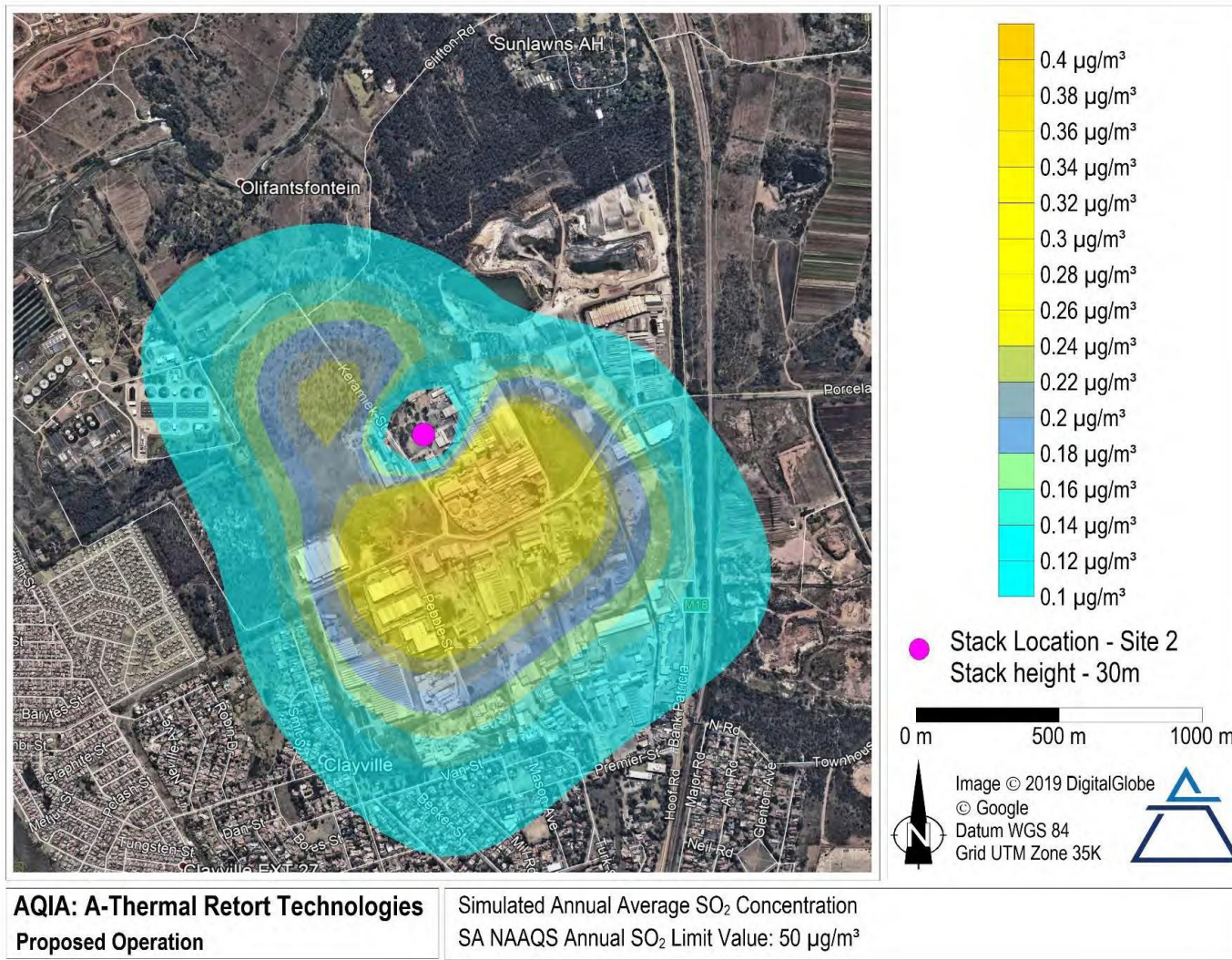


Figure 8-4: Proposed Operation (Option 2, stack height 30m) - predicted annual SO₂ average concentration.

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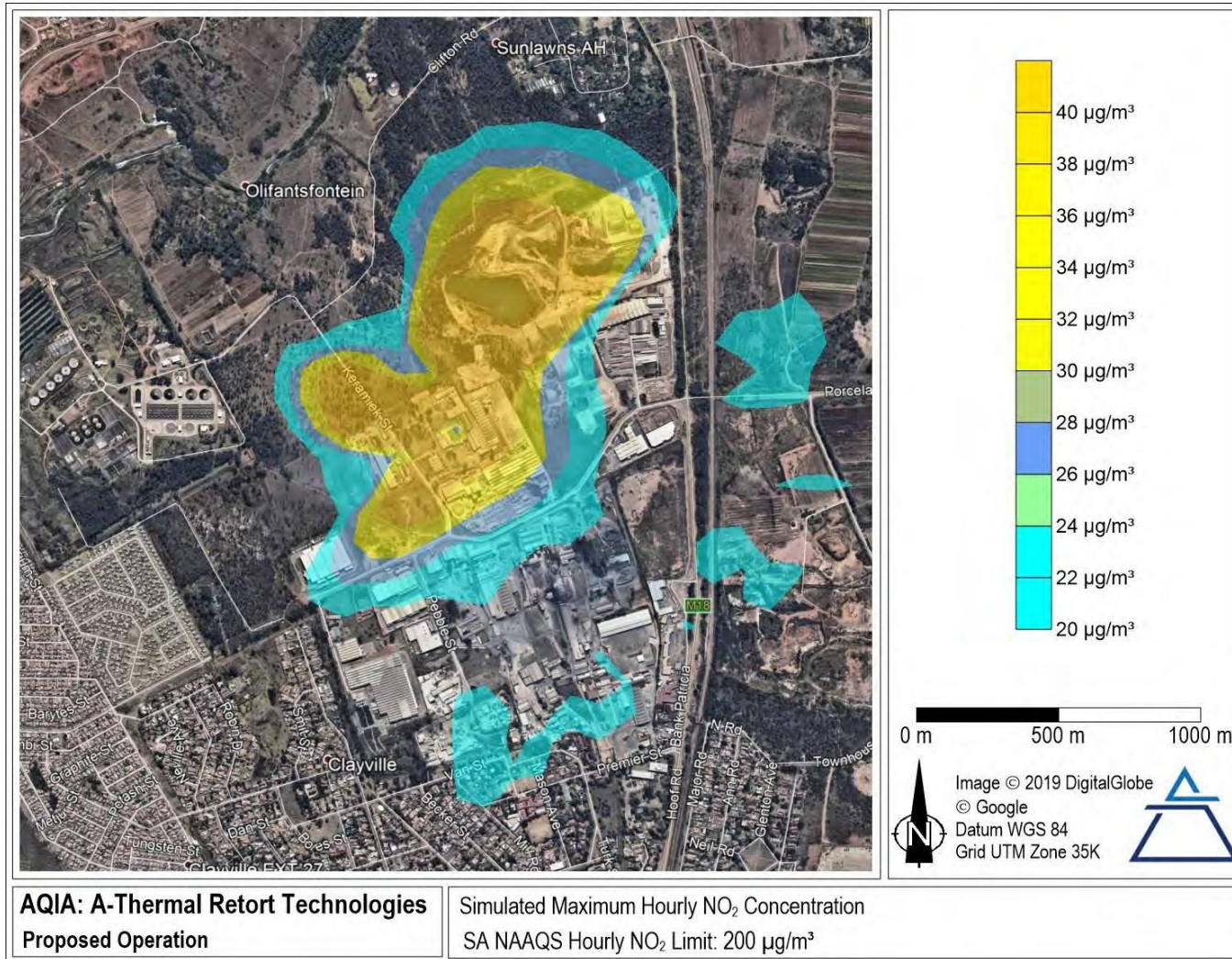


Figure 10-4: Current Operation - predicted maximum NO₂ hourly average concentration

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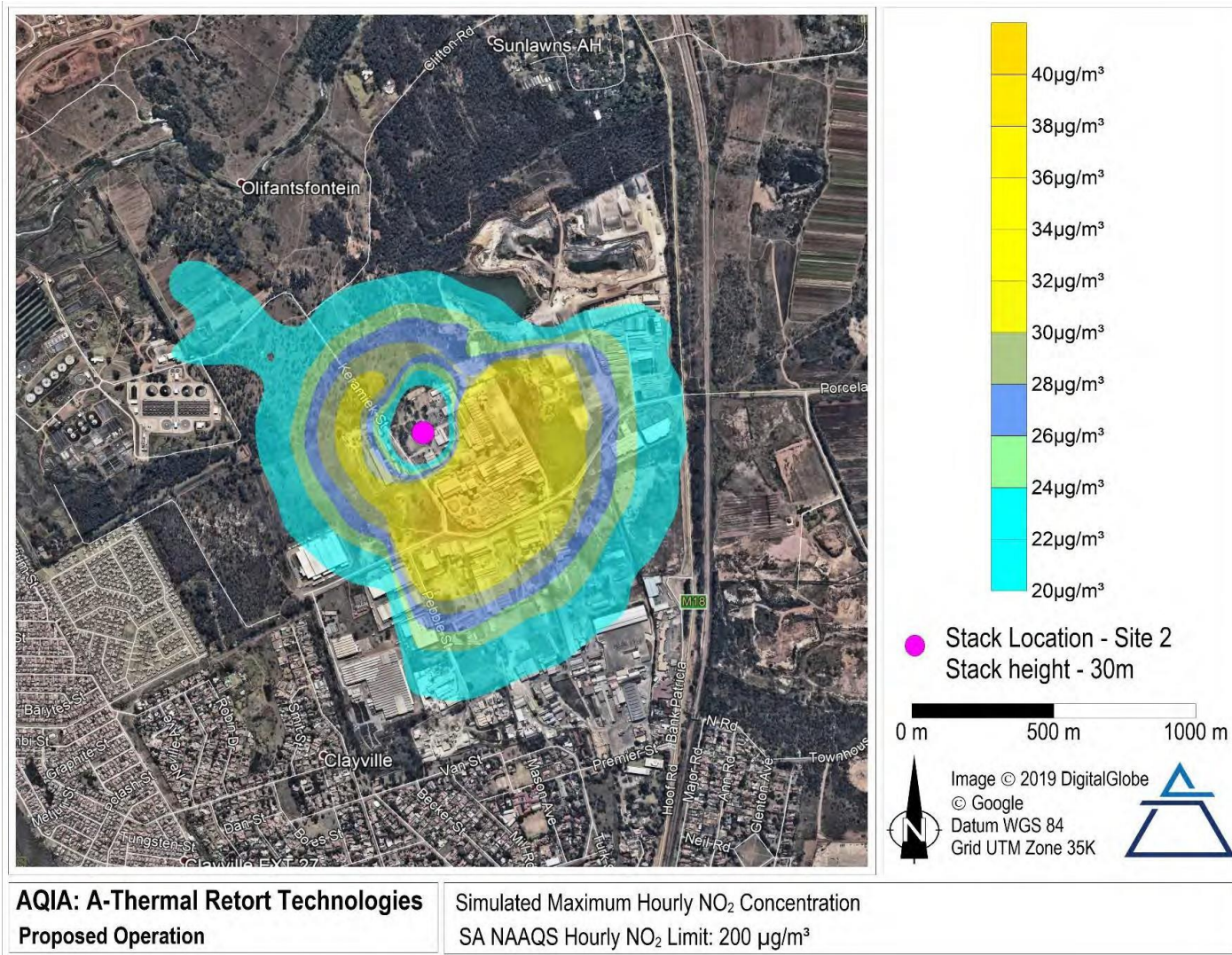


Figure 10-5: Proposed Operation (Option 2, stack height 30m) - predicted maximum NO₂ hourly average concentration

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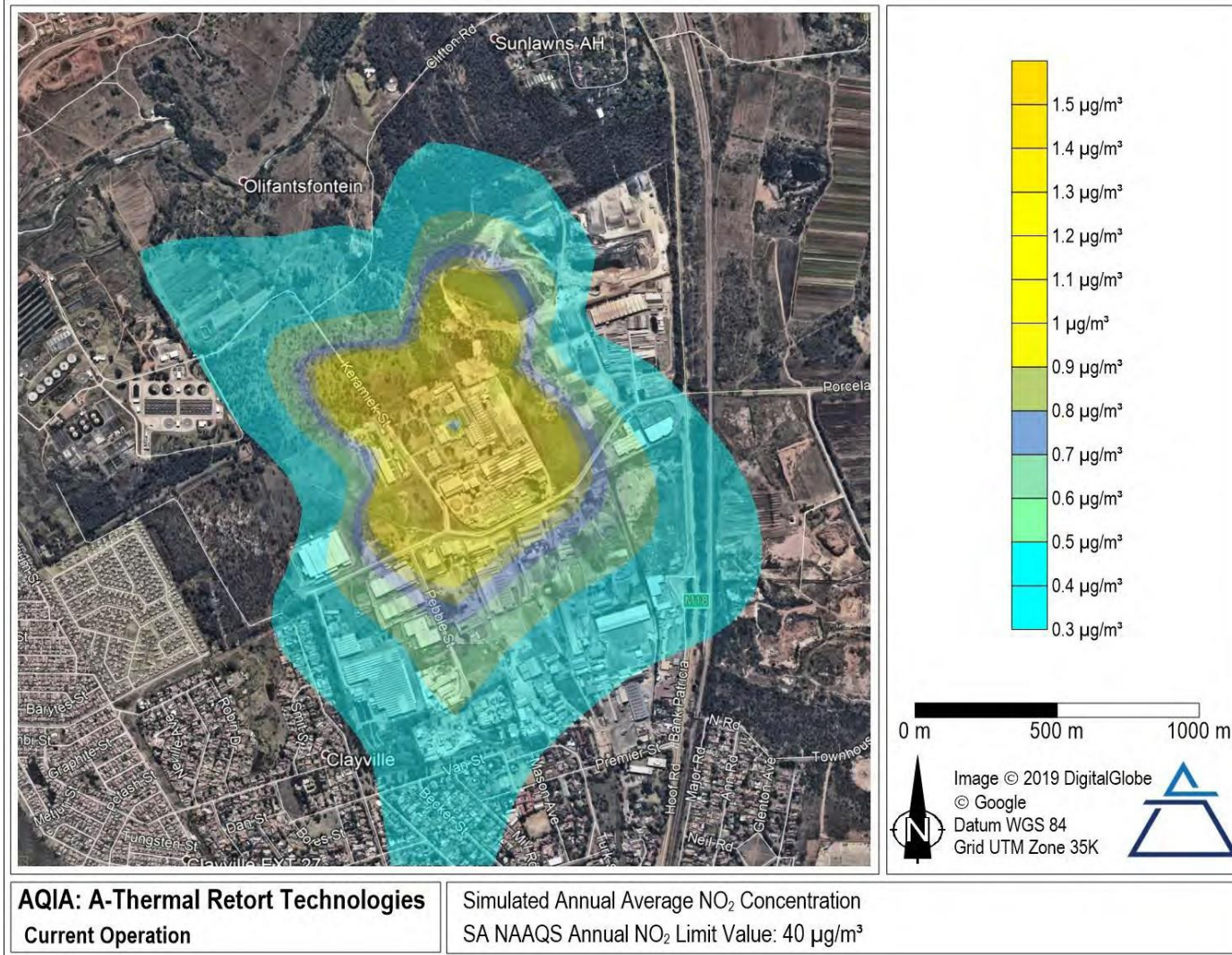


Figure 10-6: Current Operation - predicted NO₂ annual average concentration

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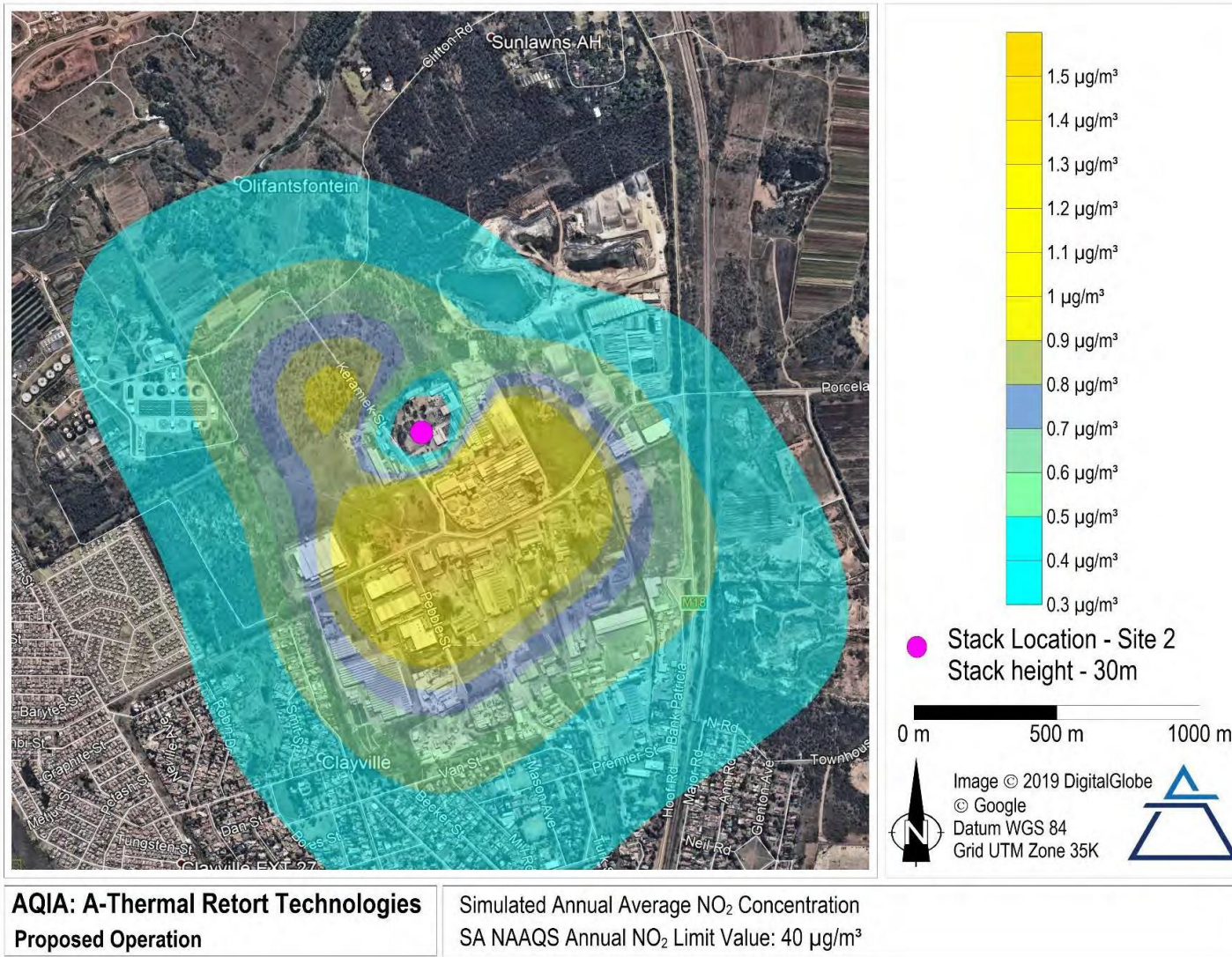


Figure 10-7: Proposed Operation (Option 2, stack height 30m) - predicted NO₂ annual average concentration

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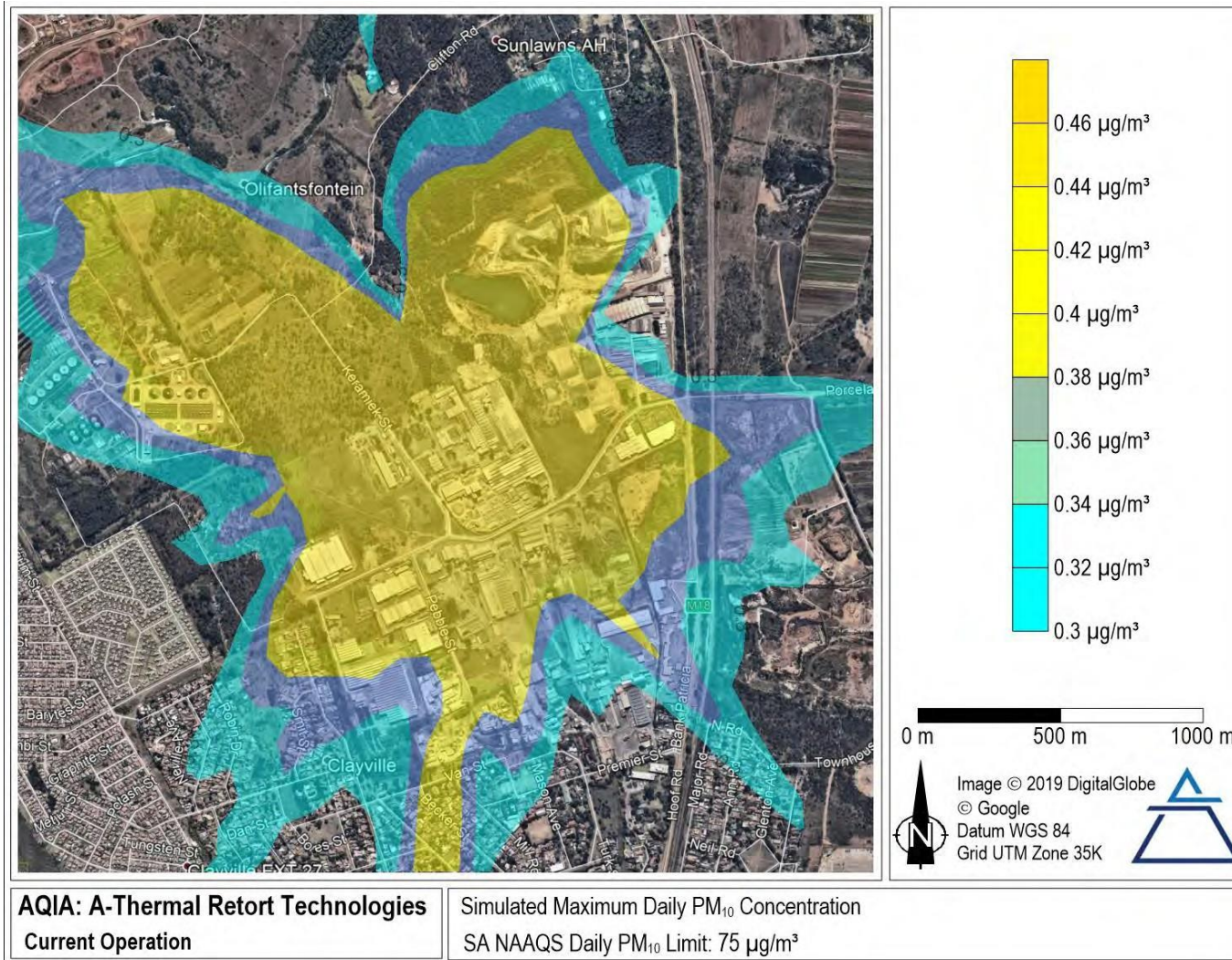
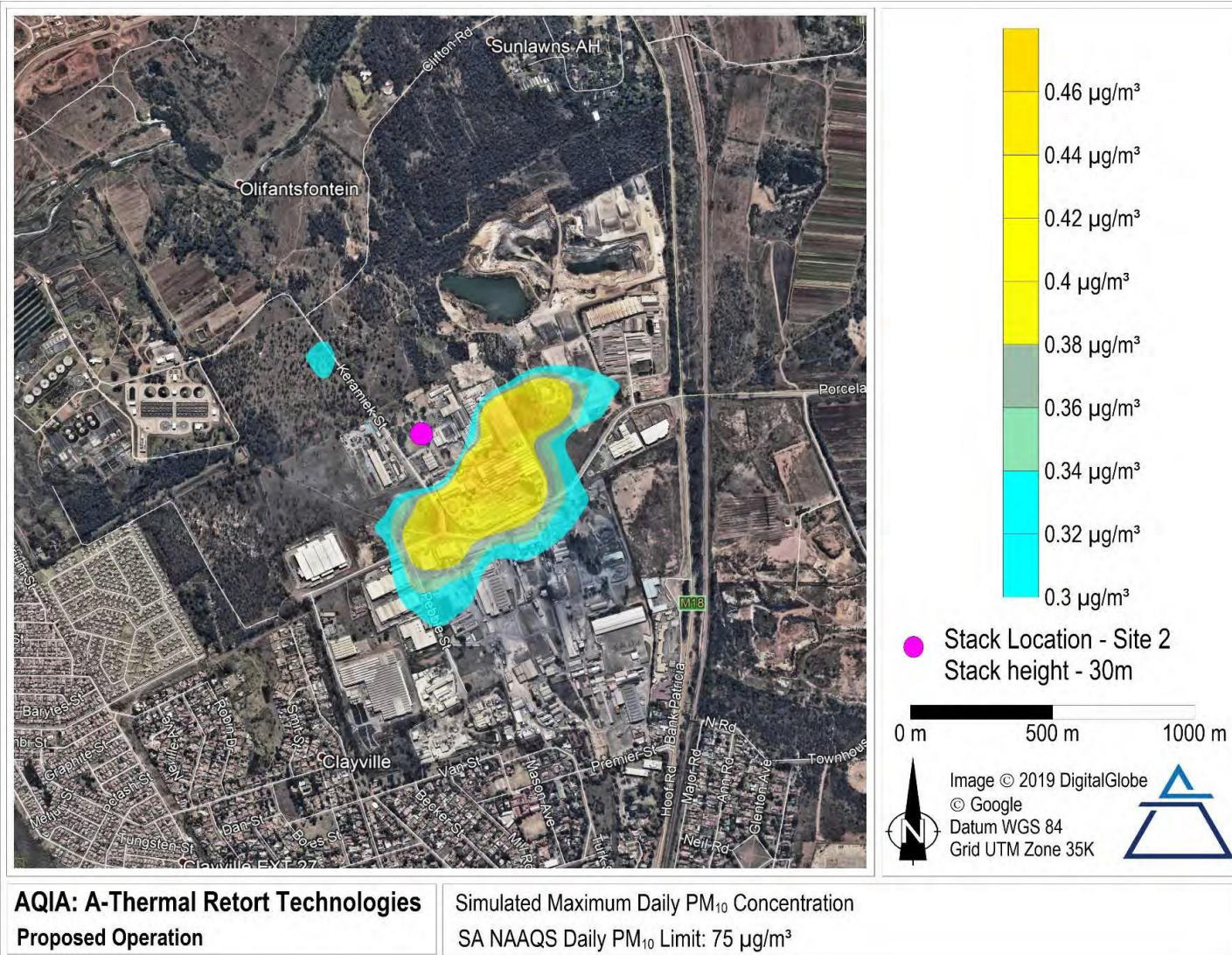


Figure 10-8: Current Operation - predicted maximum PM10 daily average concentration

Note that the daily PM₁₀ limit in terms of the NAAQS is 75 µg/m³. The maximum concentration indicated on the figure is 0.46 µg/m³, which is much lower than the limit.

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Figure 10-9: Proposed Operation (Option 2, stack height 30m) - predicted maximum PM10 daily average concentration

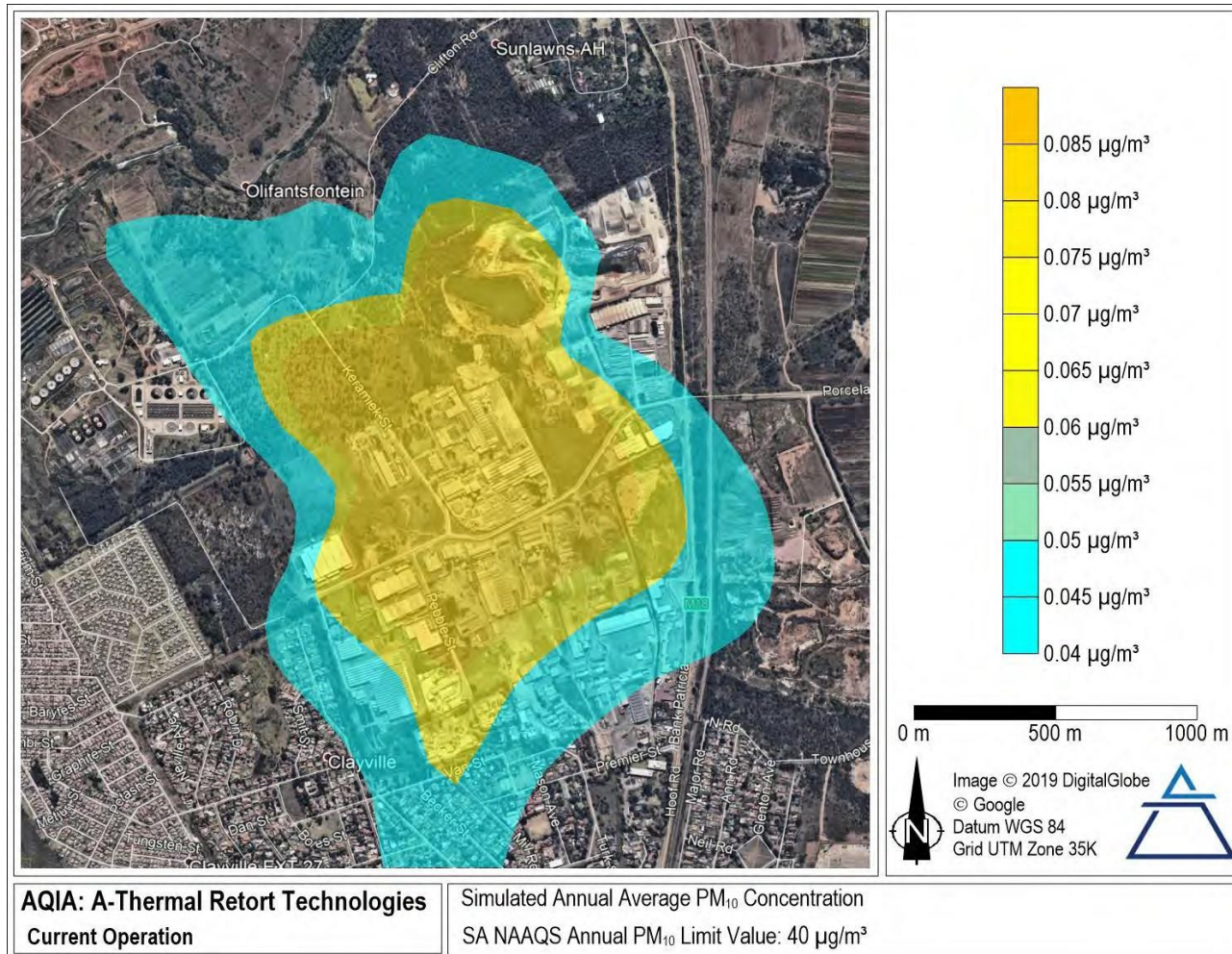


Figure 10-10: Current Operation - predicted PM10 annual average concentration

Note that the Annual PM₁₀ limit in terms of the NAAQS is 40 µg/m³. The maximum concentration indicated on the figure is 0.085 µg/m³, which is much lower than the limit

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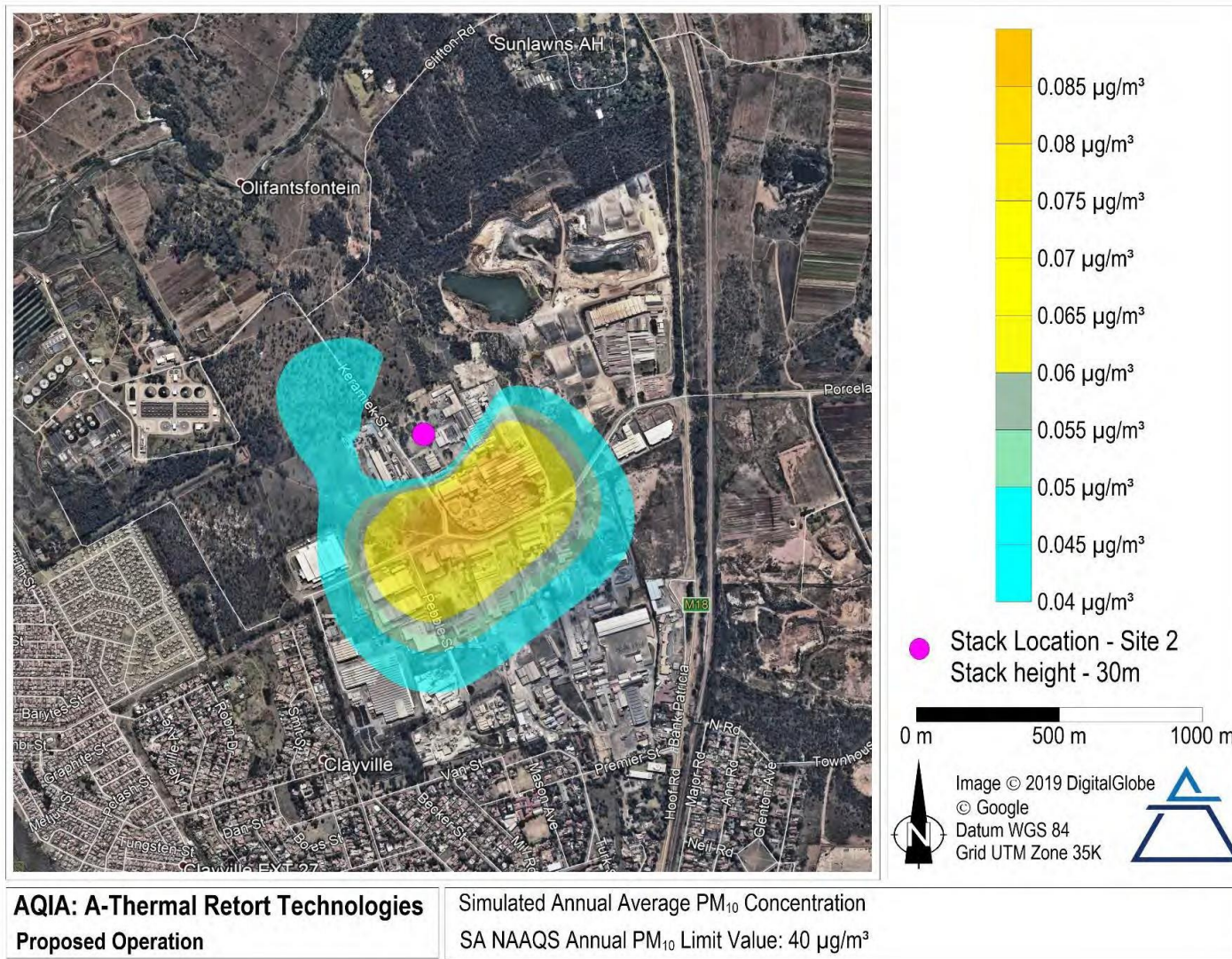


Figure 10-11: Proposed Operation (Option 2, stack height 30m) - predicted PM10 annual average concentration

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10.1.2.2 Surface and Groundwater Impacts

The following surface and groundwater impacts could take place:

- Incorrect storage of fuel resulting in contaminated stormwater runoff or seepage and contamination of the underlying aquifer.
- Incorrect storage of by-products resulting in contaminated stormwater runoff or seepage and contamination of the underlying aquifer.
- Incorrect storage of waste and spillages of chemicals resulting in contaminated stormwater runoff or seepage and contamination of the underlying aquifer.
- Release of contaminated stormwater into surroundings. The receptors being adjacent ecosystem, and the Olifantspruit which is located 1km to the northwest.

10.1.2.3 Traffic Impacts

A Traffic Impact Assessment was undertaken by Cobus Havenga in April / May 2019 and the following information is taken from the report.

The Traffic Impact Assessment was done in accordance with the South African Traffic Impact and Site Traffic Assessment Manual (COTO, 2012).

The peak traffic hours at the access are as follows:

- Weekday morning peak hour: 07:15 - 08:15
- Weekday afternoon peak hour: 17:00 - 18:00

The morning peak hour at the access do not co-inside 100% with that on the adjacent road network and occur 45 minutes later. During the afternoon it is an hour later. No trucks were recorded through the access at the plant during the peak traffic hours. Truck movement peaked between 11:15 and 11:30.

The estimated figures on the number of cars, trucks, busses and employees for the proposed project are presented in Table 10-1:

Table 10-1: Current and expected figures

	Current (No)	Upgrade (No)	Current (No)	Upgrade (No)
Cars	30		60	
Trucks	10		30	
Busses (for employees)	0		4	
Employees	140		250	

Based on these employees will more or less double and trucks will increase threefold.

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The current trip generation (total existing) and expected trip generation (total expected) through the access during a normal weekday is depicted in the graph below.

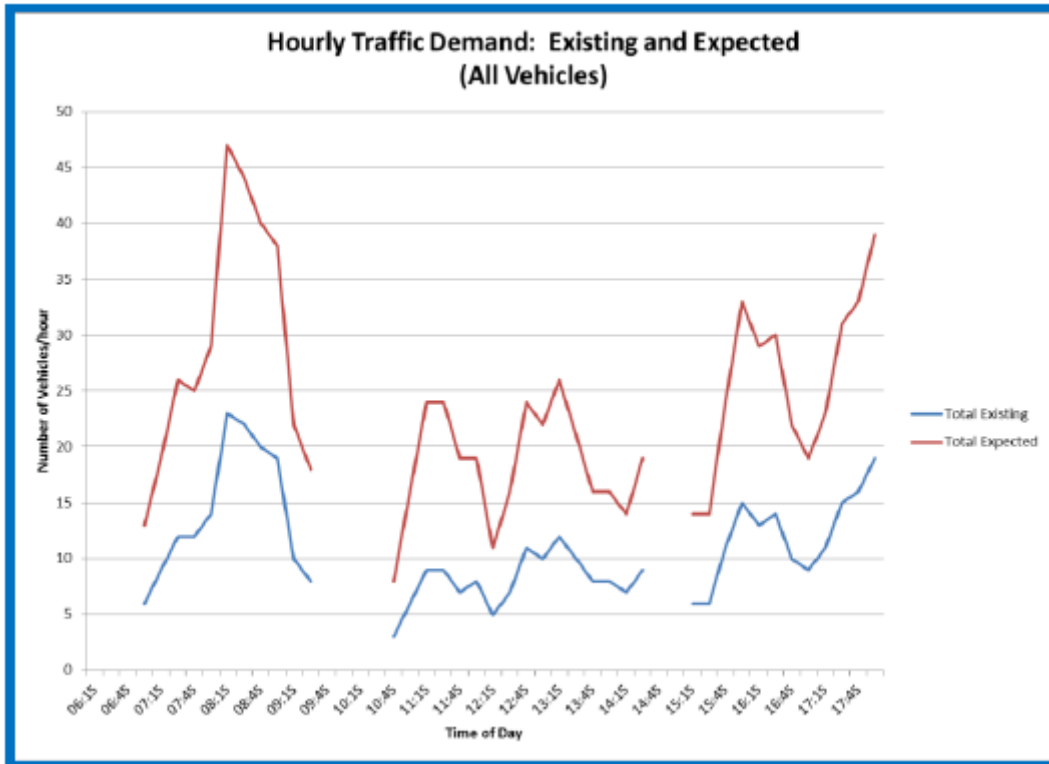


Figure 10-12: Hourly Traffic Demands

In terms of the SA Traffic Impact and Site Traffic Assessment Manual an assessment is only required if the additional hourly vehicular trip generation exceeds 50 trips. The additional peak hour trips are not expected to exceed this.

The following design scenarios were adopted for the purposes of this study:

- Scenario 1: 2019 - existing a.m. and p.m. peak hour traffic demand.
- Scenario 2: 2019 – expected a.m. and p.m. peak hour traffic demand with the expected additional traffic demand from the proposed expansion.
- Scenario 3: 2023 – expected a.m. and p.m. peak hour traffic demand with a 3% per annum background traffic growth and the expected additional traffic demand from the proposed expansion.

It can be concluded that with the proposed upgrades, the intersection and the approaches to the intersection will operate at acceptable levels of service during both peak hours.

With background traffic growth road upgrades are required in the municipality. The upgrades required at the intersection of Glen Avenue and Porcelain Road are required as result of background traffic growth and not as result of the additional traffic from this expansion project.

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10.1.2.4 Socio-Economic Impacts

The project will have the following positive Socio-economic Impacts (Urban-Econ, 2020):

- The project will have a positive short and long-term impact on the local and regional GVA.
- The project will create short-term (construction) and long-term (manufacturing and utilities) jobs.
- The project will create job opportunities for the previously disadvantaged, including women and the youth.
- The facility upgrade will require new employees who, based on the current employee profile, are most likely to be from Tembisa. The project will therefore not only employ persons from the local community but will also assist with upskilling of these employees and therefore the local community.
- A-Thermal already supports several local community upliftment programmes. It is envisioned that A-Thermal will continue with its local community upliftment programmes.
- The upgraded facility will allow for the production of carbon that will reduce CO₂ emissions and create downstream value-chain opportunities.
- The upgrade will allow additional gas abatement equipment to be installed, which will result in a stack that will not have a visible plume, improving the aesthetics of the operations.
- The upgraded facility recycles waste that otherwise would have ended up on landfills, where it would have emitted more greenhouse gasses than what is emitted at the site.

Retainment and creation of permanent and temporary employment and subsequent positive effect on living standards

A-Thermal currently employs 109 personnel and the project will create about an additional 80 new work opportunities. Of the current personnel, about 85% reside in the surrounding communities of Tembisa, Olifantsfontein or Clayville and it is expected that the majority of new personnel will also come from these areas.

Power generation and provision of electricity to customers

Renewable Energy Independent Power Producer Projects are in alignment with government's commitment not only to renewable energy but also to a solid partnership with the private sector in pursuing government's energy transition objectives for the future. Provision of electricity to surrounding customers will be beneficial to customers as it will be a reliable source of energy during times of load-shedding or power outages by Eskom. This will have a positive impact on GDP for the region.

Provision of waste treatment services that diverts waste from landfill

Government policy aims towards minimising the consumption of natural resources; avoiding and minimising the generation of waste and reducing, re-using, recycling and recovering of waste.

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Government's position on thermal waste treatment is that it is an acceptable waste management option in South Africa. This includes incineration of general and hazardous waste in dedicated incinerators or other high temperature thermal treatment technologies.

Incineration and co-processing are internationally proven technologies for the treatment of general and hazardous waste, as well as the recovery of energy and raw materials. Not only do these options present a significant opportunity to recover resources (energy and raw materials), it would also facilitate a move away from waste disposal to landfill, particularly of organic waste.

The proposed project is well aligned with government's general outlook. The proposed project does not contradict any of the government objectives and is more likely to contribute to the development in the specified priority areas particularly related to waste minimisation as well as to promote renewable energy.

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10.2 An assessment of the significance of each issue and risk and an indication of the extent to which the issues and risks could be avoided or addressed by the adoption of mitigation measures

Table 10-2: Table of impacts and significance (with mitigation (WM) and without mitigation (WOM))

Nr	Activity	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance	
					Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude
CONSTRUCTION PHASE														
Ecology														
1	Clearing of vegetation for development	Direct habitat modification	WOM	Negative	Highly Probable	4	Permanent	5	Local	1	Medium	6	48	Moderate
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low
2	Clearing of vegetation for development, access roads etc	Habitat fragmentation	WOM	Negative	Highly Probable	4	Permanent	5	Local	1	Medium	6	48	Moderate
			WM	Negative	Highly Probable	4	Long term	4	Local	1	Low	2	28	Low
3	Continued movement of personnel and vehicles on and off the site during the construction phase, as well as occasional delivery of materials	Spread of alien invasive species	WOM	Negative	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low

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	required for maintenance													
4	Construction of infrastructure, access roads etc., developments	Negative effect of human activities on the ecosystem	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low
Soils														
5	Exposure of soils to rainfall and wind during construction	Increased Soil erosion and sedimentation	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Medium	8	60	Moderate
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low
Water Resources														
6	Poor management and disposal of solid waste	Soil and Water pollution	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Medium	6	44	Moderate
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low
7	Movement of vehicles on site during construction, storage of waste material and chemicals	Potential spillages resulting in an impact on ground and surface water	WOM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible
Noise														
8	Construction of infrastructure and upgrade of the plant - Noisy activities during	Noise impacts on surrounding landowners	WOM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low
			WM	Negative	Probable	2	Medium term	3	Local	1	Low	2	12	Negligible

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	construction (e.g. drilling, hammering, etc.)														
Air Quality															
9	Movement of vehicles on site during construction and release of emissions, demolition of buildings resulting in generation of dust	Air pollution	WOM	Negative	Definite	5	Medium term	3	Site	2	Medium	6	55	Moderate	
			WM	Negative	Highly Probable	4	Medium term	3	Site	2	Low	2	28	Low	
Heritage															
10	Clearance of soils and vegetation for construction purposes, digging of trenches	Impact on heritage resources	WOM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	
			WM	Negative	Improbable	1	Medium term	3	Site	2	Low	2	7	Negligible	
Socio-economic															
11	Increase in construction GVA	Impact on Economy	WOM	Positive	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	
			WM	Positive	Definite	5	Short term	1	Regional	3	High	8	60	Moderate	
12	Increase in construction sector employment	Impact on Employment	WOM	Positive	Definite	5	Short term	1	Local	1	Medium	6	40	Low	
			WM	Positive	Definite	5	Short term	1	Local	1	Medium	6	40	Low	

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13	Increase in job opportunities for women and the youth from previously disadvantaged communities.	Job Opportunities for Women and Youth	WOM	Positive	Definite	5	Short term	1	Local	1	Medium	6	40	Low
			WM	Positive	Definite	5	Short term	1	Local	1	Medium	6	40	Low
OPERATION PHASE														
Air Quality Impacts														
1	Operation of the plant with 30 m stack	Impacts on air quality and health	WOM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low
			WM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low
2	Operation of the plant with 30 m stack - upset (or start-up) conditions	Impacts on air quality and health	WOM	Negative	Probable	3	Long term	4	Regional	3	High	8	45	Moderate
			WM	Negative	Probable	2	Long term	4	Regional	3	Medium	6	26	Low
3	Cumulative impacts: Greenhouse Gas Emissions and Odours from Landfills	Reduction of overall greenhouse gases and nuisance odours from landfills	WOM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High
			WM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High
Water Resources														
4	Incorrect storage of fuel	Surface water pollution	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	High	8	48	Moderate
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible
5			WOM	Negative	Highly Probable	4	Short term	1	Regional	3	High	8	48	Moderate

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		Groundwater pollution	WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible
6	Incorrect storage of by- products	Surface water pollution	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	High	8	48	Moderate
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible
7		Groundwater pollution	WOM	Negative	Highly Probable	4	Short term	1	Regional	3	High	8	48	Moderate
			WM	Negative	Probable	2	Medium term	3	Site	2	Low	2	14	Negligible
8	Incorrect storage of waste and spillages of chemicals	Surface water pollution	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	High	8	56	Moderate
			WM	Negative	Improbable	1	Medium term	3	Site	2	High	8	13	Negligible
9		Groundwater pollution	WOM	Negative	Highly Probable	4	Medium term	3	Regional	3	High	8	56	Moderate
			WM	Negative	Improbable	1	Medium term	3	Site	2	High	8	13	Negligible
10	Release of contaminated stormwater into surroundings	Surface water pollution	WOM	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
			WM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low
11		Groundwater pollution	WOM	Negative	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
			WM	Negative	Probable	2	Medium term	3	Site	2	Medium	6	22	Low
Traffic Impacts														
12			WOM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible

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	Daily increase in trucks	Traffic impact on intersections	WM	Negative	Improbable	1	Long term	4	Regional	3	Low	2	9	Negligible
13	Holding and queuing of additional trucks	Impact of parking in the road reserve	WOM	Negative	Definite	5	Long term	4	Regional	3	Low	2	45	Moderate
			WM	Negative	Probable	2	Long term	4	Regional	3	Low	2	18	Negligible
Socio-economic Impacts														
14	Increase in utility GVA	Impact on the Economy	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
			WM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
15	Increase in utility sector employment	Impact on Employment	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate
			WM	Positive	Highly Probable	4	Permanent	5	Regional	3	Medium	6	56	Moderate
16	Continue training locally employed community.	Up-Skilling the Local Community	WOM	Positive	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low
			WM	Positive	Highly Probable	4	Long term	4	Site	2	Low	2	32	Low
17	Sponsoring local community events and holiday work programmes for students	Local Community Upliftment	WOM	Positive	Probable	2	Long term	4	Site	3	Medium	6	26	Low
			WM	Positive	Probable	2	Long term	4	Site	3	Medium	6	26	Low
18	The production of carbon and unlocking its value-chain	Carbon Value Chain	WOM	Positive	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
			WM	Positive	Highly Probable	4	Long term	4	Regional	3	Medium	6	52	Moderate
19	Reduce stack plume visibility	Stack Aesthetics	WOM	Positive	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low
			WM	Positive	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low

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20	Greenhouse Gas Emissions	Reduction of overall greenhouse gases	WOM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
			WM	Positive	Highly Probable	4	Permanent	5	Regional	3	High	8	64	High
21	Power generation from non-fossil fuels	Reduction in overall emissions due to cleaner power generation	WOM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High
			WM	Positive	Definite	5	Long term	4	Regional	3	High	8	75	High

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Table 10-3: Table of impacts with mitigation measures

Nr	Activity	Impact	Without or With Mitigation	Significance		Mitigation Measures
				Score	Magnitude	
CONSTRUCTION PHASE						
Ecology						
1	Clearing of vegetation for development	Direct habitat modification	WOM	48	Moderate	<ul style="list-style-type: none"> • The removal of indigenous flora should only occur on the footprint area of the development and not over the larger area. The clearing and damage of plant growth in these areas should be restricted to the footprint way leave area. • Revegetation of disturbed areas must be undertaken with site indigenous species. This can provide a buffer to protect indigenous vegetation from invasion by weeds; • Ongoing monitoring and maintenance of revegetation works; • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications; • Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during the construction; • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist; • Should the development be approved by authorities, environmental monitoring of environmental aspects should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.
			WM	28	Low	

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2	Clearing of vegetation for development, access roads etc	Habitat fragmentation	WOM	48	Moderate	<ul style="list-style-type: none"> • Use existing facilities (e.g., current road surface) to the extent possible to minimize the amount of new disturbance; • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the natural vegetation representation during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas.
			WM	28	Low	
3	Continued movement of personnel and vehicles on and off the site during the construction phase, as well as occasional delivery of materials required for maintenance	Spread of alien invasive species	WOM	52	Moderate	<ul style="list-style-type: none"> • Institute strict control over materials brought onto site, which should be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual insecticides prior to transport on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species should be eradicated; • Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act or in terms of Working for Water guidelines; • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish; • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented; • A plan should be developed for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching. Prohibit the use of fill materials from areas with known invasive
			WM	28	Low	

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					vegetation problems. The spread of invasive nonnative plants should be avoided by keeping vehicles and equipment clean and reseeding disturbed areas with native plants.	
4	Construction of infrastructure, access roads etc., developments	Negative effect of human activities on the ecosystem	WOM	44	Moderate	<ul style="list-style-type: none"> • Maintain proper firebreaks around entire development footprint. • Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas. • Construction activities must be restricted to working hours Monday to Saturday, unless otherwise approved by the appropriate competent person in consultation with the affected residents. • Educate workers regarding the occurrence of important resources in the area and the importance of protection. • Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g. courtship, nesting) seasons. In addition, control pets to avoid harassment and disturbance of wildlife. • Camp fires at construction sites must be strictly controlled to ensure that no veld fires are caused.
			WM	28	Low	
Soils						

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5	Exposure of soils to rainfall and wind during construction	Increased Soil erosion and sedimentation	WOM	60	Moderate	<ul style="list-style-type: none"> • During and after construction, ensure storm water management around permanent infrastructure, rehabilitate disturbed areas, protect topsoil and protect sensitive soils. This will reduce the possibility of soil erosion. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. Control dust on construction sites and access roads using chemical dust suppressants; • Institute a storm water management plan including strategies such as: <ul style="list-style-type: none"> o Minimizing impervious area; o Increasing infiltration to soil by use of recharge areas; o Use of natural vegetated swales instead of pipes; or o Installing detention or retention facilities with graduated outlet control structures. • The control of soil erosion and siltation associated with construction and operation is important at all locations on site, and particularly adjacent to drainage lines, streams and wetland communities. Both temporary and permanent soil erosion control measures must be used during the construction and operation phases. Any earth-worked areas, which may lay bare for extended periods, should be temporarily grassed. • Ensure the amount of bare soil exposed is minimized by staging earthworks in phases and leaving as much ground cover intact as possible during construction. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible and in any case not later than six months before the termination of the construction period. • Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify. • Stockpile topsoil separately from subsoil. • Stockpile in an area that is protected from storm water runoff and wind. • Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible. • Maintain topsoil stockpiles in a weed free condition. • Topsoil should not be compacted in any way, nor should any object be placed or stockpiled on it.
			WM	28	Low	

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					<ul style="list-style-type: none"> • Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed. • Soil erosion controls must be inspected and maintained on a regular basis during construction and operation phases. 	
Water Resources						
6	Poor management and disposal of solid waste	Soil and Water pollution	WOM	44	Moderate	<ul style="list-style-type: none"> • Implement an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility. • Ensure that the design of the development includes adequate facilities for the temporary storage of waste, in terms of volume, location and enclosure. • Ensure that waste handling, storage and collection is undertaken in accordance with the relevant health and municipal legislation, practices and procedures. • Provide of adequate numbers of litter bins throughout the development. • Promote the recycling of waste, with specialist service providers appointed to remove the waste from site. • On completion of the construction works, the Contractor shall clear away and remove from the site all construction paint, surplus materials, foundations, plumbing and other fixtures, rubbish and temporary works of every kind. Areas thus cleared shall be graded and scarified to restore the ground to its original profile as near as practicable before topsoil placement. • Rubble must be removed from the construction site frequently and disposed of at a licensed landfill site
			WM	28	Low	
7	Movement of vehicles on site during construction, storage of waste material and chemicals	Potential spillages resulting in an impact on ground and surface water	WOM	26	Low	<ul style="list-style-type: none"> • Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or chemicals should be removed from the site and discarded in an environmental friendly way; • All construction vehicles should be inspected for oil and fuel leaks regularly, and any vehicle showing signs of leaking should be serviced immediately; • Vehicle maintenance yards must not be situated in any close proximity to water courses and all used oil and other waste products should be disposed of in an accepted way – preferably it should be removed from the site and recycled; • On-site Storm water control is vital to ensure that no ponding occurs; • Storm water must be prevented from entering the site.
			WM	14	Negligible	

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Noise						
8	Construction of infrastructure and upgrade of the plant - Noisy activities during construction (e.g. drilling, hammering, etc.)	Noise impacts on surrounding landowners	WOM	28	Low	<ul style="list-style-type: none"> Erect noise barriers such as screens around noisy equipment and operations. Fit efficient exhaust mufflers to diesel forklift engines, other noisy vehicles and air-powered tools. Locate mechanical equipment on mounts designed to isolate structure-borne vibration and noise. Similarly, locate this infrastructure as far as possible away from sensitive receptors. All activities at the plant must abide by the Gauteng Noise Control regulations promulgated in terms of the Environment Conservation Act of 1989. Noise levels shall be kept within acceptable limits, and construction crew must abide by local by-laws regarding noise Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Acoustical mufflers (or silencers) should be considered on equipment exhausts.
			WM	12	Negligible	
Air Quality						
9	Movement of vehicles on site during construction and release of emissions, demolition of buildings resulting in generation of dust	Air pollution	WOM	55	Moderate	<ul style="list-style-type: none"> During the construction phase, use water sprays on access area before grading, and at areas to be cleared of vegetation. Ensure exposed areas remain moist through regular water spraying. Moist topsoil will reduce the potential for dust generation when tipped onto stockpiles. Cover disturbed soils as completely as possible, using vegetation or other materials
			WM	28	Low	
Heritage						
10	Clearance of soils and vegetation for construction purposes, digging of trenches	Impact on heritage resources	WOM	7	Negligible	<p>A general watching brief monitoring process is recommended whereby an informed ECO inspects the construction sites on A regular basis in order to monitor possible impacts on heritage resources. Should any subsurface archaeological or historical material or heritage resources be exposed during construction activities, all activities Should be suspended and the archaeological specialist Should be notified immediately.</p>
			WM	7	Negligible	

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Socio-economic						
11	Increase in construction GVA	Impact on Economy	WOM	60	Moderate (positive)	Aim to employ as many people from the local community as possible
			WM	60	Moderate (positive)	
12	Increase in construction sector employment	Impact on Employment	WOM	40	Low (positive)	Expand current training programmes and offer skills development and transfer to enhance local employability, where feasible
			WM	40	Low (positive)	
13	Increase in job opportunities for women and the youth from previously disadvantaged communities.	Job Opportunities for Women and Youth	WOM	40	Low (positive)	Aim to employ as many people from the local community as possible
			WM	40	Low (positive)	
OPERATION PHASE						
Air Quality Impacts						
1	Operation of the plant with 30 m stack	Impacts on air quality and health	WOM	24	Low	<ul style="list-style-type: none"> The stack height option of 30 m must be chosen. An air quality monitoring system must be in place.
			WM	24	Low	
2	Operation of the plant with 30 m stack - upset (or start-up) conditions	Impacts on air quality and health	WOM	45	Moderate	Interlocking systems and upset operation management procedures successfully implemented. A-Thermal currently employs an interlocking feed system, which would similarly be applied for the proposed Project. The system is based on a continuous gas analyses and combustion temperature monitoring. If the gas concentrations reach 90% of the MES limit, the feeds are stopped. In addition, the waste feed is interlocked to temperature conditions to ensure that no material is fed when the temperature is too low. The secondary control measures include sorbent inject rate according to emission requirements (for SO ₂ and HCl), and preventative maintenance procedures.
			WM	26	Low	

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3	Cumulative impacts: Greenhouse Gas Emissions and Odours from Landfills	Reduction of overall greenhouse gases and nuisance odours from landfills	WOM	75	High (positive)	n/a
			WM	75	High (positive)	
Water Resources						
4	Incorrect storage of fuel	Surface water pollution	WOM	48	Moderate	<ul style="list-style-type: none"> Storage areas must be bunded in order to contain dirty runoff from these areas. Contaminated runoff should not be allowed to enter the municipal storm water management system and /or released into the environment. The stormwater management system must be regularly monitored and maintained; especially any discharge and damaged areas must be repaired if and when required. No substances other than uncontaminated rainwater may be channelled via the stormwater drainage system. For the purposes of the upgrade, an additional monitoring borehole must be drilled downstream of the site. The current groundwater monitoring programme must continue with the addition of the downstream borehole into the monitoring programme A waste storage facility must have effective access control to prevent unauthorized entry. Weatherproof, durable and legible signs in at least 3 official languages applicable in the area must be displayed at each entrance to the facility. The signs must indicate the risks involved in entering the site, hours of operation, the name, address, telephone number and the person responsible for the operation of the facility as a minimum.
			WM	14	Negligible	
5		Groundwater pollution	WOM	48	Moderate	
			WM	14	Negligible	
6	Incorrect storage of by-products	Surface water pollution	WOM	48	Moderate	
			WM	14	Negligible	
7		Groundwater pollution	WOM	48	Moderate	
			WM	14	Negligible	
8	Incorrect storage of waste and spillages of chemicals	Surface water pollution	WOM	56	Moderate	
			WM	13	Negligible	

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9		Groundwater pollution	WOM	56	Moderate	<p>Classification of waste</p> <ul style="list-style-type: none"> All waste generated on site, must be classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation, except if waste generated is listed in Annexure 1 of GNR 634. <p>Labelling</p> <ul style="list-style-type: none"> Any container or storage impoundment holding waste must be labelled in accordance with GNR 634. <p>Storage requirements</p> <ul style="list-style-type: none"> A waste storage facility must be free from odour or emissions at levels likely to cause annoyance. Waste must be sorted at source into various categories (recyclables and non-recyclables) and a documented procedure must be implemented to prevent any mixing of hazardous and general waste. Waste storage areas must be bunded in order to contain dirty runoff from these areas. Areas around the storage areas must be maintained so that they are in a clean, and neat condition at all times. Any spillages of waste must be cleaned up and placed in the waste skips. Skips must not be allowed to overflow and must be removed once they are full. <p>Storage of hazardous waste</p> <ul style="list-style-type: none"> The design, construction and operation of all equipment and facilities, required for the effective collection, containment, control and disposal of hazardous waste must at all times comply to applicable environmental legislation and SANS codes. The storage area for hazardous waste must be placed on a roofed, and impermeable and chemical resistant surface. Storage areas must be on a concrete surface. These areas must be accessible for trucks to load the hazardous waste. Hazardous waste must be treated differently as compared to general waste due
			WM	13	Negligible	
10	Release of contaminated stormwater into surroundings	Surface water pollution	WOM	64	High	
			WM	22	Low	

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11	Groundwater pollution	WOM	64	High	<p>to its potential toxicity or hazardous nature and effects.</p> <p>Stormwater management</p> <ul style="list-style-type: none"> • The migration of leachate or spillage into the ground and groundwater regime around all temporary storage areas must be prevented. • Contaminated runoff should not be allowed to enter the municipal storm water management system and /or released into the environment. • The stormwater management system must be regularly monitored and maintained; especially any discharge and damaged areas must be repaired if and when required. No substances other than uncontaminated rainwater may be channelled via the stormwater drainage system. <p>Liquid waste</p> <ul style="list-style-type: none"> • Liquid waste storage areas must have firm, impermeable, chemical resistant floors and a roof. Liquid waste containers that are not stored under a roofed area must be coated to prevent direct sunlight and rain water from getting in contact with the waste. • A liquid waste storage facility must be surrounded by an inception trench with a sump for intercepting and recovering potential spills and must be lined. <p>Domestic Waste</p> <ul style="list-style-type: none"> • All domestic waste (office waste) to be placed in allocated bins for collection from various points on a specified day. • All domestic waste containers must have a closing mechanism to prevent windblown litter. • The area must at all times be free of litter or improper storage of waste. <p>Hazardous substances</p> <ul style="list-style-type: none"> • Special attention must be given to the requirements as laid down in The Hazardous Substances Act (Act 15 of 1974) – Government Notice No. R453 25/03/77 Section 10. • All drums / containers to be re-used for containing the same waste product of the product which was originally delivered in the container. Care shall be taken to re-use the containers ONLY for the waste of the same material that was supplied in it. • All surplus drums/containers must be collected for re-use. • No empty drums having contained hazardous substances may: <ul style="list-style-type: none"> o Be washed out in the working place where they were used
		WM	22	Low	

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						<ul style="list-style-type: none"> o Be buried o Be discarded on to any dump o Be used to contain water • All empty drums/containers, which are not of any use, will be stored in a designated area, to be returned to the supplier, or for removal by an authorised/permited waste removal contractor for disposal or recycling. • For the purposes of the upgrade, an additional monitoring borehole must be drilled downstream of the site. • The current groundwater monitoring programme must continue with the addition of the downstream borehole into the monitoring programme • Refer to Waste Management Procedure (C-ATH-SHEQ-OP-07) for additional mitigation
Traffic Impacts						
12	Daily increase in trucks	Traffic impact on intersections	WOM	18	Negligible	With background traffic growth road upgrades are required. The upgrades required at the intersection of Glen Avenue and Porcelain Road is required as result of background traffic growth and not as result of the additional traffic from this expansion project
			WM	9	Negligible	
13	Holding and queuing of additional trucks	Impact of parking in the road reserve	WOM	45	Moderate	In terms of the South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, TMH 16 Volume 2(7) the following is proposed for the access: <ul style="list-style-type: none"> • Incoming lane: 1 x 3.5m (4.5m road width clearance) • Outgoing lane: 1 x 3.5m (4.5m road width clearance) • Separate pedestrian gate • Stacking length: 22m from the road reserve of Keramiek Road
			WM	18	Negligible	
Socio-economic Impacts						
14	Increase in utility GVA	Impact on the Economy	WOM	64	High (positive)	The impact will be improved by the increase in throughput of waste.
			WM	64	High (positive)	

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15	Increase in utility sector employment	Impact on Employment	WOM	56	Moderate (positive)	<ul style="list-style-type: none"> • Aim to employ as many people from the local community as possible
			WM	56	Moderate (positive)	
16	Continue training locally employed community.	Up-Skilling the Local Community	WOM	32	Low (positive)	<ul style="list-style-type: none"> • Establish a skills desk at the nearby townships of Tembisa and Ivory Park • Identify individuals who could potentially be upskilled and employed at the plant • Prioritise employment from the local community
			WM	32	Low (positive)	
17	Sponsoring local community events and holiday work programmes for students	Local Community Upliftment	WOM	26	Low (positive)	<ul style="list-style-type: none"> • Identify individuals who could potentially be upskilled and employed at the plant
			WM	26	Low (positive)	
18	The production of carbon and unlocking its value-chain	Carbon Value Chain	WOM	52	Moderate (positive)	n/a
			WM	52	Moderate (positive)	
19	Reduce stack plume visibility	Stack Aesthetics	WOM	36	Low (positive)	<ul style="list-style-type: none"> • The stack height option of 30 m must be chosen. • An air quality monitoring system must be in place.
			WM	36	Low (positive)	
20	Greenhouse Gas Emissions	Reduction of overall greenhouse gases	WOM	64	High (positive)	n/a
			WM	64	High (positive)	
21	Power generation from non-fossil fuels	Reduction in overall emissions due to cleaner power generation	WOM	75	High (positive)	n/a
			WM	75	High (positive)	

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10.3 Cumulative Impacts

It was shown in the Air Quality Impact Assessment (Airshed,2021) that the contribution of current emissions from A-Thermal to the study area's air concentrations for NO₂, CO, SO₂, VOC and PM10 varies between 8% to 30% for short-term (hourly average) impacts nearby the facility (less than 300 m). Further from the project, at the nearby sensitive receptors, the contributions are significantly lower and varies between 0.6% and 3% for the annual averages. At the Olifantsfontein AQMS the contribution from A-Thermal is in the order of about 1% for NO₂, SO₂ and VOCs and less than 0.1% for PM10.

Although it is predicted that the air pollution from the proposed Project will be lower for short-term exposures, it is not expected to make significant difference in the study area other than nearby the plant itself (i.e. less than 500 m). The predicted changes at the sensitive receptors are small compared to the contributions from other sources and it is expected to essentially remain the same. For more information refer to Appendix 16 (Air Quality Impact Assessment) of this report.

Overall reduction in Greenhouse gas (GHG) emissions

Greenhouse gas (GHG) emissions calculations show that thermal desorption results in lower GHG emissions than landfilling (refer to Section 3.2.12).

Reduction of Nuisance Odours from Landfills

Refer to Section 5.1.6. The project will result in an overall reduction of waste to landfill, and therefore a reduction of nuisance odours from landfills.

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10.4 Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

Table 10-4: Specialist summary

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE BASIC ASSESSMENT REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Air Quality Impact Assessment (Airshed, 2021)	<p>The contribution of current emissions from A-Thermal to the study area’s air concentrations for NO₂, CO, SO₂, VOC and PM₁₀ was estimated to vary between 8% to 30% for short-term (hourly average) impacts nearby the facility (less than 300 m). Further from the Project, at the nearby sensitive receptors, the contributions were estimated to be significantly lower and varied between 0.6% and 3% for the annual averages. At the Olifantsfontein AQMS the contribution from A-Thermal was shown to be in the order of about 1% for NO₂, SO₂ and VOCs and less than 0.1% for PM₁₀.</p> <p>Although it is predicted that the air pollution from the proposed project will be lower for short-term exposures, it is not expected to make significant difference in the study area other than nearby the plant itself (i.e. less than 500 m). The predicted changes at the sensitive receptors are small compared to the contributions from other sources and it is expected to essentially remain the same. The project is far more beneficial to the environment than landfilling of waste</p>	X	Section 10.2, 11.4, 11.5.1 and Appendix 19.
Ecological Impact Assessment (Exigo, 2019)	<p>It is evident that the proposed development site has the potential for negative impact on the flora and faunal of the study area, although the impact potential is low considering the degraded state of the site.</p> <p>Many threatened species are grassland species, linked to these habitats either for breeding, feeding or shelter. Impacts on the surrounding natural grassland should be avoided wherever possible during construction.</p>	X	Section 10.2, 11.4 and Appendix 19.

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	<p>Existing hydrodynamics must be protected to ensure that water regimes in the larger area are maintained.</p> <p>Ecological monitoring is recommended for the construction phase of the development. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the construction phase of the development site should be considered a high priority. The proposed site for the development varies from being in a degraded state to modified.</p>		
Archaeological Impact Assessment (Exigo, 2019)	<p>The proposed Project area is situated in environments that have been transformed and degraded as a result of urbanization and as such, no archaeological objects or sites, or features of heritage potential were noted during the site survey of the development footprint. It might be assumed that these areas have largely been sterilized of heritage remains, especially those dating to prehistorical times. The following general recommendations are made based on general observations in the proposed project footprint area:</p> <ul style="list-style-type: none"> A general watching brief monitoring process is recommended whereby an informed ECO inspects the construction sites on a regular basis in order to monitor possible impacts on heritage resources. Should any subsurface archaeological or historical material or heritage resources be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately. 	X	Section 10.2, 11.4 and Appendix 19.
Palaeontological Impact Assessment: Phase 1 Field Study (Dr H Fourie, 2020)	<p>The project area is situated on the Malmani Subgroup rocks with the Vryheid formation to the east. Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity can generally be low to very high, and here locally high for the Malmani Subgroup (SG 2.2 SAHRA APMHOB, 2012). Fossils were not found during the walk through of the site.</p>	X	Section 8.12 and 10.1.1.9 and Appendix 19
Traffic Impact Assessment (CHavenga, 2019)	<p>In terms of the SA Traffic Impact and Site Traffic Assessment Manual an assessment is only required if the additional hourly vehicular trip generation exceeds 50 trips. The additional peak hour trips are not expected to exceed this.</p>	X	Section 10.2, 11.4 and Appendix 19.

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	<p>With background traffic growth road upgrades are required. The upgrades required at the intersection of Glen Avenue and Porcelain Road is required as result of background traffic growth and not as result of the additional traffic from this expansion project.</p> <p>The following is recommended:</p> <ul style="list-style-type: none"> • The access be upgraded as follows: <ul style="list-style-type: none"> ○ Incoming lane: 1 x 3.5m (4.5m road width clearance) ○ Outgoing lane: 1 x 3.5m (4.5m road width clearance) • Separate pedestrian gate • Stacking length: 22m from the road reserve of Keramiek Road • Provision must be made on site for dropping-off and picking-up of staff using bus services/staff transport. 		
Socio-Economic Impact Assessment (Urban-Econ, 2020)	<p>The identified impacts indicate that the A-Thermal upgrade will predominantly have a positive influence on the natural environment and community. These benefits include growth in the local economy and increased job opportunities near existing labour pools, as well as local community upliftment through skills development and community sponsorships. The upgrade will further reduce greenhouse gas emissions and improve the aesthetics of the operation. Based on these findings, the study indicates that, given the socio-economic impact perspective, the A-Thermal upgrade should be supported.</p>	X	Section 8.13, 10.1.1.10 and 10.1.2.4 and 10.2 and Appendix 19
Stormwater Management Plan (Hydrological Assessment)	<ul style="list-style-type: none"> • The run-off peak flows from this proposed development was designed to be in accordance with the prescribed General Storm Water Management requirements of the Ekurhuleni Metropolitan Municipality. The storm recurrence interval used for determining the sizing of the structures was in accordance with WRC Draft SUDS Guidelines. • The structures were designed to manage the 1:100 year storm water peak for Post-development conditions to be equal or less than 1:25 year storm water peak for Pre-development conditions. The Post-development discharge directly into the Municipal system will not be more than the 1:5 year peak for Pre-development conditions. • The ponds were designed to intercept all storm water from the area of the proposed development and transport it safely to the lowest retention pond 3 from where it will be discharged at a lower flow rate. 	X	Section 10.1.1.6, 10.1.2.2, 10.2 and Appendix 19

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	<ul style="list-style-type: none"> • The storage capacity of the proposed ponds (1682 m³) is more than what is needed to satisfy the requirements as detailed in the prescribed General Storm Water Management requirements of the Ekurhuleni Metropolitan Municipality (1 277 m³). • The ponds will not store water permanently. The total surface area of the embankments of the pond will be hardened to prevent erosion and flood damage and will be lined with a non-erodible surface such as Armoflex Grass Blocks or Hyson Cells Grass Blocks. The inlet and outlet structures in the pond will be constructed as shown to enable easy cleaning of the sand traps. • Three Triple Separators will be installed. The Separators will ensure that no dirty water such as oil leaks from trucks etc. will contaminate the stormwater run-off. • It is of prime importance that the storm water management system is well maintained and operated in accordance with the intentions of the design. 		
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Attach copies of Specialist Reports as Appendix 6 - 10.

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11 Screening Report Requirements

The following Specialist Assessments were included in the DEA Screening Report (as required in terms of Section 24(5)(h) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations, 2014, as amended.

Table 11-1: List of Specialist Assessments and reference in the report

Name of specialist Assessment	Reference to Applicable Section of report where Specialist Studies have been included
Agricultural Impact Assessment	Appendix 6 (A Compliance Statement has been included)
Landscape/Visual Impact Assessment	Appendix 7 (A Compliance Statement has been included)
Archaeological and Cultural Heritage Impact Assessment	Appendix 8
Palaeontology Impact Assessment	Appendix 9
Terrestrial Biodiversity Impact Assessment	Appendix 10 (Included within the Ecological Assessment)
Aquatic Biodiversity Impact Assessment	Appendix 11 (A Compliance Statement has been included)
Hydrology Assessment	Appendix 12 (Stormwater Management Plan)
Noise Impact Assessment	Appendix 13 (A Compliance Statement has been included)
Traffic Impact Assessment	Appendix 14
Health Impact Assessment	Appendix 16 (Health screening impacts are included in the Air Quality Impact Assessment)
Socio-Economic Assessment	Appendix 15
Ambient Air Quality Impact Assessment	Appendix 16 (Included in the Air Quality Impact Assessment)
Air Quality Impact Assessment	Appendix 16 (Included in the Air Quality Impact Assessment)
Plant Species Assessment	Appendix 10 (Included within the Ecological Assessment)
Animal Species Assessment	Appendix 10 (Included within the Ecological Assessment)

11.1 Environmental impact statement

11.1.1 Summary of the key findings of the environmental impact assessment;

Construction Phase

Impacts of Moderate significance prior to mitigation can be mitigated to Low or Negligible which include the following:

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- Clearing of vegetation for development, access roads etc resulting in direct habitat modification and habitat fragmentation.
- Continued movement of personnel and vehicles on and off the site during the construction phase, as well as occasional delivery of materials required for maintenance resulting in spread of alien invasive species.
- Construction of infrastructure, access roads etc., developments resulting in negative effects of activities on the ecosystem.
- Exposure of soils to rainfall and wind during construction resulting in soil erosion and sedimentation.
- Poor management and disposal of solid waste and potential spillages resulting in soil and water pollution.
- Movement of vehicles on site during construction and release of emissions, demolition of buildings resulting in generation of dust.
- Construction of infrastructure and upgrade of the plant resulting in noisy activities during construction (e.g. drilling, hammering, etc.)
- Clearance of soils and vegetation for construction purposes and digging of trenches resulting in an impact on heritage resources.

The Positive Socio-economic impacts include:

- Increase in construction Gross value added (GVA) -moderate positive impact
- Increase in construction sector employment - low positive impact
- Increase in job opportunities for women and the youth from previously disadvantaged communities - low positive impact.

Operation Phase

Impacts of High and Moderate significance prior to mitigation can be mitigated to Low or Negligible which include the following:

- Air Quality: operation of the plant with a 30 m stack.
- Air Quality: operation of the plant resulting in upset (or start-up) conditions.
- Incorrect storage of fuel resulting in surface water and groundwater pollution.
- Incorrect storage of by- products resulting in surface water and groundwater pollution.
- Incorrect storage of waste and spillages of chemicals resulting in surface water and groundwater pollution.

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- Release of contaminated stormwater into the surroundings resulting in surface water and groundwater pollution.
- Traffic: daily increase in trucks.
- Traffic: holding and queuing of additional truck.

Positive impacts include:

- Cumulative impacts: Reduction in Greenhouse Gas Emissions and Odours from Landfill - high positive impact
- Increase in utility GVA- high positive impact
- Increase in utility sector employment- moderate positive impact
- Continue training locally employed community - low positive impact
- Sponsoring local community events and holiday work programmes for students- low positive impact
- The production of carbon and unlocking its value-chain- moderate positive impact
- Reduce stack plume visibility- low positive impact
- Reduction of Greenhouse Gas Emissions- high positive impact
- Power generation from non-fossil fuels and reduction in overall emissions due to cleaner power generation high positive impact.

11.2 Final Site Map

Please refer to Figure 11-1 and Appendix 4.

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Legend New Infrastructure Existing roadway Existing Infrastructure Ecological Sensitivity Low Sensitivity - Degraded / modified land A-Thermal	Aerial map		 70 Regency Drive, Route 21 Business Park, Centurion, 0178 Tel: +27 12 751 2160 Fax: +27 86 607 2406
	Client A-Thermal Retort Technologies	Project A-Thermal BA	
	0 15 30 60 Meters	Compiled by C Da Camara	Projection
	Date 2019-11-11	Datum WGS 84	

Figure 11-1: Final Site Map

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11.3 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

Please refer to Section 11.1.1.

11.4 Proposed Impact Management Objectives and the Impact Management Outcomes for Inclusion in the EMPR

Please refer to Section 11.1.1. Also note the following objectives for the project:

Construction Phase

- Exposure of soils to rainfall and wind during construction can be mitigated by ensuring effective stormwater management, rehabilitation of disturbed areas and implementation of stringent erosion and dust control practices.
- Clearing of vegetation for development resulting in direct habitat modification and habitat fragmentation can be mitigated by the removal of vegetation on the development footprint area only and rehabilitation of disturbed areas with indigenous vegetation.
- Continued movement of personnel and vehicles on and off the site during the construction phase, resulting in spread of alien invasive species can be mitigated through rehabilitation of disturbed areas, and eradication of invasive species.
- Construction of infrastructure resulting in negative effects of activities on the ecosystem can be mitigated by means of raising awareness and providing environmental training to employees.
- Poor management and disposal of solid waste resulting in soil and water pollution can be mitigated through the implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility.
- Movement of vehicles on site during construction, demolition of buildings resulting in generation of dust can be controlled by applying effective dust suppression methods.

Operation Phase

- Release of contaminated stormwater into the surroundings resulting in surface water and groundwater pollution can be mitigated through the implementation of an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste.
- Air Quality from emissions generated from the plant can be managed and mitigated by implementation of an Air Quality Monitoring Programme, which includes continuous emission monitoring system (CEMS), abatement equipment for power generation, the increased stack height, and the ongoing compliance to the Air Emissions Licence currently in place.
- Incorrect storage of fuel (resulting in surface water and groundwater pollution can be mitigated through secondary containment system such as the bunding of storage areas to contain potential spills and dirty water runoff.

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- Incorrect storage of by- products resulting in surface water and groundwater pollution can be mitigated by implementing an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste as prescribed in established procedures.
- Incorrect storage of waste and spillages of chemicals resulting in surface water and groundwater pollution can be mitigated through the implementation of an effective Stormwater Management Plan and the correct storage and handling of dangerous goods and waste as prescribed in established procedures. Storage will be done as per current license and legal requirements including the National Norms and Standards for the Storage of Waste.
- With regard to an increase of traffic, holding and queuing of additional trucks can be mitigated through the correct design width of the incoming and outgoing lanes (e.g. 4.5m road width clearance), a separate pedestrian gate, and stacking distance of 22m from the road reserve of Keramiek Road.

11.5 Monitoring Programmes

11.5.1 Air Quality Monitoring Programme

- The Air Quality Monitoring Programme will continue according to the requirements applicable to Category 8.1⁶ - Thermal Treatment of Hazardous and General Waste.
- A-Thermal's current Air Emission Licence would be updated to reflect the upgrade to power generation.

11.5.2 Groundwater Monitoring Programme

- Continuous evaluation of the existing monitoring network will take place to monitor groundwater quality overtime. The monitoring for groundwater are to detect significant changes in background groundwater quality, detect adverse groundwater impacts caused by the project activities as soon as possible, compare the observed changes in groundwater levels, spring flow, and groundwater quality to those predicted in the environmental and social impact assessment, to provide information to refine and improve the calibration and predictions of the groundwater flow model, and to provide information that can be used to guide continuous improvement in groundwater management approach and actions.
- The current groundwater monitoring programme must continue.

⁶ Listed Activities and associated minimum Emission Standards identified in terms of Section 21 of the National Environmental Management Air Quality Act, 2004 – GNR 893 published in the Government Gazette 37054 on 31 March 2010

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11.5.3 Surface Water Monitoring Programme

- During the first annual rain event, as is currently being implemented, a surface water sample must be taken to analyse possible pollutants in the stormwater.
- The stormwater management system must be regularly monitored and maintained; especially any discharge and damaged areas must be repaired if and when required. No substances other than uncontaminated rainwater may be channelled via the stormwater drainage system.

11.6 Aspects for inclusion as conditions of Authorisation

Any aspects which must be made conditions of the Environmental Authorisation

All mitigation as listed in Section 11, 11.4 and 0 must be adhered to. In addition:

- A Stormwater Management Plan must be implemented for the site.

11.7 Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measures proposed)

There is an inherent level of uncertainty in impact assessment, as impact assessment essentially aims to determine what would happen in the future, and is thus associated with unforeseen and unforeseeable events. This uncertainty cannot be reduced by doing more research and has to be addressed by acknowledging the assumptions, uncertainties and gaps in knowledge associated with an impact assessment study (Thissen & Agustinata, 2008).

The conclusions and recommendations made in this impact assessment have to be routinely verified through monitoring exercises during the construction and operational phases of the proposed project, as measuring the actual impacts of a development as they occur is the only undisputable way of showing which impacts are of an acceptable significance and which impacts may require additional or adapted management measures in order to reduce their physical, measured impact.

Thus while this report was compiled with due regard to public consultation, authority consultation, specialist input and in accordance with the relevant legislation, it cannot be seen as a “promise” of what is going to happen, but rather should be seen as a scientific prediction of the most likely significant effects that could be brought about by the proposed project based on current knowledge.

The detailed specialist studies referred to the adequacy of their predictions. Where an uncertainty existed the precautionary principle was applied and the impact rated with a higher significance.

11.8 Reasoned opinion as to whether the proposed activity should or should not be authorised

The proposed upgrade should be authorised in view of the fact that there are no fatal flaws foreseen for the project, is aligned with government’s waste management strategy, promotes economic growth, and that the impacts associated with the proposed upgrade can be managed and mitigated effectively to prevent harm to the environment and/or risk to neighbouring communities.

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The specialist studies support the opinion that the proposed upgrade is beneficial to the community and the environment.

Specifically, it is noted by an additional study in the Air Quality Assessment that was undertaken, that thermal treatment of waste types at the A-Thermal facility in Olifantsfontein produces less GHG than any other treatment/disposal methods currently available.

As stated in Section 4, energy recovery is in line with government policy relating to the recovery / beneficiation of products from wastes and hazardous wastes, since waste-to-energy initiatives are robust and effective alternative energy options to reduce CO₂ emissions and replace the use of fossil fuels. Energy recovered from the process will assist with supplementing of power shortages currently experienced in South Africa.

The proposed upgrade supports internationally accepted principles of best environmental practice and sustainable waste management, that will contribute to the minimisation of waste to landfill, whilst improving the current gas cleaning technology, already utilised at the facility. The facility produces no effluent and as such poses no risk of generating or discharge of wastewater. The proposed upgrades will enable implementation of government policies for waste management options that are consistent with the principles of the waste management hierarchy.

As indicated above, the assessment concludes that the impacts identified in respect of the proposed upgrade will predominantly have a positive influence on the natural environment and will promote socio-economic development by stimulating growth in the local economy, creating job opportunities near existing labour pools, and uplifting the local community through skills development and community sponsorships.

11.9 Period for which the Environmental Authorisation is required

A-Thermal is proposing to upgrade its existing operations. The proposed upgrade is to allow for the following:

- Energy recovery: For the feasibility of power generation, the treatment capacity will be increased and will be a mix of general and hazardous wastes.
- The proposed project includes additional abatement technologies in line with international standards.

The Environmental Authorisation (EA) is for the continued operation of the A-Thermal Plant. It is requested that the EA is authorised for the maximum possible time period.

11.10 Undertaking

(Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report).

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The undertaking is applicable to both the Basic assessment report and the Environmental Management Programme report.

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The EAP herewith confirms:

- i) the correctness of the information provided in the reports
- ii) the inclusion of comments and inputs from stakeholders and I&APs ;
- iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and
- iv) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein.



Signature of the environmental assessment practitioner:

Exigo Sustainability (Pty) Ltd

Name of company:

3 March 2021

Date:

-END-

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13 APPENDICES

Appendix 1: EAP's Qualifications and CV

A-Thermal Retort Technologies Basic Assessment Report

Appendix 2: Company Profile & EAP's Curriculum Vitae

A-Thermal Retort Technologies Basic Assessment Report

Appendix 3: Locality Map

A-Thermal Retort Technologies Basic Assessment Report

Appendix 4: Site Plan

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Appendix 5: A-Thermal Waste Management Procedure (C-ATH-SHEQ-OP-07)

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Appendix 6: Agricultural Assessment – Compliance Statement

A-Thermal Retort Technologies Basic Assessment Report

Appendix 7: Visual Assessment - Compliance Statement Plan

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Appendix 8: Archaeological Impact Assessment

A-Thermal Retort Technologies Basic Assessment Report

Appendix 9: Palaeontological Assessment

A-Thermal Retort Technologies Basic Assessment Report

Appendix 10: Ecological Assessment

A-Thermal Retort Technologies Basic Assessment Report

Appendix 11: Aquatic Assessment – Compliance Statement

A-Thermal Retort Technologies Basic Assessment Report

Appendix 12: Stormwater Management Plan

A-Thermal Retort Technologies Basic Assessment Report

Appendix 13: Noise Assessment -Compliance Statement

A-Thermal Retort Technologies Basic Assessment Report

Appendix 14: Traffic Impact Assessment

A-Thermal Retort Technologies Basic Assessment Report

Appendix 15: Socio-economic Impact Assessment

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Appendix 16: Air Quality Impact Assessment

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Appendix 17: Ground water Monitoring

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Appendix 18: Public Participation Documentation

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Appendix 18.1: Newspaper advert (2019)

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Appendix 18.1: Newspaper advert (2021)

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Appendix 18.2: Site notices

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Appendix 18.2: Delivery register

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Appendix 18.4: Notification letter for registration phase

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Appendix 18.4: Focus Group Meeting (Midstream Estates)

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Appendix 19: Environmental Management Programme Report (EMPR)

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Appendix 20: Incident and Environmental Incident log

INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	Corrective Action Taken <i>(Give details and attach documentation as far as possible)</i>	Signature

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