1. INVESTIGATION OF ALTERNATIVES

1.1. Introduction

The process requires that the development team investigates various means of achieving the general purpose and requirements of the development, in order to identify the lowest-impact alternatives which can be implemented, which are financially beneficial for the applicant. When identifying whether possible alternatives for implementation are both "reasonable" and "feasible" the team should consider: -

(a) the general purpose and requirements of the activity
(b) need and desirability
(c) opportunity costs
(d) the need to avoid negative impact altogether
(e) the need to minimise unavoidable negative impacts
(f) the need to maximise benefits; and
(g) the need for equitable distributional consequences (DEA 2014, p. 16).

A development team can investigate various types of alternatives, such as:

- Different sites on which to locate a development, especially if any of the sites investigated are identified as sensitive from a land use or natural or cultural resources perspective.
- Different development layouts to avoid any identified sensitive areas or receptors on or nearby a site.
- Technology alternatives, where some technologies may lead to excessive impacts such as air emissions, whilst other technologies may be ideal for minimizing such impacts.
- Activity alternatives, such as whether to smelt aluminium or whether to undertake an entirely different activity, depending on the market demand identified, the skills and resources of the developing entity, etc.

For the purposes of this application, **activity**, **process** and furnace and emissions abatement system **technologies** were considered by the development team. This is due to the need to produce a high-specification aluminium alloy; the market demand for aluminium alloy; and the potentially significant air quality impacts associated with a foundry.

1.2. Activity alternatives

Metals such as aluminium and copper are in high demand both in the local and in international construction and production industries. Producing these metals through a process of diverting scrap metal from landfill and adding to the waste-to-value chain, is a significant benefit for the environment. It is accepted that the carbon footprint of recycling metals is lower than the footprint associated with mining and processing the virgin metals.

Get Alloys has identified a need in the market for recovery facilities. The foundry is aimed at meeting that need. Get Alloys has also identified operational efficiencies and cost savings to be had with establishing multiple facilities across South Africa.

1.2.1. Negative impacts associated with the foundry activity

- Increased combustion emissions, as well as pollutant emission from burning the coatings off the scrap and from the additives used in the melt. These include sulphur dioxide, nitrogen dioxide and particulate matter, which are all considered as criteria air pollutants for their potential to adversely

impact air quality. Poor air quality has well-documented negative impacts on human and environmental health.
- Increased fugitive dust emissions from material handling at the site. Dustfall similarly has the potential to impact air quality adversely.
- The foundry will have associated additional trucks on the road, transporting scrap aluminium and copper to the plant while also transporting alloy to customers. There will be associated exhaust emissions and contribution to road congestion.
- Risk of contamination of soil and groundwater associated with the bulk storage and handling of Hydrocarbons. The new foundry will be associated with bulk fuel storage tanks. If the tank bunding, tanks, fuel lines and other associated infrastructure are not monitored and maintained regularly, and if fuel storage and handling is not managed appropriately, infrastructure failure and unnecessary leaks and spills could cause soil or groundwater contamination.
- The foundry has significant associated risks in terms of health and safety of workers (working with extreme temperature machinery and molten metal; furnace emissions in the workplace; handling hazardous dross (corrosive; skin and lung irritant; potential for harmful and explosive fumes when wet).
- Impacts on the Biophysical Environment in respect of Botanical and Freshwater receptors.
- Noise impacts associated with the Construction and Operational phases of the proposed activity.
- Traffic impacts on the surrounding road networks both during the Construction and Operational Phases of the proposed activity.
- Impacts as a result of the underlain geological formations. The site is located within an area known to intercept with underlain dolomite formations which places the area at risk to the formation of sink holes.

The above list of possible adverse impacts associated with the foundry can reasonably be expected to occur with any industrial development. The impacts can all be readily managed with adherence to statutory air quality standards and best practice management measures. And additional heavy traffic on the roads is a roads authority challenge that needs to be addressed during road planning in order to support necessary industrial development.

1.2.2. Benefits associated with the foundry activity

- GeT Alloys will increase their market share and profitability. Not only will there be knock-on benefits for Get Alloys staff in terms of job and income security, and benefits to the owners of GeT Alloys, but the new plant will require the employment of potentially 50 new staff members.
- GeT Alloys provides a service to downstream production and construction industries. These are essential industries which support human activities.
- It can be argued that successful businesses in the Germiston Knights industrial area, could attract additional investment into the area: businesses which provide goods and services to GeT Alloys, the scrap providers (companies and individuals), and construction-related businesses which use GeT Alloys’ aluminium alloy and copper in their manufacturing and construction processes.
- An expanded and financially stable and profitable industry generates tax revenue for the government, which is an essential aspect of the economy.
- The metal recovery process has significant benefits in terms of the waste-to-value chain and diversion of waste from landfill and avoiding the impacts associated with mining and processing of virgin materials.

From the above investigation, GeT Alloys has determined that investigating other activities is not necessary for the purposes of this application. The activity of metal recovery is determined both reasonable and feasible with impacts that can be readily managed.

1.3. Site alternatives

When GeT Alloys reviewed their market position and demand for their products and determined that an expansion of operations would be necessary and profitable, they determined at that time that Germiston Knights industrial area, and specifically the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR, is the optimal location for the establishment of an alluminium recovery foundry.

<u>This is due to:</u>

1) Proximity to potential scrap material suppliers: there are many sources of scrap metal in the Gauteng region. As a result, GeT Alloys will have a stable supply of raw materials for their operation.

2) Proximity to customers: GeT Alloys' operational plant will be in close proximity to many potential clients as Gauteng is an industry hub in South Africa, and Germiston is a key industrial area.

3) Appropriate land use rights: the foundry has the potential to cause nuisance dust together with harmful combustion emissions and so can be considered a noxious activity. The un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR is zoned as an Industrial 1 zone.

   According to the City's Town Planning Scheme (2014), this zoning provides for noxious industries, which are defined as: -

   > *"activit(ies) where any one or more of the following activities are carried out: … smelting of ores and minerals; calcining; puddling and rolling of iron and other metals; … re-heating; annealing; hardening; forging; converting and carburizing iron and other metals…"* (p. 10).

   Applying to have a property rezoned is costly and time consuming. Also, there is the risk of ongoing complaints from neighbours if a noxious trade is established on an inappropriately zoned site. Therefore, GeT Alloys only investigated Industrial 1-zoned properties for their foundry. And the site is a suitable distance from the closest residences to avoid complaints.

4) Sensitive natural and cultural-historical environment features: an investigation of the site by the EAP using available desktop data, as well as input from a heritage specialist, showed that the site is not sensitive from a natural or cultural-historical perspective. This is elaborated on further in Section 7 of this report, and in the Site Sensitivity Verification Report contained in Annexure B1.

5) Buildings and past land use: the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR already has all the bulk engineering services infrastructure needed for the development of the foundry. There are also office and workshop buildings already on site, reducing the number of structures which need to be constructed to house the development. Further, the site has been used for industrial purposes for many years. The development of the foundry will thus be in line with the past land use practices of the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR.

6) Availability: and lastly, the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR was available for rent and Get Alloys are now in negotiations to buy the property.

From the above information on the suitability of the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR for this development, it is clear that there is no need to investigate alternative sites.

1.4. Process alternatives: dross recovery

The scrap aluminium melting process entails the production of dross as a by-product. The Get Alloys proposal includes a hot dross processing machine, which will extract about 10 - 15 % of the residual aluminium content in the dross as it is removed from the furnace. The recovered aluminium is returned as feedstock to the alloying process.

This represents a cost savings for Get Alloys, as well as having such materials- and waste management benefits as: reducing the bulk of the dross that is transported elsewhere for further recovery, thereby reducing transport costs and associated transport emissions; and providing an on-site feedstock, thereby reducing to a small extent, feedstock transportation costs and associated emissions.

Owing to these benefits, the aluminium recovery process being proposed, includes a dross recovery step.

1.5. Furnace types

GeT Alloys’ core business is the recycling of scrap metal (aluminium and copper) in order to produce aluminium alloy and copper for a variety of industrial applications. Before the alloys can be produced, the scrap metal needs to be melted, refined (“alloyed”) to customer specifications and cast into ingots.

GeT Alloys needs to choose a furnace for the melting, alloying and casting process that yields a high metal recovery rate; is cost effective to purchase and operate; parts and servicing for which are readily available; and which is appropriately designed to efficiently melt the particular metal, being aluminium and copper.

The technologies considered by Get Alloys include:

1. Rotary furnaces
2. Pit Furnaces, and
3. Vortex pump furnaces
4. Reverberatory furnaces

The viability of implementation of the above furnace technologies are detailed below.

1.5.1. Rotary furnaces[1]

Rotary furnaces comprise a “barrel” which rotates around an axis, moving the metal from one end of the barrel to the other for uniform heat distribution to aid efficient melting. The “barrel” can be electric- or combustion-heated. According to GETA’s design engineers, a rotary furnace does not have a sufficiently high metal recovery rate for their purposes.

1.5.2. Pit furnaces[2]

[1] https://thermcraftinc.com/working-principle-rotary-furnace/
[2] https://thermalprocessing.com/the-versatility-of-the-pit-furnace/

Pit furnaces (or top-loading furnaces) are more versatile than other furnace types. Due to their shape, they can accommodate dense loads, long loads, as well as processes involving many different shaped parts needing to be processed. Pit furnaces cover a relatively small footprint.

According to GETA's design engineers, a pit furnace does not have a sufficiently high metal recovery rate for their purposes.

1.5.3. Vortex pump furnaces

According to GETA's design engineers, the vortex pump furnace is more complex than other furnace types. The vortex pump furnace is a system which involves a number of steps: shredding of the scrap and separating out unusable material at the very start; and pre-heating the scrap, which burns off coatings to ensure that the scrap load into the vortex furnace itself is as clean as possible for rapid melting time and minimal dross production.

The vortex pump furnace then sucks the pre-treated scrap by means of an electromagnetic pump, into a vortex of already-molten metal The scrap is melted instantaneously.
Due to this pre-treating and instantaneous melting of the feedstock, the system has a high metal recovery rate; a low residence time of the feedstock in the vortex melting furnace; and the temperature of the molten metal stays uniform, providing constant and optimal operating conditions.

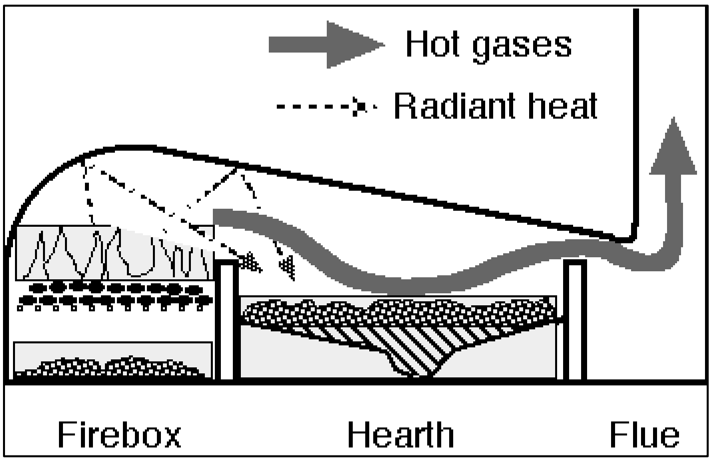
According to the engineers, the system is also energy efficient, since the hot flue gases from the vortex furnace are channelled to the scrap pre-treating system to pre-heat the scrap.

A significant consideration with a vortex pump furnace, however, is its high capital cost. Therefore, GETA has included in their proposal two reverberatory furnaces with which to start up the development, with the vortex pump furnace to be added when financially viable to do so.

1.5.4. Reverberatory furnace

A reverberatory furnace has a chamber for combustion of the fuel and a separate chamber for melting the scrap metal. This ensures that the combustion process is not in direct contact with the melt. The inner surfaces of the furnace chambers are made from bricks or a similar refractory surface, which directs the heat from the combustion chamber into the melt.

Figure 1 Typical reverberatory furnace[3]



[3] https://en.wikipedia.org/wiki/Reverberatory_furnace

GETA have used reverberatory furnaces with great success at their existing plant in Cape Town and so are satisfied with the metal recovery rate these furnaces can achieve; as well their cost to purchase and operate.

GETA has therefore included two reverberatory furnaces in the development proposal (each comprising an 8 tonne melting furnace and a 10 tonne holding furnace from which the melt is poured for casting purposes). The reverberatory furnaces are affordable for starting up the development, where after once financially viable to do so, the vortex pump system will be installed.

1.5.5. Conclusion

Based on the investigation into different furnace technologies, GeT Alloys has determined that the development proposal should include the installation of two reverberatory furnaces to begin with; to be followed when financially viable to do so, with the installation of a vortex pump furnace.

The reverberatory furnaces are a reliable and familiar technology which is fit-for-purpose for the scrap aluminium that GETA is proposing to process. Reverberatory furnaces are also affordable.

The vortex pump furnace system, whilst representing a high initial capital outlay, yields considerable operational efficiencies as well as fuel and so cost efficiencies. Use of hot flue gasses in the scrap pre-treatment process also represents an energy savings.

And because the system entails discrete steps and chambers for pre-processing the scrap, melting, holding and casting the aluminium, localized / targeted pollutant emissions abatement, which should be more effective, is possible.

Lastly, critical spares for the vortex pump furnace system and other maintenance support are readily available in South Africa. Therefore, the vortex pump furnace system is included in the foundry development proposal.

1.6. Emissions abatement technology

Air emissions from combustion of fuel to heat the furnace; toxic pollutants from burning off the coatings on the scrap (typically mineral oils and paints); and particulate emissions from the melt and from the casting process, have the potential to adversely impact ambient air quality. Emissions from the foundry therefore need to be treated in some way in order to reduce pollutant concentrations to within statutory limits before discharge to atmosphere.

The statutory limits for pollutants associated with scrap aluminium recovery using a combustion-heated furnace, which are contained in the Minimum Emissions Standards published in terms of the Air Quality Act, are:

Table 1: Statutory pollutant concentration limits for scrap aluminium recovery

Pollutant	**Emission concentration limit (mg/Nm^3 under normal conditions of 273Kelvin and 101.3kPa**
Particulate matter (PM)	30
Sulphur dioxide (SO2)	500
Oxides of nitrogen (NOx expressed as NO2)	50
Total fluorides measured as hydrogen fluoride (F as HF)	1
Total volatile organic compounds (TVOC)	40
Ammonia (NH3)	30

1.6.1. Consideration of emissions abatement technologies

Various technologies are available for emissions abatement. But not all technologies are suitable for a particular application, given the characteristics of the exit gases (heat, exit velocity, pollutant concentration, pollutant types) that need to be treated.

GeT Alloys' abatement system engineers considered such factors as:

- Whether the system is fit for purpose in terms of the foundry operating conditions
- Whether the system is efficient in treating scrap metal processing and melting emissions and can reduce pollutant concentrations to within statutory limits
- Affordability; and
- Availability of critical spares and maintenance support

A summary of the abatement systems investigated in included below with the detailed investigation assessment included thereunder.

Table 2: Ait Emissions Abatement saysment technology investigation summary

	TYPE OF EMISSIONS ABATEMENT SYSTEM	EFFICIENCY	ENERGY USAGE	MAINTENANCE REQUIREMENTS	SECONDARY EQUIPMENT REQUIRED	COST FACTOR	FURTHER NOTES
1	BAG FILTERS	HIGH	MEDIUM	HIGH - SUPPLIER SERVICING REQUIRED	COMPRESSED AIR SYSTEM	8	FILTERS LOSE EFFICIENCY OVER TIME
2	CYCLONE	MEDIUM	LOW	VERY LOW - ONLY FAN	NONE	3	PERFORMANCE CAN BE VARIABLE
3	SETTLING BOX	LOW	LOW	VERY LOW - ONLY FAN	NONE	1	CONSTANT PERFORMANCE. NOT EFFICIENT FOR SMALL PARTICLES
4	ELECTROSTATIC PRECIPITATOR	HIGH - MEDIUM	HIGH	HIGH - SUPPLIER SERVICING REQUIRED	COMPRESSED AIR SYSTEM	10	PERFORMANCE NOT ALWAYS CONSTANT
5	VENTURI SCRUBBER	VERY HIGH	HIGH	MEDIUM - SUPPLIER SERVICING REQUIRED	WATER FILTER, PUMP & CHEMICALS	10	HIGH kW FAN REQUIRED
6	WET IMPINGEMENT SCRUBBER	HIGH	LOW	LOW - INTERNAL MAINTENANCE REQUIRED	WATER FILTER, PUMP & LOW VOLUME CHEMICALS	5	SIMPLE OPERATION, SMALL FOOTPRINT
7	NORMAL WET SCRUBBER	MEDIUM - LOW	LOW	LOW - INTERNAL MAINTENANCE REQUIRED	WATER FILTER, PUMP & CHEMICALS	7	NOT EFFICIENT FOR PARTICLE REMOVAL, MORE FOR GASSES

1.6.2. Description of types of air emissions abatement systems

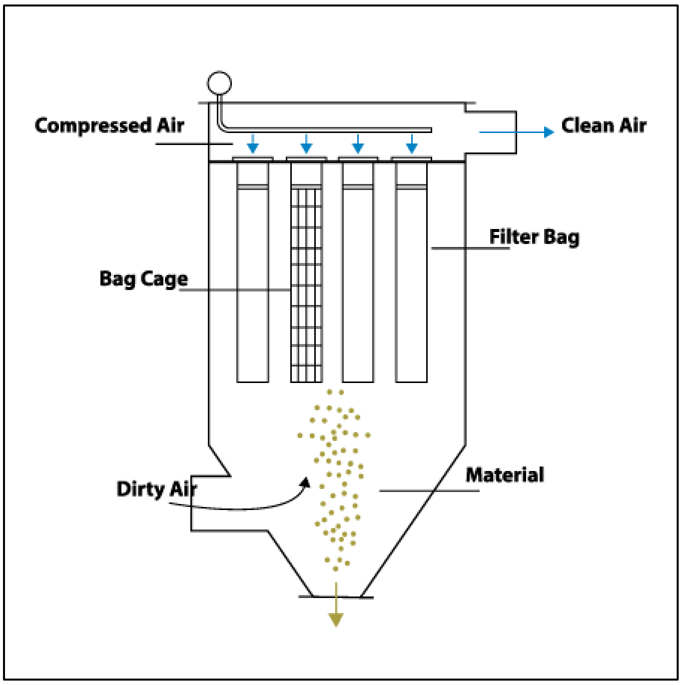
GeT Alloys' engineers investigated several different types of emission abatement technology that are suitable for the types of emissions discharged from the foundry, namely combustion emissions (PM, SO2, NOx, CO, etc.) and other emissions (TVOC's, NH3, HF). A brief description of each technology type follows. All of the abatement systems work on the principle that pollutant-laden exhaust gas from the dryer is forced through the system by means of an extraction fan. The system then treats the emissions, removing the pollutant particles in the gas stream, before the gas exhausts via a stack, or chimney, to atmosphere.

1.6.2.1. Bag filter

A bag filter system comprises a chamber containing multiple fabric filters. Exhaust gas from the dryer is forced through the filters by means of a fan. Particulate in the gas clings to the outside of the filter bags, whilst the treated gas exhausts to atmosphere. The particulate is removed from the exterior of the bags regularly and collected for disposal. Often, the bags are cleaned by means of a built-in shake-off or pulse system, whereby the bags vibrate and the particulate falls to a collector for disposal[4].

[4] https://www.britannica.com/technology/air-pollution-control/Scrubbers#ref1084073

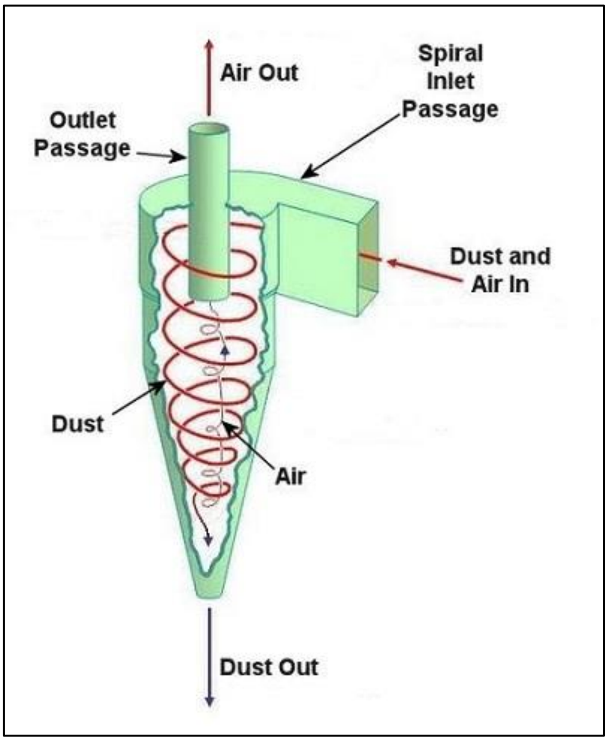
Figure 2: Typical bag filter[5]



1.6.2.2. Cyclone filter

A cyclone filter comprises a chamber with a spiral formation, which moves the exhaust gas from the dryer in a spiral vortex. Heavier particles in the gas stream have more inertia and so are not as easily influenced by the vortex. These heavier particles fall out of the gas steam to the sides of the cyclone chamber and down to a collector box. The lighter (cleaned) gas is more easily influenced by the vortex, which carries the lighter air up and out of the cyclone to exhaust to atmosphere via a stack[6].

Figure 3: Typical cyclone filter[7]



[5] https://www.indiamart.com/proddetail/bag-house-dust-collectors-13919316173.html
[6] https://energyeducation.ca/encyclopedia/Cyclone_separator
[7] http://www.engineeringexpert.net/Engineering-Expert-Witness-Blog/industrial-ventilation-%E2%80%93-local-exhaust-ventilation-filters-and-air-cleaners-ii

1.6.2.3. Settling box

A settling box or chamber is a simplistic system whereby pollutant-laden exhaust gas is directed through a chamber, which slows the velocity of the gas. At this slower velocity, particles are able to settle to the floor of the chamber via gravity[8].

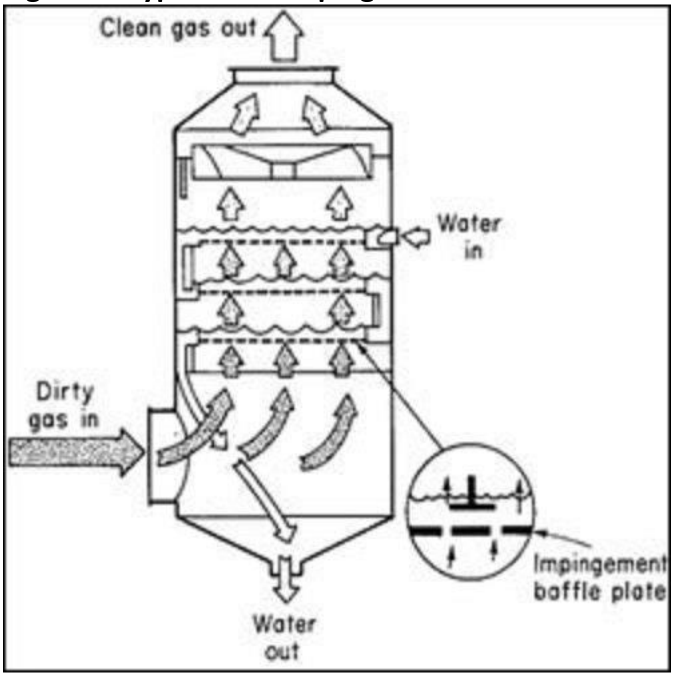
1.6.2.4. Electrostatic precipitator

Electrostatic precipitators function by means of charging the particles in the gas stream, and then removing the charged particles by means of an electric field. The ESP unit comprises a chamber in which are discharge electrodes – to which current is applied in order to charge the particles. Then there are oppositely charged collection electrodes in the chamber, to which the charged particles cling. The system also includes a dust collection system, and baffles for distributing airflow[9].

1.6.2.5. Wet scrubbers

A wet scrubber treats emissions through contact of the polluted gas stream with water or other liquids. Through contact, particles and gaseous pollutants become entrained in the solution and are thus removed from the gas stream. The scrubber solution is usually reused a number of times before being discharged as effluent to an appropriate effluent treatment system, or to sewer.

Figure 4: Typical wet impingement scrubber[10]



1.6.3. Preferred abatement system included in development proposal

GeT Alloys' engineers have indicated that a bag filter system is considered to be the most efficient system for use in a foundry application. They have advised as follows with regards to the system included in the development proposal:

Hall Fume Extraction:

- Each furnace will have its own dedicated hood extraction system. Each of the hood extraction elements will feed to a central extraction manifold where this gas will serve as the primary flue gas cooling medium. The hood system will include an automated pneumatic valve system that will increase extraction velocity whenever a furnace door is opened.

[8] https://authors.library.caltech.edu/25069/9/AirPollution88-Ch7.pdf
[9] https://www.britannica.com/technology/air-pollution-control/Scrubbers#ref1084073
[10] https://www.indiamart.com/proddetail/water-scrubber-8932167755.html

- In addition to the individual furnace extraction hoods, there will also be an apex extraction system to ensure fumes that have escaped the hood system will be drawn out in the apex of the structure.

Flue Gas Extraction:

- Furnace flue gases will be consolidated and blended into the main extraction system. This blending ratio will ensure that gas temperatures entering the baghouse filter will be below 180 degrees centigrade this system will have the added advantage of ensuring optimal air fuel mixtures for the furnaces resulting in a cleaner burn.
- The primary extraction fans will be located between the baghouse filtration and the stack. This will ensure negative pressure throughout the extraction system and the filtration of all air prior to expulsion.
- A section of the large non lagged ducting will be reused to increase the dwell time of the consolidated Flue gases allowing further cooling prior to blending with the Hall Fume cooling gases.

System Capacities:

- The system will be capable of extracting 30,000 Nm3/h air per hour and will be upgradable in 15,000 Nm3/h increments.

Baghouse Filtration:

- This installation will call for two standard 15,000 Nm3/h baghouse units that will operate in parallel. Each of the baghouse units will be equipped with 81 filtration elements offering a total filtration area of 160 m2 per unit.
- This system has been designed to ensure that there is air velocity of less than 1.3 metres per minute within the baghouse filtration chamber, which remains well below the permeability requirements for the filtration media.
- The system will be equipped with a reverse pulse bag cleaning system and hopper units for dust recovery.
- The filtration media will be Crosible Nomex with PTFE membrane

1.7. The No-Go Option

The No-Go Option is the alternative of not proceeding with the development, in this case the development of a foundry on the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR. The No-Go Option includes the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR remaining in its current state – a vacant factory.

1.7.1. Negative impacts associated with the No-Go Option

- From the investigation of the need and desirability of the development that has been undertaken in Section 7, the No-Go Option does not support the regional planning imperatives for the Germiston Knights and greater Ekurhuleni area in terms of investment in Germiston.
- The No-Go Option could curtail the profitability and therefore financial stability of GeT Alloys.
- The No-Go Option does not represent jobs and associated income, to the benefit of the surrounding Germiston community.
- There is market demand from the construction and manufacturing sectors for GeT Alloys' product, namely recycled aluminium alloy and copper. The No-Go Option would mean that necessary support for these sectors would not be realised.
- The South African scrap aluminium recovery industry would not receive much-needed investment and growth with the establishment of a technologically advanced foundry. The scrap could potentially need to be transported to other countries for processing.
- Increased pressure on the aluminium industry for the continued mining of aluminium at the detriment of the environment and natural stocks.

1.7.2. Benefits associated with the No-Go Option

- The additional air emissions and possible fugitive dust emissions associated with the proposed foundry would not occur associated with the No-Go Option.

The proposed development design, including appropriate process and abatement technology, as well as dust control measures, however, are expected to reduce emissions to within statutory and therefore acceptable limits. This benefit is not considered significant enough to warrant not developing the plant. The results of Air Quality Impact Assessment which will be undertaken for the EIA phase, are expected to support this finding.

- The identified health and safety risks associated with operating a foundry would not occur.

But these impacts can be readily avoided with standard, best-practice measures and adherence to statutory requirements contained in the Occupational Health and Safety Act. This benefit is therefore not considered significant enough to warrant not developing the foundry.

- The waterbodies and vegetation situated in close proximity to the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR would remain unharmed.

According to the Need and Desirability assessment and Site Sensitivity Verification Report that has been undertaken, however, the freshwater and vegetation sensitivity of most of the site is considered to be low to negligible. There is no natural vegetation in close proximity to the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR. The wetlands are also heavily transformed and more than 380 and 750m away from the site.

This benefit is therefore not considered significant enough to warrant not developing the foundry.

1.8. Public participation and the alternatives investigation process

During the public participation process to date, the only concern or issue raised that might influence the investigation of alternatives for this application, is the matter of the area's underlying geology being Dolomite. With Dolomite, there is an attendant risk of sinkholes occurring. At the request of the GDARD, a Dolomite Feasibility Investigation, as well as a Geotechnical Investigation, will be undertaken in order to inform the EIA phase of this application.

Should any specific design or layout measures be recommended by the specialists and engineers undertaking these studies, in order to avoid the risk to the facility posed by sinkholes, these measures will be included in the development proposal as preferred (required) design and / or layout alternatives.

During the upcoming EIA phase public participation process, significant queries or concerns or gaps in knowledge could be raised, which the project team needs to address. Such stakeholder feedback may result in the introduction of additional alternatives for investigation in the EIA process. Any such significant concerns, queries and identified appropriate alternatives, will be documented in the EIA phase of the application.

1.9. Concluding statement of preferred alternatives included in the development proposal

The development proposal that is being put forward for assessment during the EIA phase, is anticipated to be a low-impact proposal with the implementation of best practice technologies, basic fugitive dust control design measures, and operational-phase management procedures. This is due to the following investigations that have been undertaken by the development planning team in formulating the proposal:

1) The investigation of whether the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR, Germiston Knights is appropriate for a potentially noxious activity such as scrap aluminium and copper recycling, which is a heavy industrial activity with associated noise, combustion emissions dust emissions and heavy vehicle traffic for raw material and metal transportation to and from site.

2) The investigation of the negative impacts and benefits of developing GeT Alloys' foundry operation and their operational processes.

3) The investigation of alternative furnace types which can meet the operational efficiencies required by GeT Alloys, thereby ensuring that the operation can remain profitable, that fuel usage is not excessive, and that excessive pollutant emissions due to continued upset conditions can be avoided; and

4) The investigation of alternative emissions abatement technologies which can reduce pollutant emissions to within statutory limits.

In summary, then, the development proposal going forward is as follows:

- A foundry that will enable GeT Alloys to develop their operation in response to market demand.
- The plant will be situated on Industrial 1-zoned the un-subdivided portion of Remainder of Portion 1 of farm Driefontein No. 87-IR, Shaft Road, Germiston Knights Industrial area.
- The furnaces to be installed include *two reverberatory furnaces* and *one vortex pump furnace*, including *scrap pre-treatment process*, for aluminium melting; and *one furnace for copper melting*.
- The emissions abatement technology will be *a bag filter system* as described.