

## **Appendix N: Impacts Identified as Potentially Associated with the LCOA Woodchip Burn-off Pilot Plant**

The potential impact of an activity on the receiving environment where the activity is proposed to be undertaken is dependent on the nature of the activity, together with the nature of the receiving environment

### **1.1 Construction and Decommissioning Phases**

In terms of Construction Phase impacts associated with the LCOA's Woodchip burn-off pilot plant, these would have entailed standard construction-type impacts. If the facility is decommissioned at some time in the future, impacts are expected to be similar.

It should be noted that LCOA did not implement an Environmental Management Programme during the facility development. However, the establishment of the wood chip plant entailed site clearing and levelling, minor surfacing, and the assembly and erection of equipment and portacabins. These activities are considered to be small-scale and low intensity.

The following construction phase impacts are likely to have occurred:

#### **1.1.1 Waste Management**

During the Construction Phase, activities included walling the facility with vibracrete; clearing, levelling, compacting and surfacing the site with a layer of laterite ("subbase"); and laying a 20m x 20m concrete slab for the main operational area. No permanent structures or infrastructure were constructed.

The scale of these activities was very small with negligible quantities of associated waste: cleared vegetation and some soil, which are still located in an unused corner of the site. And possibly some "lunch waste", which would have been removed off site and disposed of into nearby municipal bins.

Similarly, site decommissioning would entail the removal of temporary structures (the portacabin and container laboratory), equipment), and possibly the breaking to slab with very minor associated rubble. The rubble could be sent to a recycler, or crushed on site and sold.

The general waste management measures applicable have been included in the EMPr contained in **Appendix I**.

#### **1.1.2 Ambient Air Quality**

During the Construction and Decommissioning Phases, dust was generated from associated activities on the concerned property, including construction vehicles and equipment moving to and from the property; construction of infrastructure; excavations; and stockpiling. Dust and vehicle exhaust emissions from site clearing, levelling, excavations, vehicles traversing

the sandy site, etc. The activity occurred in the Industrial Area of Atlantis where similar dust-generating activities occur.

Neil Hare Drive is already a heavy trafficked road and no complaints related to dust emissions, to date, was known to the applicant at the time. Additionally, construction activities were small scale in relation to other industrial activities in the area, given the footprint and scale of the Woodchip Burn-off Plant and the associated infrastructure required. The development entailed only the erection of infrastructure, with minimal site surfacing on a relatively small property. Additionally, the Woodchip Burn-off plant was not located in close proximity to residential neighborhoods.

It is expected that standardized, proven construction industry methods were implemented during the Construction Phase of the activity, in order to mitigate dust impacts. See the EMPr contained in **Appendix I**.

### **1.1.3 Noise Impacts**

The Construction and Decommissioning phase of the proposed LCOA's Woodchip Burn-off Plant would have and will entail the use of heavy machinery to construct/erect/dismantle buildings, dig excavations, pour concrete, etc. These activities generate noise which can potentially be a nuisance to the surrounding areas.

However, the impact on sensitive receptors is deemed to be minor given the location of the plant within the Industrial Area of Atlantis. Additionally, this potential impact can be mitigated during the decommissioning phase by implementing appropriate noise reduction and management measures, such as using modern equipment, which produces the least noise; and locating any unavoidably noisy equipment/machinery in areas where the impact will be least significant. These and other noise reduction measures have been included in the EMPr contained in **Annexure I**.

### **1.1.4 Soil and Groundwater Contamination**

The Construction phase of LCOA's wood burn-off plant entailed use of construction machinery and/or plant, with the potential for fuel-spill related soil and groundwater contamination. Umvoto found the probability of this to be Low, and the severity of the risk to be Negligible. During the decommissioning phase, appropriate construction management measures to avoid Hazchem and fuel-related contamination, should be implemented. See the EMPr contained in **Appendix I**.

### **1.1.5 Impacts on Heritage Resources**

Impacts on Heritage Resources such as Archaeological resources, Palaeontological Resources, Graves and Burial Grounds or Human Remains could have occurred as a result of the establishment of the woodchip burn-off plant. This impact is deemed to be negligible: the Notification of Intent to Develop (NID), which was compiled by a suitably qualified Heritage Specialist, confirmed that the concerned property only has a very limited chance of containing any significant Heritage Resources.

### **1.1.6 Biophysical Impacts (Terrestrial & Aquatic Biodiversity)**

The construction of the LCOA's woodchip burn-off plant on Erf 299 in Atlantis entailed levelling and removal of approximately 0.25 ha Medium sensitivity vegetation and faunal habitat; loss of about 0.75 ha of Low sensitivity vegetation and faunal habitat; all vegetation was of Endangered type; no plant or terrestrial animal Species of Conservation Concern were likely impacted or lost; no loss of mapped CBAs occurred. This biophysical impact was assessed to be of low significance in the Biodiversity Assessment compiled by Nick Helme Botanical Surveys, November 2020.

Similarly, the construction of the LCOA's woodchip burn-off plant on Erf 299 in Atlantis did have the potential of impacting freshwater receptors in the form of natural depression wetlands situated approximately 300 metres from the concerned property. A Section 21 (c) and (i) Risk Assessment was compiled by Confluent Environmental in April 2021, for the proposed activity, as it relates to the National Water Act for Section 21 (c) and (i) Water Uses.

The assessment found that the proposed activity fell well outside of the delineated area of the depression wetland. Given the large distance of the property from these wetlands as well as the flat topography of the surrounding area, the construction and operational impacts associated with the woodchip burn-off plant on these receptors are considered to be negligible.

## **1.2 OPERATIONAL PHASE**

The activity entailed the treatment of woodchip waste through burning off unwanted compounds and resizing the product for further off-site ore beneficiation / metal recovery. As such, activities associated with the plant which have been identified as possibly impacting on the surrounding environment (social, economic, and bio-physical) include:

- 1) Ambient Air Quality: Sulphur Dioxide, Nitrogen Dioxide, Particulate Matter and VOC's could have had associated localised negative health impacts at sufficiently high concentrations. Cumulative negative impacts on air quality in the region, in terms of negative health impacts for residents, that could potentially have been associated with unacceptably high concentrations of such emissions.
- 2) Health and safety of employees could have been potentially be affected operating heavy machinery, operating a high-temperature kiln, working in an environment where dust and combustion emissions and incineration emissions occurred. Other concerns were the (small-scale) handling and storage of dangerous Hydrocarbons.
- 3) Potential Traffic impact to the surrounding road networks as a result of the trucks associated with feedstock deliveries to the plant and with treated product deliveries from the plant.
- 4) Potential Noise impact related to the operation of the woodchip burn-off plant, which includes the use of trucks, TLB's, a combustion-heated kiln and milling/resizing operations (engine revving and idling; reverse signals; moving mechanical parts; etc.)

- 5) Potential Risk of Soil, Groundwater and Freshwater contamination due to handling and storage of Hydrocarbons.
- 6) Operational impacts to potentially sensitive Biophysical receptors including Botanical and Water Resources.

The following potential benefits were associated with the pilot woodchip burn-off plant:

- 1) The woodchip burn-off represented employment opportunities for workers in the waste treatment and ore processing industry.
- 2) The woodchip burn-off plant enabled LCOA to establish a company yielding income to the applicant.
- 3) The plant represented capital investment in the Atlantis area; and
- 4) The facility is a waste-to-value operation and promoted the circular economy. Forming part of the metal recovery process, the facility represented a lower carbon footprint than mining of virgin ore, as well as diversion of waste from landfill, thereby saving valuable and scarce landfill airspace.

The receiving environment is the developed Atlantis Industria area, zoned for Risk Industry and General Industrial use. Some undeveloped properties are located adjacent and nearby the site. Sensitive receptors to the impacts identified as potentially associated with the woodchip burn-off plant include:

- The health and safety of staff on the site
- The health of people working and living in the local Atlantis area
- On a cumulative basis, the health of residents in the Cape Town region
- Soil and water resources in the form of groundwater.

Those who may have benefited from the plant include semi-skilled and skilled workers in the waste industry in the Western Cape: the plant represented employment opportunities as well as capital investment. The applicant, LCOA, will also benefit from the establishment of the treatment plant in terms of income.

The potential impacts associated with the Operational Phase of the woodchip burn-off plant are described below.

### **1.2.1 Biophysical Impacts (Terrestrial & Aquatic Biodiversity)**

As a result of operating the wood chip burn-off facility on cleared Erf 299, habitat fragmentation and loss of current ecological connectivity across development areas will occur with a potential facilitated spread of alien invasive vegetation due to soil disturbance on the development edge. Additionally, the operation could have impacted nearby water resources in the form of depression wetlands situated approximately 300 metres north of the property.

### **Aquatic biodiversity:**

According to the Section 21 (c) and (i) report compiled by Confluent Environmental dated April 2021 (see **Appendix H**), the operational impacts of the activity could include leaks and spills of hydrocarbons associated with the storage and handling of fuel on site, Confluent assessed these impacts on the nearby depression wetlands was Low to Negligible. This is due to the following characteristics of the wetlands and the surrounding area:

- The wetlands are some 300m from the site and any impacts from the activity will take place well outside the delineated area of the wetland.
- The topography of the area is flat.
- The wetlands are endorheic and primarily driven by rainfall and surface runoff within a small catchment area. This means that the development is highly unlikely to affect any subsurface inputs of water to the wetlands.

### **Terrestrial biodiversity:**

According to the Botanical Impact Assessment compiled by Nick Helme Botanical Surveys dated November 2020 (see **Appendix H**), the primary operational phase botanical impact was habitat fragmentation and the loss of current ecological connectivity across the development site. A secondary operational phase impact was the spread of alien invasive vegetation in adjacent areas, facilitated by the soil disturbance caused by construction.

Nick Helme found, however, that the site is small and is situated adjacent to existing development. Therefore, these impacts were found to be of Low significance before and after mitigation.

### **1.2.2 Soil, Groundwater and Freshwater Contamination.**

The Atlantis Industria area is located above the sensitive Atlantis Aquifer, which provides potable water to the area, The risk to the aquifer from contamination due to various industrial activities taking place (e.g., foundries with bulk fuel oil usage), could be significant on a cumulative basis.

According to a desktop contamination assessment undertaken by Umvoto Africa geohydrologists in February 2022 (see **Appendix H**):

*“The material that was processed by the pilot plant is considered to have posed limited to no threat of contamination. The wood chip feedstock is predominantly inert (wood and silica), with low proportions of metal ore minerals present. Due to the low tonnage, means of storage and handling, it is unlikely that contamination related to the oxidation and hydration of these minerals occurred (e.g., acid mine drainage). The volume of hydrocarbons (oil, diesel, grease) stored on site are not expected to pose catastrophic contamination risk, however some risk (low) of soil and groundwater contamination by these is a reality. Mechanical cleanup of the affected soils and improved storage areas (impermeable and bunded) will sufficiently mitigate these. Rainfall and contaminants mobilized by stormwater runoff pose a greater risk of*

*contamination from a full-scale plant, but the amount of rainfall and runoff generated during the initial operations is considered to have resulted in little to no contamination. (Page 2)”*.

A full suite of mitigation measures is contained in Section 5 of the Stormwater Management Plan attached to the EMPr attached in **Appendix I**, in order to *“improve the quality of runoff, control the quantity and rate of runoff, protect receiving water bodies, develop sustainable stormwater systems, and encourage natural groundwater recharge (Page30)”*. These measures are to be implemented prior to re-commencement of operations at the plant in order manage stormwater-related impacts.

Umvoto states that *“No off-site surface water or groundwater impacts are expected should the above measures be in place (Page 26)”*.

### **1.2.3 Health and Safety of Employees (Risk of Fire, Risk of Operating a High-Temperature Incineration Process, Working in potentially dusty and smoky environment)**

The kiln has significant associated risks in terms of health and safety of workers (working with extreme temperature machinery, kiln process and combustion emissions, fugitive emissions from various processing equipment, risk of fire from fuel handling, risk of injury from heavy machinery). According to LCOA, the facility was designed and operated in such a way as to effectively avoid and manage health and safety risks, for example:

- The kiln is insulated to the extent that you can touch the exterior surface when operating.
- The exit point is too hot and this is guarded.
- The diesel burner flame is inside the kiln and operators are not exposed to it.
- The rest of the equipment has appropriate mantis grating steps, walkways and hand rails where required.

An essential part of the plant design was to capture any combustion and dust emissions from the kiln first through the use of a cyclone and then through a bag filter, as these emissions will contain fines that will be sold off as product. This should limit the amount of particulate emissions from the main plant area.

Best practice management and mitigation measures to minimize these potential impacts are included as conditions in the EMPr contained in **Appendix I**.

### **1.2.4 Waste Impacts**

The operation of the woodchip burn-off plant generated waste. General waste was generated, such as office and some kitchen waste. This was disposed of in the municipal waste stream.

These quantities of waste were fairly insignificant given the scale of the plant and given that the woodchip burn-off process itself does not generate waste. However, effective waste management to reduce waste to landfills and to minimise risks associated with waste storage

and handling on the site will need to be undertaken. These have been included in the EMPr in **Appendix I**.

### 1.2.5 Potential Noise Impacts

The operation of machinery and vehicular movement associated with the operation of the woodchip burn-off plant could have added to background noise levels. This noise could have potentially impacted sensitive receptors in the surrounding receiving environment, although this is not expected: the facility is located within the Industrial Area of Atlantis and >3km from the nearest residential receptors.

Extensive mitigation is not applicable in the case of an industrial plant operating in a heavy industrial area. However, the applicant will need to operate within the noise limits set by the Western Cape Noise Control Regulations, 2013 to avoid “disturbing” noise. The management and mitigation measures included in the EMPr contained in **Appendix I**, are summarised as follows:

- Develop a mechanism to record and respond to complaints
- In the event of a complaint being lodged, investigate through specialist site visit and noise monitoring to determine cause and implement any recommended remedial measures to resolve complaint.
- Avoid unnecessary revving of engines and switch off equipment/vehicles/trucks when not required.
- Manage the impact of reverse warning signals by removing the need for reversing by using drive through pathways.
- Maintain internal road surfaces and avoid steep road gradients.
- Avoid excessive use of exhaust brakes.
- Maintain machinery and equipment and roller elements of conveyors to minimise noise.

### 1.2.6 Impact on Ambient Air Quality

The woodchip burn-off plant is expected to generate air emissions such as Particulate Matter (PM), gaseous and vehicle exhaust emissions. An Atmospheric Impact Report was compiled by Soundscape Consulting (Pty) Ltd in April 2022 to assess the potential impact on air quality as a result of the operation of the plant. Please see **Appendix H**. The conclusion of this impact assessment is summarized as follows:

*“Both point and fugitive sources of emission are present at the plant. Fugitive air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point. They typically originate in operations where fumes are not captured and passed through control device and/or a stack. Fugitive emissions have the potential for much greater ground-level impacts per unit than point source emissions, since they are discharged and dispersed close to the ground (IFC, 2007).*

*Point sources wood chip treatment plant include:*

- ❖ *The kiln baghouse. Though not fitted with a stack, it is for the purpose of this assessment, considered a 'modified' point source from which particulate matter (PM) and other combustion gases such as carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>) and volatile organic compounds (VOC), will be emitted. Various metallic particulates, inorganic, and organic compounds may also be emitted in trace amounts depending on the composition of the feedstock.*
- ❖ *Diesel generator exhaust, primarily CO, CO<sub>2</sub>, NO<sub>x</sub>, PM, SO<sub>2</sub>, and VOC.*

*Fugitive sources emission sources include:*

- ❖ *Dust generated by the handling of wood chip feedstock as it is emptied into the feed hopper and conveyed to the kiln.*
- ❖ *Dust generated by the handling of product fines at the bagging station.*
- ❖ *Dust generated by the milling and screening of product.*
- ❖ *Dust generated by truck and other vehicle movement on-site.*
- ❖ *During strong wind conditions, windblown dust from unsurfaced areas of Erf 299.*

*Other, less significant sources of emission may include:*

- ❖ *Exhaust emissions from of on-site vehicle movement.*
- ❖ *VOC from diesel fuel containers and handling.*

*To determine the potential for air quality related impacts on human health and the environment, a Level 2 assessment, as per the requirements of the 2014 Regulations Regarding Air Dispersion Modelling, was conducted.*

*Simulation results, health risk and odour nuisance screening, and key findings are summarised below:*

- ❖ *No exceedance of NAAQS for benzene, CO, lead, and SO<sub>2</sub> are expected off-site.*
- ❖ *Simulations indicate exceedance of the short-term NAAQS of 200 µg/m<sup>3</sup> for NO<sub>2</sub> up to ~230 m from the plant boundary. The 1-hour NAAQS of 40 µg/m<sup>3</sup> is exceeded up to 100 m from the boundary.*
- ❖ *Both PM<sub>10</sub> and PM<sub>2.5</sub> NAAQS are in exceedance off-site, but the impact is localised, within a few meters from the boundary.*
- ❖ *Simulated criteria pollutant concentrations at all sensitive receptors are a fraction of NAAQS, less than 10%.*
- ❖ *Simulated dustfall rates meet National Dust Control Regulations (NDCR) for all off-site non-residential and residential receptors in the study area.*
- ❖ *Exceedances of NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> NAAQS are primarily attributed to uncontrolled emissions from the diesel generator which will provide electricity until a municipal connection is available. Modern diesel generators are often fitted with low NO<sub>x</sub> burners and PM filters but in the absence of more detailed information, a conservative uncontrolled approach was adopted. These emissions will however only occur while the generator is the main power source on site.*
- ❖ *Although the impact area of the wood chip treatment plant is localised, it can be minimised by mitigating and managing of fugitive dust emissions.*
- ❖ *Increased life-time cancer risk was shown to be low to very low for inhalation exposure to metals, benzene, and dioxins and furans.*

- ❖ *The non-carcinogenic health impact screening indicates no exceedance of criteria except for cadmium and thallium (risk ratio 1.5). The assessment assumes conservatively that only cadmium, which is more harmful than thallium, will be emitted.*
- ❖ *Odour units at the plant boundary are less than the 5 ou<sub>E</sub>/m<sup>3</sup> criterion for industrial receptors.*
- ❖ *Inhalation health risk and odour impacts at sensitive receptors are negligible”*

...

*“The impact significance was found to be medium without mitigation and low with the implementation of mitigation and management measures...*

*It is the specialist’s reasoned opinion that the AEL may be issued provided that air quality management measures listed in this report are implemented”.*

### **1.2.7 Traffic Impacts associated with the Woodchip Burn-off Plant**

During the Operational Phase, the plant generated traffic in the form of personnel vehicles, as well as a fleet of trucks that delivered/collected the woodchip waste and product to and from the property.

Given the location of the woodchip burn-off plant within the Industrial Area of Atlantis, it was not anticipated that the new plant added materially to the amount of traffic on the surrounding road network, either during the construction or the operational phases. The surrounding road network was designed to accommodate heavy vehicles and was already accommodating heavy vehicle traffic.

In terms of access arrangements, the activity proposal included access and exit at the current property access from Daimler-Benz Road. No additional access is required for the operation of the woodchip burn-off plant.

### **1.2.8 Socio-Economic Impacts (Benefits)**

The woodchip pilot plant enabled LCOA to meet market demand and to establish a facility in order to generate income for the applicant. The plant also requires the employment of four staff members.

LCOA provided a service to downstream metal recovery processes as the product can be further treated off-site to extract the ore within the waste material

It can also be argued that successful businesses in the Atlantis Industria area, could attract additional investment into the area.

A manufacturing facility such as the wood chip plant also generates tax revenue for the government, which is an essential aspect of the economy.

### **1.2.9 Impact of Waste beneficiation (Benefits)**

It should be noted that this facility is a waste-to-value operation and will promote the circular economy. Forming part of the metal recovery process, the facility represents a lower carbon footprint than mining of virgin ore, as well as diversion of waste from landfill, thereby saving valuable and scarce landfill airspace. Risks associated with landfilling and with unlawful dumping, can also be avoided – such as leaching of heavy metals into groundwater.

The primary risks associated with waste on the site relate to the health and safety of employees, and potential soil and groundwater contamination. These impacts are discussed in Sections 1.2.2 and 1.2.3 respectively.

### **1.2.10 The No-Go Option**

The No-Go Option would be the option of restoring Erf 299 to its undeveloped condition and re-establishing the vegetation on the site. This would constrain LCOA's service offering and profitability. Additionally, the botanical specialist noted ongoing minor alien invasive vegetation infestation as associated with the No-Go Option.

Benefits associated with the No-Go Option include:

- The additional air emissions and possible fugitive dust emissions associated with the proposed woodchip burn-off plant 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 the Atmospheric Impact Report undertaken supports this finding.
- The waterbodies and vegetation situated in close proximity to Erf 299 would remain unharmed. According to specialist input, however, impacts on terrestrial and aquatic biodiversity have been assessed as Low and Negligible respectively.
- The identified health and safety risks associated with operating the woodchip burn-off plant 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.

It should be noted, however, that Erf 299 is located within Atlantis Industria and is zoned for Risk Industry. The property is thus unlikely to remain undeveloped for long. Additionally, should the property be developed, it will be for industrial use with similar potential impacts when compared to the current Woodchip Burn-off plant.

There are thus no significant benefits associated with the No-Go Option, which would motivate for the return of Erf 299 to its pre-development condition.

## 2 IMPACT ASSESSMENT

### 2.1 Impact Assessment Methodology

#### Introduction

The assessment of the significance of predicted impacts associated with the LCOA's Woodchip Burn-off Plant is based on the Department of the Environment, Forestry and Fisheries' 1998 *Guideline on the Implementation of Sections 21, 22 & 26 of ECA*; on the DEFF's 2006 *Guideline on Assessing Impacts & Alternatives*; on the DEA&DP's 2005 *Guideline for Involving Biodiversity Specialists in EIA*; and on T Hacking's 1998 IAIA SA Conference Paper, *An Innovative Approach to Structuring EIA Reports*.

The impact assessment is based on specialist input where required, as well as on the EAP's research as required, and experience and professional judgement.

#### Nature of impact

The source of a potential impact needs to be clearly defined, as well as what particular aspect of the receiving environment would be impacted. The nature of the impact should also include whether the impact is Positive or Negative; to what degree the impact is reversible; during which phase of the development life cycle the impact will occur; and whether the impact is direct or indirect; and whether the impact is cumulative:

**Table 2.1.1 Nature of impact**

Nature of impact	
Source	Particular aspect of the development proposal that could give rise to the impact.
Aspect of environment impacted	<ul style="list-style-type: none"> <li>▪ Socio-economic</li> <li>▪ Biophysical (freshwater, geohydrological, botanical, etc.)</li> <li>▪ Heritage &amp; cultural – historical</li> <li>▪ Visual &amp; landscape</li> <li>▪ Ambient noise levels</li> <li>▪ Ambient air quality</li> </ul>
Positive	An aspect of the receiving environment benefits.
Negative	An aspect of the receiving environment is adversely affected.
Degree of reversibility	The possibility or difficulty or impossibility of returning the affected aspect of the environment to its original state after an impact has occurred -either with or without human intervention.
Lifecycle phase in which impact will occur	<ul style="list-style-type: none"> <li>▪ Planning and design phase*</li> <li>▪ Construction phase</li> <li>▪ Operational phase</li> <li>▪ Decommissioning phase</li> </ul> <p>*It should be noted that impacts can arise during the construction and operational phases if the planning and design of the development does not adequately factor in required impact mitigation and management</p>

Nature of impact	
Intermittent or continuous; immediate or delayed	An indication should be given of whether the impact will only occur intermittently; and whether the impact will be experienced immediately or on a delayed basis.
Direct	The impact is a direct result of development activities.
Indirect	Downstream, secondary or “knock-on” impacts resulting from a direct impact.
Cumulative	A cumulative impact adds to similar impacts already experienced in the receiving environment.

### Parameters used to predict impact significance

In the methodology used here, impact significance is a function of consequence and probability of occurrence, where consequence considers the Duration, Spatial Extent and Magnitude (or severity or intensity) of the identified impact.

The following rankings have been used for the parameters which factor into determining **Consequence**:

**Table 2.1.2 Parameters used to determine consequence**

Consequence			
Parameter	Ranking		
	Low	Medium	High
<b>Spatial extent</b>	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
<b>Duration</b>	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
<b>Magnitude (or severity or intensity): negative</b>	Minor deterioration. Nuisance or minor irritation. Where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.	Moderate deterioration. Discomfort. Where the affected environment is altered by natural, cultural and social functions and processes continue albeit in a modified way.	Substantial deterioration. Death, illness or injury. Where natural, cultural or social functions or processes are altered to the extent that it will temporarily or permanently cease.
<b>Magnitude (or severity or intensity): positive</b>	Minor improvement.	Moderate improvement.	Substantial / significant improvement.

Once the parameters that determine an impact consequence have been ranked, the overall consequence of impacts can be determined as follows (from Hacking):

**Table 2.1.3 Overall consequence of impacts**

Magnitude (or intensity or severity): <b>Low</b>			
Duration	High		
	Medium		
	Low		
Severity/intensity		Low	High
Spatial Extent			

Magnitude (or intensity or severity): <b>Medium</b>			
Duration	High		
	Medium		
	Low		
Severity/intensity		Low	High
Spatial Extent			

Magnitude (or intensity or severity): <b>High</b>			
Duration	High		
	Medium		
	Low		
Severity/intensity		Low	High
Spatial Extent			

The probability of an impact occurring is ranked as follows:

**Table 2.1.4 Probability rankings**

Probability	
Improbable	Where the possibility of the impact to materialise is very low either because of design or historic experience;
Probable	Where there is a distinct possibility that the impact will occur
Definite	Where the impact will occur regardless of any prevention measures.

**Methodology for predicting impact significance**

In the methodology used, predicted impact significance is a function of the impact consequence considered together with the probability of the impact occurring. Impact significance is ranked as follows:

**Table 2.1.5 Impact significance ranking**

Impact significance	
Low	Will never exceed legislation or standards. Unlikely to cause significant negative impacts. Where it will not have an influence on the decision.
Medium	Has characteristics that could cause negative impacts. Where it should have an influence on the decision unless it is mitigated.
High	Will always/often exceed legislation or standards.

Impact significance	
	Has characteristics that could cause significant negative impacts. Where it would influence the decision regardless of any possible mitigation.

Impact significance, as a function of consequence and probability, is determined as follows:

**Table 2.1.6 Determination of impact significance**

Probability	Definite			
	Probable			
	Unlikely			
		Low	Medium	High
		Consequence		

### Degree of confidence

When predicting environmental impacts, the level of confidence of the practitioner in making the prediction should be provided. Confidence can be affected by the availability and quality of data and any assumptions that need to be made. Confidence is ranked as follows:

**Table 2.1.7 Confidence ranking**

Degree of confidence	
Low	Where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving environment, or inadequate information.
Medium	Where there is a moderate level of confidence in the prediction.
High	Where the impact can be predicted with a high level of confidence.

### Mitigation hierarchy

Once impacts have been identified associated with a development proposal, any significant negative impacts need to be mitigated in such a way as to reduce these impacts to acceptable levels.

The hierarchy of mitigation should be as follows, in order of priority:

**Table 2.1.8 Mitigation hierarchy**

Mitigation hierarchy	
1	Avoiding or preventing the impact.
2	Mitigating (reducing or minimizing) negative impacts and enhancing (maximising) benefits, by considering alternatives.
3	Rectifying negative impacts by restoring the affected environment to its previous condition or rehabilitating it for a different land use.
4	Providing an offset to compensate for the residual negative impact, to ensure that there is 'no net losses of ecosystem resources / environmental attributes.

It can be noted that both avoiding and minimising negative impacts, should be factored into the consideration by the proponent of alternative means of achieving the development goals. In this way, the development proposal put before the authorities for their decision-making purposes, should have the minimum possible residual (i.e. after-mitigation) impacts on the environment.

The investigation of alternatives that was undertaken during the development planning process, as far as possible considered avoiding and minimising adverse impacts associated with the woodchip burn-off plant. **Section E** of the EIA Report provides more detail on the investigation of alternatives in order to determine a low impact development proposal.

## 2.2 Impact Assessment

### 2.2.1 Impact Assessment – Development Proposal: **Construction & Decommissioning & Closure Phase**

With the impact assessment of construction and decommissioning and closure phase impacts, it should be noted that there is no plan at this stage to decommissioning the woodchip burn-off plant. However, should the plant be decommissioned in the future, the practical decommissioning would entail activities that are substantially like those that will take place during the construction phase (stockpiling of materials; operation of heavy vehicles and machinery; removal of cement and buildings that will be similarly noisy and dusty to the erection of the surfacing and buildings, etc.).

The mitigation measures recommended for the Construction Phase should therefore similarly apply to the Decommissioning Phase.

Once the site has been decommissioned or immediately before this, a focused baseline subsoil and groundwater assessment should be carried out to determine the contamination status of the site. This should focus on areas of likely impact and known historical spillage. Based on the findings of this assessment and any planned redevelopment of the site, appropriate recommendations should be made at that time in terms of any remedial actions. Appropriate licensing and authorisation as relevant at that time should be obtained.

As described above, the significant impacts associated with construction and possible decommissioning of the facility are limited to Terrestrial Biodiversity, Noise, Dust, Waste Management.

For the No-Go Option, which entails returning Erf 299 to its pre-development condition, decommissioning activities are applicable and are assessed below.

Section 7.1 of the Environmental Management Programme in **Appendix I** contains a full suite of industry-standard, best practice measures. LCOA has confirmed that many of the industry-standard measures were implemented during site establishment; and that the EMPr will be fully implemented if the facility is ever decommissioned.

**Table 2.2.1– Impact Assessment – Construction, Decommissioning & Closure Phase – Waste Management**

<b>Development (Woodchip Burn-off Pilot Plant)</b>	
<b>CONSTRUCTION, DECOMMISSIONING &amp; CLOSURE PHASE</b>	
<b>Potential impact and risk:</b>	<b>Waste Management</b>
Nature of impact:	<p>Activities included walling the facility with vibracrete; clearing, levelling, compacting and surfacing the site with a layer of laterite (“subbase”); and laying a 20m x 20m concrete slab for the main operational area. No permanent structures or infrastructure were constructed. Negligible waste was therefore generated – really only cleared vegetation.</p> <p>Similarly, site decommissioning would entail the removal of temporary structures (the porta-cabin and container laboratory), equipment), and possibly the breaking to slab with very minor associated rubble. The rubble could be sent to a recycler, or crushed on site and sold.</p>
Extent and Duration of impact:	Local and regional extent and short-term duration
Intensity / severity / magnitude	<p>Low (Where the affected environment is altered by natural, cultural, and social functions and processes continue albeit in a modified way) without mitigation.</p> <p>Low (Where the impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected) with mitigation.</p>
Consequence of impact or risk:	<p>Low without mitigation.</p> <p>Low with mitigation.</p>
Probability of occurrence:	<p>Probable without mitigation.</p> <p>Improbable with mitigation.</p>
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	Medium
Indirect impacts:	None, since the waste generated was / will be such a small volume
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation	<b>Low</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>– Waste management on-site shall align with relevant bylaws and legislation.</li> <li>– Waste collection and disposal pathways and sites will be identified for all major waste types expected from demolition and construction activities.</li> <li>– Construction and demolition wastes will be separated from general refuse, organic, liquid, chemical/hazardous and recyclable wastes by on-site sorting and stored in appropriate containers.</li> </ul>

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Waste Management
	<ul style="list-style-type: none"> <li>– Whenever feasible the contractor will reuse and recycle appropriate and viable materials.</li> <li>– The Contractor must provide an adequate number of waste receptacles for general hazardous and recyclable waste across the site. Waste receptacles shall be of adequate size and covered to prevent windblown litter and/or pests. The use of netting covers or similar sealed containers must be implemented as and when required by the ECO.</li> <li>– All workers must be briefed that no waste is to be disposed of in the environment.</li> <li>– Hazardous waste containers must be impermeable and weatherproof. Appropriate warning signage must be in place.</li> <li>– Construction waste must be collected regularly to prevent windblown litter and bin overflows.</li> <li>– The records of waste disposal will be maintained as proof for proper management as designed.</li> <li>– Stationary vehicles and machinery should be parked with drip trays beneath to prevent hydrocarbon contamination of exposed soil. Drip trays may contain spill absorbent products. Trays should be regularly cleaned and the waste stored and disposed of in the hazardous waste stream.</li> <li>– Vegetation originating from site clearing should be diverted from landfill: chipped and composted.</li> </ul>
Residual impacts:	Minor; acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation	<b>Low</b>

**Table 2.2.2– Impact Assessment – Construction, Decommissioning & Closure Phase – Biophysical Botanical**

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Biophysical - Botanical
Nature of impact:	Loss of 0.25ha Medium sensitivity vegetation and faunal habitat; loss of about 0.75ha of Low sensitivity vegetation and faunal habitat; all vegetation is of Endangered type; no loss of plant or animal Species of Conservation Concern; no loss of mapped CBAs.
Extent and duration of impact:	Local and regional scale, long term to permanent
Intensity / severity / magnitude	Medium (moderate deterioration) without mitigation. Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Medium
Probability of occurrence:	Definite
Confidence	High

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Biophysical - Botanical
Degree to which the impact may cause irreplaceable loss of resources:	Low - The affected vegetation types are Endangered (Skowno et al 2019) on a national basis, but the area is only 1ha in extent, and no significant threatened plant or animal species populations will be lost, so there would not be much Irreplaceable loss.
Degree to which the impact can be reversed:	Low - Cannot be fully reversed although if buildings are eventually removed some of the natural vegetation in the area may very slowly (>20yrs) recolonise much of the disturbed area
Indirect impacts:	See operational phase impacts
Cumulative impact prior to mitigation:	Very Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Cannot be avoided
Degree to which the impact can be managed:	Low - Impact on areas cannot be managed if developed.
Degree to which the impact can be mitigated:	Low - The most significant impact cannot be mitigated.
Proposed mitigation:	None
Residual impacts:	Low; loss of 0.25ha of Medium sensitivity habitat
Cumulative impact post mitigation:	Very Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.3 – Impact Assessment – Construction, Decommissioning & Closure Phase – Biophysical - Freshwater**

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Biophysical - Freshwater
Nature of impact:	The construction phase impacts as defined in the Confluent Environmental DWS Risk Matrix, April 2021, are summarised as follows: 1) Compacting of wetland soils and physical disturbance of wetland fauna and flora. 2) Contamination of water resources by hydrocarbons. 3) Contamination of the wetland with sewage. 4) Erosion and sedimentation of the wetlands.
Extent and duration of impact:	Local (within site boundary), medium term (reversible over time)
Intensity / severity / magnitude	Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Low
Probability of occurrence:	Improbable
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low - The proposed development occurs well outside of the delineated area of the depression wetlands located to the north of the property (> 300 m) but does fall within the regulated area of these wetlands (as defined by the NWA). Given the large distance of the property from the wetland as well as the flat topography of the general area, the

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
<b>Potential impact and risk:</b>	<b>Biophysical - Freshwater</b>
	construction and operational impacts associated with the development are considered to be negligible.
Degree to which the impact can be reversed:	N/A - The proposed development occurs well outside of the delineated area of the depression wetlands located to the north of the property (> 300 m) but does fall within the regulated area of these wetlands (as defined by the NWA). Given the large distance of the property from the wetland as well as the flat topography of the general area, the construction and operational impacts associated with the development are considered to be negligible.
Indirect impacts:	See operational phase impacts
Cumulative impact prior to mitigation:	Very Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Cannot be avoided
Degree to which the impact can be managed:	Low - Impact on areas cannot be managed if developed.
Degree to which the impact can be mitigated:	N/A
Proposed mitigation:	Chemical toilets are to be located outside the designated buffer of the wetland; and Waste from chemical toilets must be disposed of regularly (at least once a week) in a responsible manner by a registered waste contractor.
Residual impacts:	Low
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.4 - Impact Assessment – Construction, Decommissioning & Closure Phase – Heritage & Cultural**

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
<b>Potential impact and risk:</b>	<b>Heritage &amp; Cultural - Historical</b>
Nature of impact:	Potential impact to Heritage Resources including Archaeological resources, Palaeontological Resources, Graves and Burial Grounds or Human Remains as a result of the establishment of the woodchip burn-off plant.
Extent and duration of impact:	Local, long term to permanent
Intensity / severity / magnitude	Low (minor deterioration)
Consequence of impact or risk:	Medium
Probability of occurrence:	Improbable
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Very Low - Traces of archaeological remains including stone tools, ostrich eggshell and marine shellfish were recorded during monitoring of construction operations for the Eskom OCGT (Open Cycle Gas Turbine) adjacent Dassenberg. In previous studies undertaken in Atlantis Industria, very little/no archaeological resources have been identified.

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Heritage & Cultural - Historical
	Any fossil heritage (e. g. isolated bone in Witsand Formation Sands), will likely be encountered in an archaeological context. A watching brief is not recommended  Unmarked Khoisan human remains are highly unlikely.
Degree to which the impact can be reversed:	Low
Indirect impacts:	None
Cumulative impact prior to mitigation:	Very Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Cannot be avoided
Degree to which the impact can be managed:	Low - Impact on areas cannot be managed if developed.
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>Should any Heritage Resources be unearthed during the construction phase, when construction activities are to cease immediately, and the local Heritage Resource Agency is to be contacted for removal of these resources.</li> </ul>
Residual impacts:	Low
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.5 - Impact Assessment – Construction, Decommissioning & Closure Phase – Noise**

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Noise
Nature of impact:	Disturbing noise experienced by nearby sensitive receptors due to heavy vehicles and machinery, excavation activities, hammering, etc. associated with construction activities.
Extent and duration of impact:	Medium (beyond site boundary; local) without mitigation. Medium (beyond site boundary; local) with mitigation. Short-term (construction phase) without mitigation. Short-term (construction phase) with mitigation.
Intensity / severity / magnitude	Medium (moderate deterioration) without mitigation. Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Medium without mitigation. Low with mitigation.
Probability of occurrence:	Definite without mitigation. Probable with mitigation.

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Noise
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Direct impact: wellbeing of receptors Indirect impacts: none
Cumulative impact prior to mitigation:	The impact is cumulative due to the industrial nature of the area with other sources of noise already occurring
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	Low
Degree to which the impact can be managed:	Medium
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	<ul style="list-style-type: none"> <li>▪ Developing a mechanism to record and respond to complaints</li> <li>▪ In the event of a complaint being lodged, investigate through specialist site visit and noise monitoring to determine cause and implement any recommended remedial measures to resolve complaint.</li> <li>▪ Avoid unnecessary revving of engines and switch off equipment/vehicles/trucks when not required.</li> <li>▪ Managing the impact of reverse warning signals by removing the need for reversing by using drive through pathways.</li> <li>▪ Maintain internal road surfaces and avoid steep road gradients.</li> <li>▪ Avoid excessive use of exhaust brakes.</li> <li>▪ Maintain machinery and equipment and roller elements of conveyors to minimise noise.</li> </ul>
Residual impacts:	Some disturbing noise is unavoidable with any construction activity, even with the implementation of mitigation measures
Cumulative impact post mitigation:	Medium
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.6 - Impact Assessment – Construction, Decommissioning & Closure Phase – Biophysical – Soil, Groundwater & Freshwater Contamination**

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Soil, Groundwater & Freshwater Contamination
Nature of impact:	Construction activities such as the use of chemical toilets; mixing cement; oil dispensing; storage and use of hazchems and waste handling; can cause contamination of soil and groundwater, including the sensitive underlying Atlantis Aquifer.
Extent and duration of impact:	Low (localised) without mitigation. Low (localised) with mitigation.

<b>Development (Woodchip Burn-off Pilot Plant)</b>	
<b>CONSTRUCTION, DECOMMISSIONING &amp; CLOSURE PHASE</b>	
<b>Potential impact and risk:</b>	<b>Soil, Groundwater &amp; Freshwater Contamination</b>
	Short-term without mitigation. Short-term with mitigation.
Intensity / severity / magnitude	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected) with and without mitigation.
Consequence of impact or risk:	Low with and without mitigation.
Probability of occurrence:	Improbable with and without mitigation.
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Indirect impacts could be adverse impacts on aquatic organisms in the wetlands and possibly on groundwater users in the area.
Cumulative impact prior to mitigation:	Medium (Atlantis Industria has several potential sources of contamination of the soil and groundwater and underlying Aquifer).
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Mitigation	<ul style="list-style-type: none"> <li>– Construction phase: machines in working order, no on-site refuelling or repairs</li> <li>– See EMPr for full construction industry-standard measures to prevent contamination during the decommissioning phase</li> </ul>
Residual impacts:	Minor; acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.7 - Impact Assessment – Construction, Decommissioning & Closure Phase – Ambient Air Quality**

<b>Development (Woodchip Burn-off Pilot Plant)</b>	
<b>CONSTRUCTION, DECOMMISSIONING &amp; CLOSURE PHASE</b>	
<b>Potential impact and risk:</b>	<b>Ambient Air Quality Impacts</b>
Nature of impact:	Dust and vehicle exhaust emissions from site clearing, levelling, excavations, vehicles traversing the sandy site, etc.
Extent and Duration of impact:	Medium, beyond site boundary but local, without mitigation. Low, on-site, with mitigation.
Intensity / severity / magnitude	Short-term (construction phase) without mitigation. Short-term (construction phase) with mitigation. Low (minor deterioration) without mitigation. Low (minor deterioration) with mitigation.

Development (Woodchip Burn-off Pilot Plant)	
CONSTRUCTION, DECOMMISSIONING & CLOSURE PHASE	
Potential impact and risk:	Ambient Air Quality Impacts
Consequence of impact or risk:	Low without mitigation. Low with mitigation.
Probability of occurrence:	Definite without mitigation. Probable with mitigation.
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Direct impacts: nuisance, health, and wellbeing of receptors. Indirect impacts: none
Cumulative impact prior to mitigation:	Low.
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	Low
Degree to which the impact can be managed:	Medium
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	<ul style="list-style-type: none"> <li>– Minimise areas to be disturbed.</li> <li>– Erect shade netting around site fenceline.</li> <li>– Limit materials stockpiles to 2 m in height.</li> <li>– Dust control at materials stockpiles and on sandy surfaces can include covering with shade cloth, wetting down, and application of chemical binders.</li> <li>– Non-potable water to be used for wetting down.</li> <li>– Enforce speed limits to reduce dust entrained from road surfaces.</li> <li>– Avoid unnecessary idling of vehicles on-site to reduce vehicle exhaust emissions.</li> </ul>
Residual impacts:	Some emissions are unavoidable with any construction activity, even with the implementation of mitigation measures.
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

## 2.2.2 Impact Assessment – No-Go Option: Construction Phase

For the No-Go Option, which entails returning Erf 299 to its pre-development condition, decommissioning activities are applicable as assessed above.

## 2.2.3 Impact Assessment – Development Proposal: Operational Phase

**Table:2.2.8 – Impact Assessment – Operational Phase – Biophysical - Botanical**

<b>Development (Woodchip Burn-off Pilot Plant)</b>	
<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Biophysical - Botanical<sup>1</sup></b>
Nature of impact:	Habitat fragmentation and loss of current ecological connectivity across development area; possible facilitated spread of alien invasive vegetation due to soil disturbance on development edge
Extent and duration of impact:	Local, long term to permanent
Intensity / severity / magnitude	Medium (moderate deterioration) without mitigation. Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Medium
Probability of occurrence:	Fairly likely
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low - Not likely to cause irreplaceable loss of species or habitat quality
Degree to which the impact can be reversed:	Low - Loss of ecological connectivity to development can usually be reversed if development is removed and allowed to revert to natural vegetation; alien invasive vegetation can be controlled and reversed
Indirect impacts:	Some of these are indirect impacts in that they will take place on-site but impact the adjacent areas too
Cumulative impact prior to mitigation:	Very Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Most cannot be avoided
Degree to which the impact can be managed:	Medium - Alien invasive plant impacts on the surrounding area can be managed.
Degree to which the impact can be mitigated:	None proposed
Proposed mitigation:	None proposed
Residual impacts:	Low - Minor loss of ecological connectivity & minor habitat fragmentation in the area
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

<sup>1</sup> From Nick Helme, November 2020

**Table:2.2.9 - Impact Assessment – Operational Phase – Biophysical - Freshwater**

	<b>Development (Woodchip Burn-off Pilot Plant)</b>
<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Biophysical - Freshwater<sup>2</sup></b>
Nature of impact:	Toxicity to aquatic biota as a potential result of leaks/spills of hydrocarbons
Extent and duration of impact:	Medium (beyond site boundary), long term
Intensity / severity / magnitude	Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Medium
Probability of occurrence:	Definite
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low - The proposed development occurs well outside of the delineated area of the depression wetlands located to the north of the property (> 300 m) but does fall within the regulated area of these wetlands (as defined by the NWA). Given the large distance of the property from the wetland as well as the flat topography of the general area, the construction and operational impacts associated with the development are considered to be negligible.
Degree to which the impact can be reversed:	Low - Cannot be fully reversed although if buildings are eventually removed some of the natural vegetation in the area may very slowly (>20yrs) recolonise much of the disturbed area
Indirect impacts:	Low
Cumulative impact prior to mitigation:	Very Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Cannot be avoided
Degree to which the impact can be managed:	Low - Impact on areas cannot be managed if developed.
Degree to which the impact can be mitigated:	Low
Proposed mitigation:	In areas where the transfer of fuel from tankers to the storage facility, or the transfer from fuel to vehicles will take place, the surface should be impermeable. Hazardous materials and fuels must be stored within a bunded area that is capable of storing 110% of the stored volume. Areas containing chemicals (e.g. fuel storage areas/vehicle maintenance yards etc.) should install drip-pans, a thin concrete slab or a PVC lining to prevent these substances entering ground water.
Residual impacts:	Low
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

<sup>2</sup> From Confluent, April 2021

**Table:2.2.10 - Impact Assessment – Operational Phase – Soil, Groundwater and Freshwater**

		Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE			
Potential impact and risk:		Soil and Groundwater Contamination; Freshwater Contamination	
Nature of impact:	Site Activity	Event / Occurrence	Hazard
	On site transport and storing feedstock	rainfall on feedstock (spill or stockpile)	run-off/leachate generated, infiltration to aquifer
	Processing feedstock (incl. burning off wood)	spill from diesel burners	soil contamination, infiltration to aquifer
		emissions/aerosol deposition on ground	soil contaminated, infiltration to aquifer
		rainfall on spilled drop-out / product (all sizes)	run-off/leachate generated, infiltration to aquifer
		rainfall on oversize material during cooling	run-off/leachate generated, infiltration to aquifer
		rainfall on bagged final product (all sizes)	run-off/leachate generated, infiltration to aquifer
	Storing and handling hydrocarbons (diesel, oil, grease)	hydrocarbon spill	soil contamination, infiltration to aquifer
	Storing and handling chemicals (e.g., acids)	chemical spill	soil contamination, infiltration to aquifer
	Electricity supply - diesel generators	hydrocarbon spill	soil contamination, infiltration to aquifer
Storing re-use water	contaminated water spill	runoff generated, infiltration to aquifer	
Dust suppression, washing surfaces	wetting and mobilisation of contaminants	runoff generated, infiltration to aquifer	

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Soil and Groundwater Contamination; Freshwater Contamination
	Sanitation - chemical toilet      chemical or organic waste spill      soil contaminated, infiltration to aquifer
Extent and duration of impact:	Medium (beyond site boundary; local) without mitigation. Medium (beyond site boundary; local) with mitigation. Medium-term (reversible over time) without mitigation. Short-term (quickly reversible) with mitigation.
Intensity / severity / magnitude	Medium (Where the affected environment is altered by natural, cultural and social functions and processes continue albeit in a modified way) without mitigation. Low (Where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected) with mitigation.
Consequence of impact or risk:	Medium without mitigation. Low with mitigation.
Probability of occurrence:	Probable without mitigation. Improbable with mitigation.
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Medium. Contamination can be remediated with rapid response.
Degree to which the impact can be reversed:	Medium. Impacts on soil, groundwater and freshwater from contamination can be reversed with rapid response.
Indirect impacts:	Direct impacts: contamination of soil, groundwater and water resources. Indirect impacts: adverse impacts on aquatic organisms in the watercourses, on freshwater resources linked to the watercourses, and possibly on groundwater users in the area through potential contamination of the Atlantis Aquifer.
Cumulative impact prior to mitigation:	The impact is cumulative: there are other sources of potential contamination in the surrounding industrial area.
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>– Feedstock bagged and covered,</li> <li>– Surfaces should be made impermeable by covering them in either concrete or laterite and appropriately banded.</li> <li>– Filters should be installed on any equipment that processes the feedstock to mitigate any aerosol emissions/deposition.</li> <li>– The Oversize should be covered in by tarpaulin during cooling.</li> <li>– A tarpaulin should cover the bagged product.</li> </ul>

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
<b>Potential impact and risk:</b>	<b>Soil and Groundwater Contamination; Freshwater Contamination</b>
	<ul style="list-style-type: none"> <li>– Limited volume of hydrocarbon fuel and grease should be stored on site.</li> <li>– Drip trays and spill kits should be available on site.</li> <li>– Limited volume of re-use water should be stored on site.</li> <li>– Chemical toilets should be regularly serviced.</li> <li>– The Stormwater Management Plan attached to the EMPr must be implemented.</li> <li>– Small scale leachate tests to assess the mobilization of contaminants when the feedstock or product gets wet is recommended to account for uncertainty in the Safety Data Sheet.</li> </ul>
Residual impacts:	Minor, acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.11 - Impact Assessment – Operational Phase – Fire; Health and Safety Risks**

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
<b>Potential impact and risk:</b>	<b>Health and Safety Risk, Fire; Operating High-Temperature Incineration; Potentially dusty and smoky environment</b>
Nature of impact:	<ul style="list-style-type: none"> <li>– Hydrocarbons are a flammable and so there are health and safety risks (toxic; aspiration hazard; skin irritant) and risk of fire associated with storage and handling of the hydrocarbons.</li> <li>– The high temperature kiln represents a health and safety risk.</li> <li>– The incineration process produces smoke and hot gases that are a health and safety risk</li> <li>– The milling of the woodchip and product will produce particulate emissions that present a health and safety risk.</li> <li>– Injury can result from the operation of heavy equipment, vehicles and machinery</li> </ul>
Extent and duration of impact:	Medium (beyond site boundary; local) without mitigation. Medium (beyond site boundary; local) with mitigation. Medium-term (for the life of the project) without mitigation. Medium-term (for the life of the project) with mitigation.
Intensity / severity / magnitude	High (substantial deterioration) without mitigation. Low (minor deterioration) with mitigation.
Consequence of impact or risk:	High without mitigation. Low with mitigation.

	Development (Woodchip Burn-off Pilot Plant)
<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Health and Safety Risk, Fire; Operating High-Temperature Incineration; Potentially dusty and smoky environment</b>
Probability of occurrence:	Probable without mitigation. Improbable with mitigation.
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	High—serious injury and death can result.
Degree to which the impact can be reversed:	Low.
Indirect impacts:	Direct impacts: damage to property, injury, death. Indirect impacts: none.
Cumulative impact prior to mitigation:	The impact is cumulative: there are many other industrial facilities utilizing fuel, hazchems and dangerous machinery and equipment nearby.
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>High</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>– A registered professional engineer must sign off on the design and installation of associated infrastructure</li> <li>– A Standard Operating Procedure (SOP) for all activities relating the key infrastructure (Kiln, Cyclone, Bag filter, Diesel burners, Mill, Screen and the Telehandler) must be compiled to minimise associated health, safety and environmental risks.</li> <li>– Staff must be trained in the SOP, with records of staff training retained for external auditing purposes.</li> <li>– Staff must be trained in preventative maintenance pertaining to the key infrastructure (Kiln, Cyclone, Bag filter, Diesel burners, Mill, Screen and the Telehandler), with records of staff training retained for external auditing purposes.</li> </ul>
Residual impacts:	Minor; acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.12 - Impact Assessment – Operational Phase – Noise**

	<b>Development (Woodchip Burn-off Pilot Plant)</b>
<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Noise (wellbeing) impacts</b>
Nature of impact:	Noise from on-site activities causing disturbance to sensitive receptors
Extent and duration of impact:	Medium (beyond site boundary; local) without mitigation. Medium (beyond site boundary; local) with mitigation. Medium-term (lifetime of the project) without mitigation. Medium-term (lifetime of the project) with mitigation.
Intensity / severity / magnitude	Low (nuisance / disturbance) without mitigation. Low (nuisance / disturbance) with mitigation.
Consequence of impact or risk:	Low without mitigation. Low with mitigation.
Probability of occurrence:	Definite without mitigation. Improbable with mitigation.
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High (noise will cease when operations cease)
Indirect impacts:	Direct impacts – noise disturbance and impact on receptor wellbeing. Indirect impacts – none.
Cumulative impact prior to mitigation:	The impact is cumulative since there are other sources of noise in the area (industrial, traffic, community).
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>▪ Developing a mechanism to record and respond to complaints</li> <li>▪ In the event of a complaint being lodged, investigate through specialist site visit and noise monitoring to determine cause and implement any recommended remedial measures to resolve complaint.</li> <li>▪ Avoid unnecessary revving of engines and switch off equipment/vehicles/trucks when not required.</li> <li>▪ Managing the impact of reverse warning signals by removing the need for reversing by using drive through pathways.</li> <li>▪ Maintain internal road surfaces and avoid steep road gradients.</li> <li>▪ Avoid excessive use of exhaust brakes.</li> <li>▪ Maintain machinery and equipment and roller elements of conveyors to minimise noise.</li> </ul>
Residual impacts:	Minor; acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.13 - Impact Assessment – Operational Phase – Waste Management**

<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Waste Management</b>
Nature of impact:	The operation of the woodchip burn-off plant will generate only small quantities of general waste such as office and some kitchen waste. This will be disposed of in the municipal waste stream.
Extent and Duration of impact:	Medium (beyond site boundary; local) without mitigation. Medium (beyond site boundary; local) with mitigation. Medium-term (reversible over time) without mitigation. Short-term (quickly reversible) with mitigation.
Intensity / severity / magnitude	Low (Where the impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected) with and without mitigation.
Consequence of impact or risk:	Low with and without mitigation.
Probability of occurrence:	Improbable with and without mitigation.
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Medium
Degree to which the impact can be reversed:	Medium
Indirect impacts:	Unforeseen opportunity costs due to illness – loss of work / employment, poor health, potential death.
Cumulative impact prior to mitigation:	Refer to table 2.2.10: Fire and explosion; health and safety risk above.
Significance rating of impact prior to mitigation	<b>Low</b>
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	– Impacts associated with this waste recovery process have been discussed elsewhere and entail mainly air emissions and health and safety risks. These can be readily minimised by implementing fit-for-purpose emissions abatement and best practice health and safety operating protocols.
Residual impacts:	Minor; acceptable
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation	<b>Low</b>

**Table:2.2.14 - Impact Assessment – Operational Phase – Ambient Air Quality**

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Ambient Air Quality Impacts
Nature of impact:	Fugitive dust, particulate matter, combustion products, and VOC emissions from the following operations: diesel power generation, rotary kiln, feedstock and product handling, sizing, and screening, on-site vehicle movement, and windblown dust from exposed portions of Erf 299.
Extent and Duration of impact:	Short to medium-term, lifetime of the plant. Impacts associated with diesel power generation will cease once a municipal electricity connection is available.
Intensity / severity / magnitude	Low (minor deterioration) without mitigation. Low (minor deterioration) with mitigation.
Consequence of impact or risk:	Low (minor deterioration, nuisance, or minor irritation).
Probability of occurrence:	Probable
Confidence	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Direct impacts: nuisance, health, and wellbeing of receptors. Indirect impacts: none
Cumulative impact prior to mitigation:	The facility's contribution to cumulative criteria pollutant concentrations is such that it will not result in additional exceedances NAAQS at sensitive receptors
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	Low
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> <li>– Obtain emission specifications of the diesel generator. Emission testing and control should only be considered if (a) the diesel generator design does not include NO<sub>x</sub> or PM control and (b) it will be used as main power supply for an extended period.</li> <li>– Control of fugitive dust emissions to minimise off-site impacts is considered good practice.</li> <li>– Avoiding handling and transfer activities of fine or dry materials during strong wind conditions.</li> <li>– Reduce windblown dust from exposed areas of Erf 299 by limiting disturbance of surface material, compaction, watering during strong wind conditions, and should visual inspection indicate it necessary, the surfacing of the area.</li> <li>– For vehicle entrained dust, minimise the silt loading of internal roads by (a) avoiding spills of dusty materials as far as possible, (b) immediate</li> </ul>

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Ambient Air Quality Impacts
	<p>cleaning up of spilled materials, and (c) regular sweeping or washing road surfaces.</p> <ul style="list-style-type: none"> <li>– Take care to not re-entrain surface dust during the sweeping process.</li> <li>– The kiln should only be operated when the fabric filter system is operational.</li> <li>– Minimise CO, NO<sub>x</sub>, SO<sub>2</sub>, and VOC from the kiln by ensuring optimal combustion efficiencies, controlling combustion temperatures, and using low sulphur fuels</li> <li>– Refer to the special arrangements for subcategory 8.1 listed activities pertaining to emission control.</li> <li>– Daily visual inspection of site operations and corrective action should excessively dust emissions or plumes be observed.</li> <li>– Quarterly inspection and reporting of dust and fume emissions as well as noticeable odours sources and in response to complaints. Photographic records can be useful.</li> <li>– Air Quality complaints register is required.</li> </ul>
Residual impacts:	Some fugitive emissions are unavoidable even with the implementation of mitigation measures.
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>

**Table:2.2.15 - Impact Assessment – Operational Phase – Traffic**

Development Proposal (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Traffic impacts
Nature of the impact	Possible traffic congestion, adverse impacts on road safety, and wear and tear on roads infrastructure. The roads infrastructure is designed to accommodate the surrounding industrial area.
Extent and Duration of the Impact	Medium (beyond site boundary; fairly widespread; local - surrounding road network) without mitigation. Medium (beyond site boundary; fairly widespread; local - surrounding road network) with mitigation. Medium-term (life of project) without mitigation. Medium-term (life of project) with mitigation.
Intensity/severity/magnitude	Low (minor deterioration) without mitigation. Low (minor deterioration) with mitigation.

	Development Proposal (Woodchip Burn-off Pilot Plant)
<b>OPERATIONAL PHASE</b>	
<b>Potential impact and risk:</b>	<b>Traffic impacts</b>
Consequence of impact or risk	Low without mitigation. Low with mitigation.
Probability of occurrence:	Improbable without mitigation. Improbable with mitigation.
Confidence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect Impact	Impacts associated with additional truck trips are all direct on the surrounding community and road network.
Cumulative impact prior to mitigation:	The truck routes to the site are observed to be well-trafficked routes servicing the industrial area and so the impact is cumulative.
Significance rating of impact prior to mitigation: (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Low</b>
Degree to which the impact can be avoided:	Low
Degree to which the impact can be managed:	Low
Degree to which the impact can be mitigated:	Low
Proposed Mitigation:	– No specific mitigation required.
Residual Impacts	None
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation:	<b>Low</b>

**Table:2.2.16 - Impact Assessment – Operational Phase – Socio-Economic Benefits**

Development Proposal (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Socio-Economic Benefits
Nature of impact:	<ul style="list-style-type: none"> <li>– LCOA will establish a facility which generates income for the owners and shareholders.</li> <li>– There will be benefits for LCOA staff in terms of job and income security.</li> <li>– The pilot plant will require the employment of four new staff members.</li> <li>– LCOA provides a service to downstream metal recovery processes as the product can further treated off-site to extract the ore within the waste material.</li> <li>– It can also be argued that successful businesses in the Atlantis Industria area, could attract additional investment into the area.</li> </ul>
Extent and duration of impact:	Extent: high (regional) Duration: long-term (life of the activity).
Intensity / severity / magnitude:	Medium (moderate improvement).
Consequence of impact or risk:	High
Probability of occurrence:	Definite
Confidence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Not applicable to a benefit
Degree to which the impact can be reversed:	
Indirect impacts:	
Cumulative impact prior to mitigation:	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	Mitigation does not apply to a benefit.
Degree to which the impact can be managed:	
Degree to which the impact can be mitigated:	
Proposed mitigation:	
Residual impacts:	
Cumulative impact post mitigation:	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	

**Table:2.2.17 - Impact Assessment – Operational Phase –Waste Beneficiation (Benefit)**

Development (Woodchip Burn-off Pilot Plant)	
OPERATIONAL PHASE	
Potential impact and risk:	Benefits of Waste beneficiation
Nature of impact:	The facility is a waste-to-value operation and will promote the circular economy. Forming part of the ore recovery process, the facility represents a lower carbon footprint

	than mining of virgin ore, as well as diversion of waste from landfill, thereby saving valuable and scarce landfill airspace.
Extent and duration of impact:	Extent: high (regional) Duration: long-term (life of the activity).
Intensity / severity / magnitude:	Medium (moderate improvement).
Consequence of impact or risk:	High
Probability of occurrence:	Definite
Confidence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Not applicable to a benefit
Degree to which the impact can be reversed:	
Indirect impacts:	
Cumulative impact prior to mitigation:	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	<b>Medium</b>
Degree to which the impact can be avoided:	Mitigation does not apply to a benefit.
Degree to which the impact can be managed:	
Degree to which the impact can be mitigated:	
Proposed mitigation:	
Residual impacts:	
Cumulative impact post mitigation:	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	

## 2.2.4 Impact Assessment – No-Go Option: Operational Phase

The operational phase of the No-Go Alternative would entail Erf 299 in Atlantis not being developed and this property remaining in an undeveloped state. In terms of the impacts associated with this option:

- There will be no impact to the indigenous vegetation currently on the concerned property as the property would not have been developed.
- No additional impact to the Depression Wetlands situated approximately 300 metres to the north of the concerned property or on the Atlantis Aquifer other than those impacts already taking place due to the industrialised nature of the surrounding landscape (this impact was found to be very unlikely to occur and of Low significance due to distance of the site from the wetlands).
- No additional risk of employees' health and safety as a result of being exposed to the high kiln operating temperature and working in dusty and smoky environment.
- No additional risk of soil and groundwater contamination as a result of the storage and handling of hydrocarbons and wood chip
- No additional noise impacts as a result of the operation of the woodchip burn-off plant.

- No additional traffic impacts to the surrounding road networks as a result of the operation of the woodchip burn-off.
- No additional atmospheric emission impacts in the form of fugitive dust, particulate matter, combustion products, and VOC emissions from the diesel power generation, rotary kiln, feedstock and product handling, sizing, and screening, on-site vehicle movement, and windblown dust from exposed portions of Erf 299.

However, none of the impacts associated with the establishment of the proposed woodchip burn-off plant on Erf 299 in Atlantis, which can be avoided and/or mitigated with the No-Go Option, are of such significance post-mitigation as to prevent the development of the woodchip burn-off plant from commencing.

Additionally, implementing the No-Go option will mean that none of the socio-economic benefits associated with the woodchip burn-off plant will be realised by the applicant, their employees, the industries reliant on LCOA's output, and by the municipality, other businesses in Atlantis Industria, and Atlantis residents, who all benefit from investment in the area. There will also be no contribution to the circular economy; no saving on scarce landfill airspace by diverting the wood chip from landfill; and no benefit in terms of reduced carbon footprint of recovering metal versus mining virgin ore.

## 2.3 Impact Statement

### 2.3.1 Summary of Key Findings of the EIA

The development proposal (including the technology, site and activity alternatives that were found on investigation to be the best practicable options for the minimisation of health, safety and environmental impacts) was assessed against the No-Go Option, or the option of not establishing a woodchip burn-off on LCOA's Erf 299 in Atlantis.

#### 1. Waste management

General construction waste – managed in accordance with the measures contained in **Appendix I** resulted in a low negative significance.

#### 2. Ambient air quality

PM<sub>10</sub> such as dust and smoke as a result of construction and vehicle emissions may have resulted in poor health due to potential cumulative impacts on the ambient air quality. A low negative significance with mitigation measures implemented.

#### 3. Noise

Construction noise would have resulted in a temporary nuisance for the duration of construction related activities. A low significance impact is expected with mitigation measures implemented.

#### 4. Soil and groundwater contamination

Handling and storage of hydrocarbons, as well as fuel and refueling activities was done in accordance with standard operating procedures and resulted in a low significance impact with mitigation.

#### 5. Heritage resources

No Impact expected.

#### 6. Biophysical (terrestrial and aquatic)

The construction of the proposed LCOA's woodchip burn-off plant on Erf 299 in Atlantis entailed levelling and removal of approximately 0.25 ha Medium sensitivity vegetation and faunal habitat; loss of about 0.75 ha of low sensitivity vegetation and faunal habitat; all vegetation was of Endangered type; no plant or terrestrial animal Species of Conservation Concern were likely impacted or lost; no loss of mapped CBAs.

Similarly, the construction of the LCOA's woodchip burn-off plant on Erf 299 in Atlantis the woodchip burn-off plant on these receptors are considered to be Low.

#### OPERATIONAL PHASE IMPACTS

#### 7. Biophysical (terrestrial and aquatic)

*Impacts due the operation of the plant were found to be of Low significance before and after mitigation for terrestrial biodiversity and Low to Negligible on the aquatic biodiversity near the site.*

#### **8. Soil and groundwater contamination**

*Handling and storage of hydrocarbons, as well as fuel and refuelling activities was done in accordance with standard operating procedures and resulted in a Low significance impact with mitigation.*

#### **9. Adverse occupational health effects on staff due to significant levels and periods of exposure**

*The kiln has associated risks in terms of health and safety of workers (working with extreme temperature machinery, kiln furnace emissions in the workplace, fugitive emissions from various equipment while either handling/processing of the feedstock or product). The facility should be designed and operated in such a way as to effectively avoid and manage health and safety risks.*

*Hydrocarbons are a flammable good and so there are health and safety risks (toxic; aspiration hazard; skin irritant) and small-scale risk of fire and explosion associated with storage and handling of the hydrocarbons.*

*LCOA has prepared standard operating procedures for the various treatment processes (e.g., kiln loading,), as well as preventative maintenance plans for all infrastructure associated with the woodchip treatment activities, in order to ensure that best-practice health and safety measures are implemented, and that infrastructure does not become derelict and unsafe to operate. With mitigations as included implemented the impact is expected to result in a Low negative significance.*

#### **10. Waste impacts**

*The operation of the Woodchip burn-off generated only small quantities of general waste such as office and some kitchen waste. This was disposed of in the municipal waste stream [normal solid waste collection services as provided by the Municipality in the area]. Therefore, no increase expected on the current municipal solid waste capacity.*

#### **11. Noise resulting in nuisance factors / potential complaints**

*Potential noise impact related to the operation of the facility is expected. This is compatible with the existing land use planning objectives for the property (zoned for Risk Industry use).*

#### **12. Impacts on air quality / pollutants**

*Fugitive dust, particulate matter, combustion products, and VOC emissions from the various operations. At sufficiently high concentrations, these pollutants may result in potential health, nuisance, dust, and odour impacts without mitigation. Regional air quality may have been negatively affected as a result of the cumulative impacts associated with these emissions which might have led to a potentially more widespread negative impact for residents within proximity to the facility. The air quality specialist found this impact of be of Low significance.*

#### **13. Increase traffic and congestion – nuisance**

*The treatment plant would have had associated additional trucks on the road, transporting woodchip waste to the plant while also transporting the treated product. This would have added to the cumulative impacts associated with the movement of heavy vehicle within the industrial area and*

localised surrounds. Effects were likely to only be felt on a localised level resulting in a low significance impact.

**14. Socio-economic benefits**

The components making up the socio-economic benefits are highlighted below – the result of the associated impacts is expected to have a Medium positive impact.

**15. Impact on natural resources (positive)**

**The operation of the facility will result in a positive impact on the use of natural resources:**

The metal ore contained in the woodchip is a finite natural resource. The proposed development thus addressed this through burning off any undesirable contaminants in the woodchip waste. The results are a product that can be further treated at a mine to remove any metals, thereby reducing the demand for mining of these metals. Recovering the ore from the woodchip is commonly known to have a smaller carbon footprint and to be less energy intensive than mining these virgin ores.

In addition, woodchip waste will be diverted from landfill, thereby saving on scarce landfill airspace. The burn-off plant therefore has environmental benefits.

**16. Socio-economic (employment opportunities)**

LCOA increased their market share and profitability. Not only would there have been knock-on benefits for LCOA’s staff in terms of job and income security, and benefits to the owners of LCOA, but the plant required the employment of four new staff members.

**17. Socio-economic (contribution to capital investment)**

It can also be argued that successful businesses in the Atlantis Industria area, could attract additional investment into the area: businesses that provide goods and services to LCOA, which allow LCOA’s to expand their waste treatment plant and services.

**Table 2.3.1 - Summary of no-go option [advantages vs disadvantages] associated with the LCOA Woodchip Burn-off, Atlantis, Erf 299**

ADVANTAGES	DISADVANTAGES
ENVIRONMENTAL ATTRIBUTES	
<p>The additional air emissions and possible fugitive dust emissions associated with the proposed woodchip burn-off plant 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 have reduced emissions to within statutory and therefore acceptable limits. This benefit is not considered significant enough to warrant not developing the plant.</p> <p>The waterbodies and vegetation situated in close proximity to Erf 299 would have remain unharmed. According to the need and desirability assessment and site sensitivity verification report that has been</p>	<p>Impacts resulting from the development could impact negatively on ambient air quality. However through effective mitigation, monitoring and management the effects are not significant enough to warrant not developing.</p> <p>Increased pressure on the mining industry for the continued mining of metal ores at the detriment of the environment and natural stocks.</p> <p>From the investigation of the need and desirability of the development that has been undertaken in Appendix M, the no-go option does not support the regional planning imperatives for Atlantis in terms of investment in industrial enterprise and job creation.</p>

undertaken, however, the freshwater and vegetation sensitivity of most of the site is considered to be low.	The no-go option will not represent any contribution to the circular (waste-to-value) economy and to diversion of woodchip from landfill.
<b>SOCIO-ECONOMIC ASPECTS</b>	
The identified health and safety risks associated with operating the woodchip burn-off plant 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.	<p><b>Employment opportunities:</b> The no-go option does not represent jobs and associated income, to the benefit of the surrounding LCOA community.</p> <p><b>Economic growth:</b> There is market demand from the construction and manufacturing sectors for LCOA's product, namely beneficiated ore. The no-go option would mean that necessary support for these sectors would not be realised.</p> <p><b>Market viability:</b> The no-go option could curtail the profitability and therefore financial stability of LCOA.</p>

A summary of the findings of the Impact Assessment is contained in **Table 2.3.2** and **Table 2.3.3**. It has been found that any negative impacts associated with establishing and operating the woodchip burn-off plant can be avoided altogether or can be reduced to acceptable levels through appropriate mitigation. All of these negative impacts were of **low significance**.

The identified benefits associated with the woodchip burn-off plant were found to be of **medium benefit**.

The activity proposal has been assessed against the No-Go option, which is the option of returning Erf 299 to its pre-development condition. The No-Go option has thus provided a baseline against which to assess the benefits and drawbacks of the woodchip burn-off plant.

With the No-Go option, no benefits of sufficient significance were identified to warrant not continuing to operate the drying plant.

However, the No-Go option has the drawback of constraining LCOA's service offering to the metal ore industry, as well as their profitability. The No-Go option also represents the loss of potential investment, income, job opportunities and service to downstream industries, which could be realised with the establishment of the current facility.

**Table 2.3.2 - Summary of Construction and Decommissioning Phase impacts associated with the woodchip burn-off plant.**

Impact	Before mitigation	After mitigation
Waste Management	Low (-ve)	Low (-ve)
Biophysical - Botanical	Low (-ve)	Low (-ve)
Biophysical - Freshwater	Low (-ve)	Low (-ve)
Heritage & Cultural - Historical	Low (-ve)	Low (-ve)
Noise	Medium (-ve)	Low (-ve)
Soil and groundwater contamination	Low (-ve)	Low (-ve)
Ambient Air Quality	Medium (-ve)	Low (-ve)

**Table 2.3.3 - Summary of Operational Phase impacts associated with woodchip burn-off plant.**

Impact	Before mitigation	After mitigation
Biophysical - Botanical	Low (-ve)	Low (-ve)
Biophysical - Freshwater	Low (-ve)	Low (-ve)
Soil, Groundwater and Freshwater Contamination	Medium (-ve)	Low (-ve)
Fire explosion; health and safety risk	High (-ve)	Low (-ve)
Waste management	Medium (-ve)	Low (-ve)
Noise	Medium (-ve)	Low (-ve)
Ambient Air Quality	Medium (-ve)	Low (-ve)
Traffic	Low (-ve)	Low (-ve)
Socio-Economic Benefits	Medium (+ve)	
Waste beneficiation (Benefit)	Medium (+ve)	

### 2.3.2 Uncertainties, Assumptions and Gaps in Knowledge

The following uncertainties, assumptions and gaps in knowledge pertain to this impact assessment:

- It has been assumed that the Specialist Findings are accurate and impartial; that mapping data from sources including Google Earth and the Council for Geosciences is accurate, and that information on all aspects of the wood burn-off plant provided by the applicant is accurate.
- Besides the above, there are no assumptions, uncertainties or gaps in knowledge that are material to this application.

### 2.3.3 Recommendations of the EAP and Conditions to be included in the Environmental Authorisation (EA)

The Environmental Practice recommends that the woodchip burn-off plant on Erf 299 in Atlantis be authorized for development. This recommendation is based on the outcome of the impact assessment process, which has been informed by Enviroprac's Professional Experience in Environmental Management as well as on Specialist input and detailed process information provided by the Applicant.

The facility should be designed and operated with the implementation of all the mitigation measures recommended by the specialists. All of these measures are contained in the EMPr,

which is attached as **Appendix I**. The implementation of the EMPr should therefore be the Condition of the Environmental Authorisation.

Once the plant is operational, all ongoing emissions monitoring and other ongoing management measures contained in the EMPr should be reported on to the DEA&DP and the City of Cape Town's Air Quality Branch by the applicant on a basis reflected in the environmental authorisation. On a five-year basis, the facility should be audited against the conditions of the EMPr by an independent Environmental Control Officer (ECO). These audit reports should be submitted to the DEA&DP and the City of Cape Town for their record-keeping purposes.

These recommendations for monitoring and auditing of operations against the EMPr are contained in the EMPr and should therefore be a Condition of Authorisation.