

**Bio2Watt (Pty) Ltd: Bronkhorstspuit Biogas  
Plant**

**Final Basic Assessment Report for  
waste licence in support of proposed  
upgrade**

DEFF Reference number: 12/9/11/L200729151308/3N

Report date: October 2020

**SHANGONI**  
*Management Services (Pty) Ltd*

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# PART A:

## SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

### 1 Details of project applicant and environmental assessment practitioner

#### 1.1 Details of project applicant

<b>Name of operation</b>	Bronkhorstspuit Biogas Plant
<b>Applicant</b>	Bio2Watt
<b>Postal address</b>	PO Box 1068, Lonehill
<b>Responsible person</b>	Sean Thomas
<b>Telephone no.</b>	011 463 4200
<b>Fax no.</b>	086 648 5023
<b>e-mail address</b>	sean@bio2watt.com
<b>Company registration no.</b>	2007/014974/07

#### 1.2 Details of the environmental assessment practitioner

<b>EAP</b>	Shangoni Management Services (Pty) Ltd.: Lee-Anne Fellowes and Olwethu Mungwe
<b>Tel No</b>	(012) 807 7036
<b>Fax No</b>	(012) 807 1014
<b>e-mail Address</b>	<a href="mailto:leeanne@shangoni.co.za">leeanne@shangoni.co.za</a> / <a href="mailto:olwethu@shangoni.co.za">olwethu@shangoni.co.za</a>

#### 1.3 Expertise of the environmental assessment practitioner

Name and Surname	Qualifications and summary of experience
Lee-Anne Fellowes	Lee-Anne has a B-tech degree in Nature Conservation from the Tshwane University of Technology and holds a National Diploma in Nature Conservation. She gained valuable experience in the conservation and the environmental field through her employment at Gauteng's Department of Agriculture, Conservation and Environment for a period of 5 years. Her areas of expertise include alien invasive surveys & conservation plans, Environmental Impact Assessments (EIA), Environmental



Name and Surname	Qualifications and summary of experience
	<p>Management Programmes (EMP), Section 24G Rectification Applications, Basic Assessments, Water Use Licences and Project Management. Lee-Anne has 14 years' experience at Shangoni Management Services. Lee-Anne has been registered as a Professional Natural Scientist in the field of Conservation Science Registration number: 115574 and is registered as an environmental impact assessment practitioner Registration number: 2019/850.</p>
Olwethu Mungwe	<p>Olwethu is junior environmental consultant. He obtained his B.Sc. Environmental Science degree, with Environmental Science and Biology as his two majors from the University of KwaZulu-Natal and is a registered Cand.Sci.Nat. Olwethu assists with the compilation of various reports required as part of Environmental Authorisation processes, including amongst other; Environmental Impact Assessments, Scoping Reports, Basic Assessments, Environmental Management Plans and Environmental Management Programmes. He also has experience in water sampling, public participation and translating public documentation.</p>

## 2 Description of the property

Table 1: Description of the properties applicable to the Bronkhorstspuit Biogas Plant

<b>Fame name</b>	Remaining extent of the farm Boschkop 543 JR
<b>Application area (ha)</b>	The Bronkhorstspuit Biogas Plant site is 2 hectares in size on a 5-hectare land parcel.
<b>Local minimality</b>	City of Tshwane
<b>Distance and direction from nearest town</b>	18 km south-west of Bronkhorstspuit
<b>21-digit Surveyor General code for each farm portion</b>	T2528000000005430000



### 3 Locality of the Bronkhorstspuit Biogas Plant

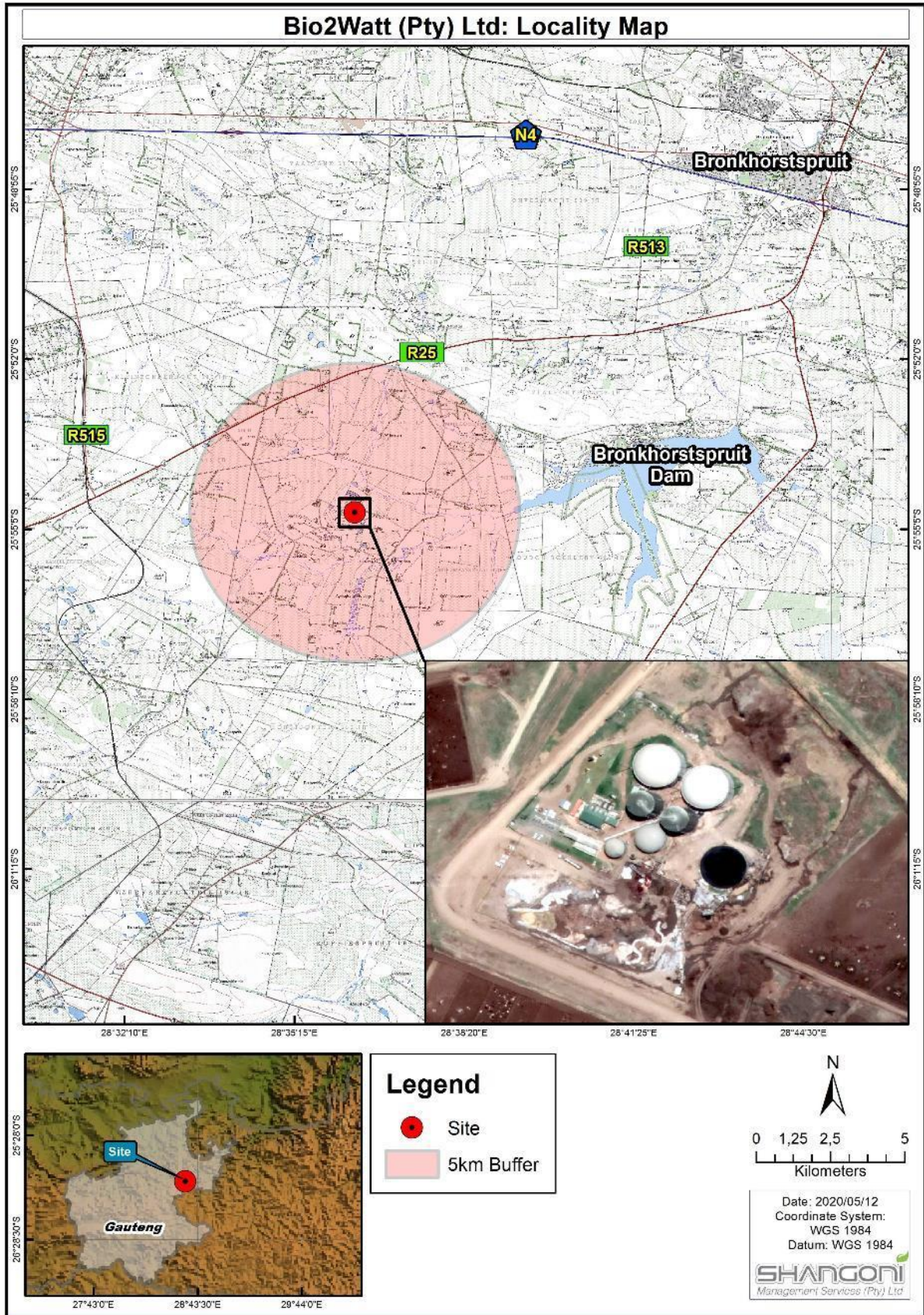


Figure 1: Locality map





## 4 Description of the scope of the proposed overall activity

The existing Bronkhorstspuit Biogas Plant (“BBP”) has the following environmental authorisations and licences:

- An Environmental Authorisation was obtained in 2009 from the Gauteng Department of Agriculture, Conservation and Environment for the construction of the BBP reference number GAUT:002/07-08/N193.
- The BBP was issued a Waste Licence in 2010 by the then Department of Environmental Affairs. Category A1 “The storage of general waste in lagoons” and A10 “The disposal of general waste to land covering an area of more than 50 m<sup>2</sup> but less than 200 m<sup>2</sup> and with a total capacity not exceeding 25 000 tons”.
- An Atmospheric Emission Licence (“AEL”) was granted in 2016 for subcategory 10: Animal matter processing for the 4.5 MW Biogas Plant. The AEL is currently being amended to include the upgrade activities and associated emissions for the 8.4 MW Biogas Plant. Attached as annexure C.
- A Water Use Licence was issued in 2013 by the Department of Water Affairs for Section 21 (e) engaging in controlled activity, and Section 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource. Attached as annexure C.

The proposed upgrade of the BBP will trigger the following authorisations under the NEM:WA to which this application applies:

- Waste Management Licence (“WML”) in terms of Section 19 of the National Environmental Management Waste Act (Act No. 59 of 2008) (“NEM:WA”) and the List of Waste Management Activities (“GN.R 921”) dated 29 November 2013, as amended.
- For the WML, a Basic Assessment (“BA”) will be required in compliance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (“NEMA”) and the NEMA Environmental Impact Assessment Regulations, 2014 (GN R982 of 4 December 2014) (“GN R982”), as amended.

### 4.1 Listed and specified activities

Table 2: Activities and listed activities associated with the Bronkhorstspuit Biogas Plant as specifically applicable to this application

Name of activity	Aerial extent of the activity (Ha or m <sup>2</sup> )	Listed activity Mark with an x where applicable or affected.	Waste Management Activity (GN 921)
Upgrade of the existing BBP from	The BBP site is 2 hectares in size	X	Activity 13 of category A (GNR 921 of 29 November 2013, as amended):



Name of activity	Aerial extent of the activity (Ha or m <sup>2</sup> )	Listed activity Mark with an x where applicable or affected.	Waste Management Activity (GN 921)
4.5 megawatts ("MW") to 8.4 MW.	on a 5-hectare land parcel.		The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of this Schedule.

## 4.2 Description of the activities to be undertaken

The BBP operated by Bio2Watt is a renewable energy industrial facility that is located 18 km south-west of Bronkhorstspuit. The existing biogas plant is 4.5 megawatts ("MW") and they propose to upgrade to 8.4 MW due to increased energy demands.

The upgrade will entail improvements to the original design (new line will handle wear and tear better) and be able to process manure containing sand and stones more efficiently. In addition, the plant will also upgrade its output digestate handling and separation processes to produce water and bio-fertilizer as plant outputs.

The BBP adopted an anaerobic digestion ("AD") process to recover value from organic wastes (fruit & vegetable), chicken sludge, food and beverage waste and cattle manure to generate biogas for power production. The AD process converts organic matter/waste into biogas, a source of renewable energy, and a nutrient rich organic fraction known as digestate will also be produced as a by-product.

The BBP produces electrical power by digesting cattle manure and organic waste under thermophilic anaerobic conditions to generate biogas that is used to fuel gas engines, which drive electrical generators.

### Existing BBP:

The existing BBP is on a 2-hectare fenced off area of a 5-hectare plot and comprised of the following infrastructure:

- Feed lot,
- Digestor tanks,
- Mixing tank,
- Blowers,
- Generators,
- Flare,
- Steel tank and
- Concrete slab.



Proposed upgrade to the BBP:

To increase the gas of the BBP through increased utilisation of manure, the following additional infrastructure are proposed within the existing 2-hectare fenced off area:

- One digester with gas storage; the digester size will be (27 m x 8 m in size with a capacity of 4580 m<sup>3</sup>),
- Secondary digester with gas storage; the digester size will be (27 m x 8 m in size with a capacity of 4580 m<sup>3</sup>),
- Two generators,
- Mixing tank of 22 m x 5 m in size,
- Gas flare in case the biogas cannot be utilised (e.g. when the downstream equipment is down), is out of specification (e.g. during start-up) or an excess is produced and must be safely disposed of it.
- Condensate pit,
- Desulphurisation scrubber that is an integral part of the gas phase in the digester and the post digester.
- Gas cooling,
- Combined heat and power (“CHP”) 1 and 2, and
- De-watering system.

The source of material used in the BBP comes from the Beefcor cattle feedlot (manure) and restaurants/factory (organic waste). Emissions into the atmosphere are primarily carbon dioxide.



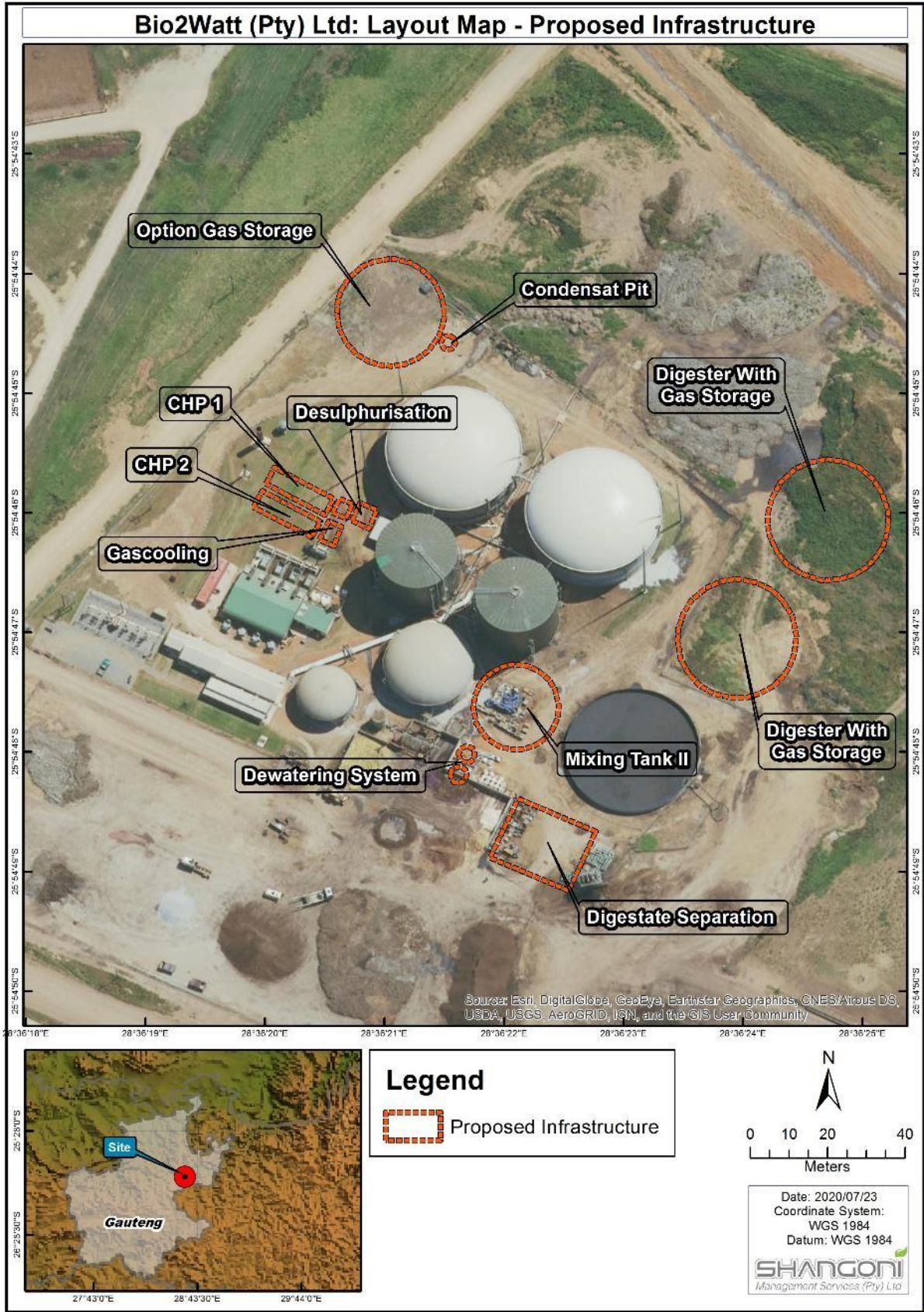


Figure 2: Layout map





Figure 3: Site plan (photos below A-G)



Figure 4: Photo A





Figure 5: Photo B



Figure 6: Photo C



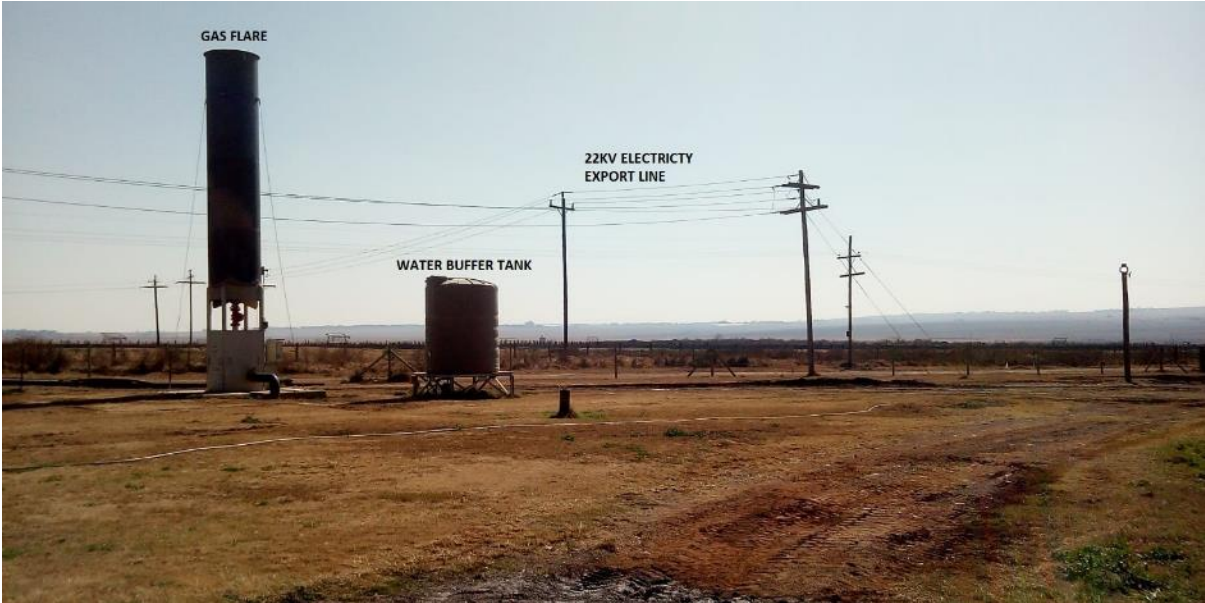


Figure 7: Photo D



Figure 8: Photo E





Figure 9: Photo F



Figure 10: Photo G





## 5 Policy and Legislative Context

The following table is a summary of the policy and legislative context applicable to the proposed development.

Table 3: Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
<p>The Constitution of the Republic of South Africa (1996).</p>	<p>Throughout the whole document</p>	<p>The Constitution of the Republic of South Africa was considered and applied to throughout the Basic Assessment Report (“BAR”), as the Constitution states that everyone has the right; (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that; (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p>
<p>The Promotion of Access to Information Act, 2000(Act No. 2 of 2000).</p>	<p>Throughout the whole document</p>	<p>Without access to information, a person may be unable to determine whether or not his or her right to just administrative action (or to an environment not harmful to human health or wellbeing or, for that matter, any other Constitutional right) has been infringed. The purpose of the Promotion of Access to Information Act (“PAIA”) is to give effect to the Constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights, and to provide for matters connected therewith. In addition to providing access to information, cognisance should be taken that PAIA also makes provision for the refusal of access to information that is deemed to be of a sensitive, confidential, or classified nature. This is captured under Chapter 4 of part 2 and 3 of PAIA.</p>
<p>The National Environmental Management Act, 1998 (Act No. 107 of 1998).  The Environmental Impact Assessment Regulations, R. 982 dated December 2014, and amended.</p>	<p>Throughout the whole document</p>	<p>An environmental authorisation was obtained in 2009 from the Gauteng Department of Agriculture, Conservation and Environment for the construction of the BBP.  The overarching principle of the National Environmental Management Act 1998 (Act 107 of 1998) (“NEMA”) is sustainable development. It defines sustainability as meaning the integration of social, economic, and</p>



APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
		<p>environmental factors into planning, implementation and decision making so as to ensure the development serves present and future generations. Section 2 of the provides for National Environmental Management Principles. These principles include:</p> <ul style="list-style-type: none"> <li>• Environmental management must place people and their needs at the forefront of its concern.</li> <li>• Development must be socially, environmentally, and economically sustainable.</li> <li>• Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated.</li> <li>• Environmental justice must be pursued.</li> <li>• Equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human wellbeing must be pursued.</li> </ul> <p>Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service, or activity exists throughout its life cycle.</p> <p>The participation of all Interested and Affected Parties (“I&amp;APs”) in environmental governance must be promoted.</p> <p>Decisions must take into account the interests, needs and values of all I&amp;APs.</p> <p>The social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</p> <p>Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.</p> <p>The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people’s common heritage.</p> <p>The costs of remedying pollution, environmental degradation, and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health</p>



APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
		<p>effects must be paid for by those responsible for harming the environment.</p> <p>On 04 December 2014, the then Department of Environmental Affairs (“DEA”) published the 2014 NEMA Environmental Impact Assessment (“EIA”) Regulations and listed activities in Government Gazette No. 38282, which was amended in 2017.</p> <p>The proposed upgrade of the existing Bronkhorstspuit Biogas Plant (“BBP”) will follow a Basic Assessment process under NEMA.</p>
<p>Guideline on Need and Desirability in terms of the Environmental Impact Assessment (“EIA”) Regulations, 2017.</p>	<p>Part A Section 6.1</p>	<p>The need and desirability were assessed for the proposed upgrade of the existing BBP and are discussed in Section 6 below in terms of the required format contained in the Guideline on Need and Desirability (2017).</p>
<p>The National Environmental Management: Biodiversity (Act 10 of 2004, as amended).</p>	<p>Chapter E and F of Part A Section 7.4.1 of</p>	<p>Biodiversity related to the proposed upgrade of the existing BBP were considered when sites were selected, and alternatives considered. No permits and/or licences in terms of National Environmental Management: Biodiversity (Act 10 of 2004, as amended) will be required for the proposed activity.</p>
<p>Alien and Invasive Species Regulations (GN R598 dated 2014).</p>		<p>The occurrence of alien and invasive species will be assessed and mitigated (in accordance with these regulations) during the construction and operational phases of the proposed upgrade of the existing BBP.</p>
<p>Conservation of Agricultural Resources (Act 43 of 1983).</p>		<p>The proposed site has in the past has been extensively utilised for cattle grazing. Erosion potential will be assessed and mitigated (in accordance with this act) during the construction and operational phases of the proposed upgrade of the existing BBP.</p>
<p>SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments.</p>	<p>Chapter J of Part A Section 7.4.1</p>	<p>The SABS Code of Practice 0103 will be taken into account when the mitigation measures for the proposed upgrade of the existing BBP are formulated.</p>



APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
<p>National Environmental Management: Waste Act (Act No. 59 of 2008, as amended).</p>	<p>Section 4 of Part A</p>	<p>The BBP was issued a waste licence in 2010 by the then Department of Environmental Affairs. Category A1 “<i>The storage of general waste in lagoons</i>” and A10 “<i>The disposal of general waste to land covering an area of more than 50m<sup>2</sup> but less than 200m<sup>2</sup> and with a total capacity not exceeding 25 000 tons</i>” were authorised.</p> <p>As a result of the upgrade, Category A13 is triggered.</p> <p>To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;</p> <ul style="list-style-type: none"> <li>• To provide for institutional arrangements and planning matters;</li> <li>• To provide for national norms and standards for regulating the management of waste by all spheres of government;</li> <li>• To provide for specific waste management measures;</li> <li>• To provide for the licensing and control of waste management activities;</li> <li>• To provide for the remediation of contaminated land;</li> <li>• To provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.</li> </ul>
<p>National Heritage Resources Act (Act No. 25 of 1999, as amended).</p>	<p>Chapter K of Part A section 7.4.1</p>	<p>Cultural heritage includes areas set aside for conservation, special or historical landscapes and areas of archaeological significance, none of which occur upon the farm where the proposed upgrade of the existing BBP is located. According to Sidney Miller 2020 “No heritage remains were observed”.</p> <p>A Palaeontological Desk Top study (annexure F) was conducted. Dr Fourie 2020 found the potential impact of the development on fossil heritage is HIGH for the Silverton Formation [and VERY LOW for the diabase] and therefore a field survey will be necessary for this development (according to SAHRA protocol) if fossils are found during construction. A Phase 2 PIA and or mitigation are generally</p>



APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
		recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations and blasting (stromatolites).
The National Environmental Management: Air Quality (Act 39 of 2004, as amended).	Chapter I of Part A section 7.4.1	An Atmospheric Emission Licence was granted in 2016 for subcategory 10: Animal matter processing for the 4.5 MW Biogas Plant. The AEL is currently being amended to include the upgrade activities and associated emissions for the 8.4 MW Biogas Plant. Attached as annexure C.
The National Water Act (Act No. 36 of 1998, as amended).	Chapter G and H of Part A Section 7.4.1	A Water Use Licence was issued in 2013 by the Department of Water Affairs for Section 21 (e) engaging in controlled activity, and Section 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource. Attached as annexure C.

## 6 Need and desirability of the proposed activities

### 6.1 Need and Desirability in terms of the Guideline on Need and Desirability, 2017

In 2017, the Department of Environmental Affairs published an Integrated Environmental Management Guideline, the Guideline on Need and Desirability. The following table indicates on how the guideline requirement were considered in this Basic Assessment Report (“BAR”):

Table 4: Need and desirability of the Bronkhorstspruit Biogas Plant

Requirement	Part where requirement is addressed/response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? <sup>1</sup>	The upgrade to the BBP will have a minimal impact on the ecological integrity of the area. Refer to Chapters E and F of Part A Section 7.4.1 of this document and Section 7.5 for potential impacts.
1.1 How were the following ecological integrity considerations taken into account?	
1.1.1 Threatened Ecosystems <sup>2</sup>	
1.1.2 Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal	

<sup>1</sup> Section 24 of the Constitution and section 2(4)(a)(vi) of NEMA refer.

<sup>2</sup> Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).



Requirement	Part where requirement is addressed/response
<p><i>shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure<sup>3</sup></i></p>	
<p><i>1.1.3 Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”).</i></p>	
<p><i>1.1.4 Conservation targets</i></p>	
<p><i>1.1.5 Ecological drivers of the ecosystem.</i></p>	
<p><i>1.1.6 Environmental Management Framework.</i></p>	<p>The Spatial Development Framework (“SDF”) is the legislated component of the municipality’s Integrated Development Plan (“IDP”) that prescribes development strategies and policy guidelines to restructure and reengineer the urban and rural form. The SDF is the municipality’s long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The BBP has considered and is guided by the Regions’ SDF and IDP priorities of the area.</p>
<p><i>1.1.7 Spatial Development Framework.</i></p>	<p>The Gauteng Provincial Environmental Management Framework has been used to assist in the determination of land use zones and to guide sustainable land use management.</p>
<p><i>1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)<sup>4</sup></i></p>	<p>The BBP (and proposed upgrade) is located in an Industrial and large commercial focus zone. The BBP is located close to poultry houses and Beefcors cattle feedlot. The cattle manure at the Beefcor feedlot releases a complex of gases into the atmosphere. Among these gases are carbon dioxide, organic odorants and ammonia. The potential impacts and mitigation measures will be further discussed and assessed in greater detail as part of the Impact risk assessment in Part A Section 7.5 of this document.</p>

<sup>3</sup> Section 2(4)(r) of NEMA refers.

<sup>4</sup> Section 2(4)(n) of NEMA refers



Requirement	Part where requirement is addressed/response
<p>1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?<sup>5</sup></p>	<p>The preliminary potential impacts that have been identified and may occur as a result of the proposed activities have been discussed in Part A Section 7.5 of this document.</p>
<p>1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?<sup>6</sup></p>	
<p>1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?<sup>7</sup></p>	<p>The BBP adopted an anaerobic digestion (“AD”) process to recover value from organic wastes (fruit &amp; vegetable), chicken sludge, food and beverage waste and cattle manure to generate biogas for power production. The AD process converts organic matter/waste into biogas, a source of renewable energy, and a nutrient rich organic fraction known as digestate will also be produced as a by-product.</p> <p>Bronkhorstspruit Biogas Plant produces electrical power by digesting cattle manure and organic waste under anaerobic conditions to generate biogas that is used to fuel gas engines that drive electrical generators.</p>
<p>1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation’s cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?<sup>8</sup></p>	<p>The closest heritage site is a monument commemorating the Battle of Bronkhorstspruit of 1886, which is located at the intersection of the R25 and R4233. A small graveyard was also noticed near a smallholding on the gravel road approximately 2 km from the site. There are no sites of cultural heritage and archaeological importance occurring on the farm where the proposed upgrade of the BBP is located.</p>

<sup>5</sup> Section 24 of the Constitution and Sections 2(4)(a)(i) and 2(4)(b) of NEMA refer.

<sup>6</sup> Section 24 of the Constitution and Sections 2(4)(a)(ii) and 2(4)(b) of NEMA refer

<sup>7</sup> Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer

<sup>8</sup> Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.



Requirement	Part where requirement is addressed/response
	According to Sidney Miller 2020 “No heritage remains were observed”.
1.6 How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts? <sup>9</sup>	The BBP is a renewable energy facility. The BBP is very efficient at digesting waste and converting the produced biogas to electricity. This energy will feed into the Eskom grid and will assist in reducing the need for load shedding. Further benefits include the production of bio-fertilizers that can be used in agriculture.
1.7 How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? <sup>10</sup>	The potential impacts that may occur as a result of the BBP upgrade have been identified and discussed in Part A Section 7.5. Refer to Part B Section 1.4.4 for the mitigation measures to be applied.
1.7.1 <i>Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. dematerialised growth)? (note sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</i>	The BBP adopted an anaerobic digestion (“AD”) process to recover value from organic wastes (fruit & vegetable), chicken sludge, food and beverage waste and cattle manure to generate biogas for power production. The AD process converts organic matter/waste into biogas, a source of renewable energy, and a nutrient rich organic fraction known as digestate will also be produced as a by-product.
1.7.2 <i>Does the proposed use of natural resources constitute the best use thereof? Is the use</i>	

<sup>9</sup> Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer

<sup>10</sup> Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer





Requirement	Part where requirement is addressed/response
<p><i>justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</i></p>	
<p>1.7.3 Do the proposed location, type and scale of development promote a reduced dependency on resources?</p>	
<p>1.8 How were a risk-averse and cautious approach applied in terms of ecological impacts?<sup>11</sup></p>	<p>The BBP upgrade will have a minimal impact on the ecological integrity of the area.</p> <p>A conservative approach in terms of the identification and assessing of environmental impacts associated with the BBP upgrade is included in Part A Section 7.5, and the mitigation measures have been provided in Part B Section 1.4.4.</p>
<p>1.8.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</p>	<p>The impacts were assessed in terms of environmental, social and economic aspects that may relate to the proposed development. The impacts identified have been assigned a significance rating as well as proposed mitigation measures.</p>
<p>1.8.2 What is the level of risk associated with the limits of current knowledge?</p>	<p>The level of risk associated with the limits of current knowledge can be considered low. The potential risks have been identified in Part A Section 7.5 and will be further assessed in detail in Part B Section 8 in the Environmental Management Programme of this document.</p>
<p>1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</p>	<p>All information provided by the applicant and previous Final Scoping and EIA conducted for the BBP were used in compilation of this BAR.</p>
<p>1.9 How will the ecological impacts resulting from this development impact on people's environmental right in terms following:<sup>12</sup></p>	
<p>1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid</p>	<p>The potential impacts that may occur as a result of the proposed activities have been identified and discussed in Part A Section 7.5 of. The impacts have also been assessed and mitigation</p>

<sup>11</sup> Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.

<sup>12</sup> Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer



Requirement	Part where requirement is addressed/response
<i>negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i>	measures were explored to minimise and remediate the impacts.
1.9.2 <i>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</i>	The positive and negative cumulative impacts have been described in Part A Section 7.7 of this document. Alternatives identified have been described in Part A Section 7.1 of this document.
1.10 Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	
1.11 Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	
1.12 Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the “best practicable environmental option” in terms of ecological considerations? <sup>13</sup>	
1.13 Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area? <sup>14</sup>	The positive and negative cumulative impacts have been described in Part A Section 7.7 of this document.

**2. “Promoting justifiable economic and social development”<sup>15</sup>**

2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?

<sup>13</sup> Section 2(4)(b) of NEMA refer

<sup>14</sup> Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer

<sup>15</sup> Section 24 of the Constitution refers.



Requirement	Part where requirement is addressed/response
2.1.1 <i>The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</i>	
2.1.2 <i>Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),</i>	
2.1.3 <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</i>	
2.1.4 <i>Municipal Economic Development Strategy ("LED Strategy").</i>	
2.2 Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	<p>The Spatial Development Framework ("SDF") is the legislated component of the municipality's Integrated Development Plan ("IDP") that prescribes development strategies and policy guidelines to restructure and re-engineer the urban and rural form. The SDF is the municipality's long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The BBP has considered and is guided by the regions' SDF and IDP priorities of the area.</p>
2.2.1 <i>Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?</i>	
2.3 How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities? <sup>16</sup>	
2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? <sup>17</sup> Will the impact be socially and economically sustainable in the short- and long-term?	<p>The proposed upgrade of the BBP is for a period of 20 years during which jobs will be created and will continue to contribute to the socio-economy in the local communities. The upgrade will also increase capacity of the current renewable energy plant and produce more electricity.</p>
2.5 In terms of location, describe how the placement of the proposed development will: <sup>18</sup>	

<sup>16</sup> Section 2(2) of NEMA refers

<sup>17</sup> Sections 2(2) and 2(4)(c) of NEMA refers.

<sup>18</sup> Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer



Requirement	Part where requirement is addressed/response
2.5.1 result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	
2.5.2 reduce the need for transport of people and goods,	The BBP is situated on the premises of one of South Africa’s largest feedlots, Beefcor, which is a source of fuel used in the BBP to generate biogas.
2.5.3 result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	The BBP upgrade will continue to contribute to the socio economy in the area, with job creation during the construction and operational activities.
2.5.4 compliment other uses in the area,	
2.5.5 be in line with the planning for the area,	
2.5.6 for urban related development, make use of underutilised land available with the urban edge,	The BBP adopted an anaerobic digestion (“AD”) process to recover value from organic wastes (fruit & vegetable), chicken sludge, food and beverage waste and cattle manure to generate biogas for power production. The AD process converts organic matter/waste into biogas, a source of renewable energy, and a nutrient rich organic fraction known as digestate will also be produced as a by-product.
2.5.7 optimise the use of existing resources and infrastructure,	Water required for the BBP is currently abstracted from the pollution control dam. Water is further produced through the digestate separation plant for reuse in the plant, hence reducing water consumption to a minimum. After the upgrade, water used in the BBP will be self-provided from the process.
2.5.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	The waste emanating from the process will be placed on a fertilizer storage area where the excess water will be drained and sent back to the settling pond where it will be recycled and used in the BBP.
2.5.9 discourage “urban sprawl” and contribute to compaction/densification,	
2.5.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	
2.5.11 encourage environmentally sustainable land development practices and processes,	The BBP upgrade will have minimal impact on the proposed area. Most of the impacts will take place during the construction phase. Detailed management and mitigation measures have been included in Part B Section 1.4.4.
2.5.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	Refer to Part A Section 7.1 for details of alternatives.



Requirement	Part where requirement is addressed/response
<p>2.5.13 <i>the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),</i></p>	<p>Biogas plants are very efficient at digesting waste and converting the produced biogas to electricity. The plant upgrade will increase the electricity generation.</p> <p>Further benefits include the production of bio-fertilizers that can be used to generate electricity and used in agriculture.</p>
<p>2.5.14 <i>impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and</i></p>	<p>There are no sites of Cultural heritage and archaeological importance occurring upon the farm where the proposed upgrade of the BBP is located.</p>
<p>2.5.15 <i>in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?</i></p>	<p>A conservative approach is followed in terms of the identification and assessing of environmental impacts associated with the BBP upgrade.</p>
<p>2.6 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?<sup>19</sup></p>	
<p>2.6.1 <i>What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?<sup>20</sup></i></p>	
<p>2.6.2 <i>What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?</i></p>	<p>The level of risk associated with the limits of current knowledge is considered to be low.</p> <p>In compilation of the risk assessment (Part A Section 7.5) and mitigation measures (Part B Section 1.4), avoidance of risk was first considered and where avoidance was not possible options for remedy, modification, minimisation and control were considered.</p>
<p>2.6.3 <i>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</i></p>	
<p>2.7 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following</p>	
<p>2.7.1 <i>Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i></p>	<p>No negative impacts on the socio-economy as a result of the BBP have been identified. This application will continue to contribute to the socio-economy in the area.</p>

<sup>19</sup> Section 2(4)(a)(vii) of NEMA refers

<sup>20</sup> Section 24(4) of NEMA refers



Requirement	Part where requirement is addressed/response
2.7.2 <i>Positive impacts. What measures were taken to enhance positive impacts?</i>	Refer to Part A Section 7.7 of this report for an identification of the positive impacts.
2.8 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	The preliminarily identified impacts of the proposed activities are presented in Part A Section 7.5 of this document.
2.9 What measures were taken to pursue the selection of the “best practicable environmental option” in terms of socio-economic considerations? <sup>21</sup>	
2.10 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? <sup>22</sup> Considering the need for social equity and justice, do the alternatives identified, allow the “best practicable environmental option” to be selected, or is there a need for other alternatives to be considered?	Refer to Part A Section 7.1 of this report for an assessment of the alternatives identified and their potential impacts on the social environment.
2.11 What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination? <sup>23</sup>	
2.12 What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the	Refer to Part B Section 1.7 for a description of the manner in which the applicant intends to inform employees of any environmental risk that may result from their work and the manner in

<sup>21</sup> Section 2(4)(b) of NEMA refers.

<sup>22</sup> Section 2(4)(c) of NEMA refers.

<sup>23</sup> Section 2(4)(d) of NEMA refers.



Requirement	Part where requirement is addressed/response
development has been addressed throughout the development's life cycle? <sup>24</sup>	which risks will be dealt with in order to avoid pollution or the degradation of the environment.
2.13 What measures were taken to:	
2.13.1 <i>ensure the participation of all interested and affected parties,</i>	The details of the Public Participation Process followed have been included in Part A Section 7.2.
2.13.2 <i>provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</i> <sup>25</sup>	
2.13.3 <i>ensure participation by vulnerable and disadvantaged persons,</i> <sup>26</sup>	
2.13.4 <i>promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,</i> <sup>27</sup>	
2.13.5 <i>ensure openness and transparency, and access to information in terms of the process,</i> <sup>28</sup>	
2.13.6 <i>ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge</i> <sup>29</sup> , and	
2.13.7 <i>ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were being promoted?</i> <sup>30</sup>	Refer to the Public Participation Report attached hereto as Annexure D. The Public Participation Report presents the detail of all Interested and Affected Parties ("I&APs") that were identified, how the I&APs were notified and involved in the process, any issues and concerns raised by the
2.14 Considering the interests, needs and values of all the interested and affected parties,	

<sup>24</sup> Section 2(4)(e) of NEMA refers.

<sup>25</sup> Section 2(4)(f) of NEMA refers

<sup>26</sup> Section 2(4)(f) of NEMA refers.

<sup>27</sup> Section 2(4)(h) of NEMA refers.

<sup>28</sup> Section 2(4)(k) of NEMA refers.

<sup>29</sup> Section 2(4)(g) of NEMA refers.

<sup>30</sup> Section 2(4)(q) of NEMA refers.



Requirement	Part where requirement is addressed/response
<p>describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?<sup>31</sup></p>	<p>I&amp;APs, and the final results of the Public Participation Process.</p>
<p>2.15 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?<sup>32</sup></p>	<p>All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will be regularly updated.</p>
<p>2.16 Describe how the development will impact on job creation in terms of, amongst other aspects</p>	
<p>2.16.1 <i>the number of temporary versus permanent jobs that will be created,</i></p>	<p>As mentioned above, jobs will be created during the construction phase (temporary) and the operation phase of the proposed upgrade of the BBP. Local labour will be considered where the necessary skills are available.</p>
<p>2.16.2 <i>whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),</i></p>	
<p>2.16.3 <i>the distance from where labourers will have to travel,</i></p>	
<p>2.16.4 <i>the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and</i></p>	
<p>2.16.5 <i>the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</i></p>	
<p>2.17 What measures were taken to ensure:</p>	
<p>2.17.1 <i>that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and</i></p>	<p>Government departments are included on the list of I&amp;APs and stakeholders and received the notifications of the proposed activity as well as notifications on the availability of the report for</p>

<sup>31</sup> Section 2(4)(g) of NEMA refers.

<sup>32</sup> Section 2(4)(j) of NEMA refers





Requirement	Part where requirement is addressed/response
2.17.2 <i>that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</i>	review. All applicable environmental legislation was considered during the basic assessment process.
2.18 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people’s common heritage? <sup>33</sup>	During the initial Public Participation Process, all issues and concerns raised by the I&APs, stakeholders and the Organs of State are considered, and responses provided.
2.19 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left? <sup>34</sup>	Mitigation measures for each of the identified impacts are described in detail in the Environmental Management Programme report (“EMPr”). The proposed mitigation measures are realistic to protect both the bio-physical and socio-economic environment in both the short- and long-term.
2.20 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment? <sup>35</sup>	The applicant will be responsible for the costs of any remediation of pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects
2.21 Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations? <sup>36</sup>	The alternatives for the BBP upgrade are discussed in Part A Section 7.1.
2.22 Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its	The cumulative impacts associated with the BBP upgrade are indicated in Part A Section 7.5.

<sup>33</sup> Section 2(4)(o) of NEMA refers.

<sup>34</sup> Section 240(1)(b)(iii) of NEMA and the National Development Plan refer.

<sup>35</sup> Section 2(4)(p) of NEMA refers.

<sup>36</sup> Section 2(4)(b) of NEMA refers.



Requirement	Part where requirement is addressed/response
location and other planned developments in the area? <sup>37</sup>	

## 7 Motivation for the overall preferred site, activities and technology alternative including a full description of the process followed to reach the proposed preferred alternatives within the site

### 7.1 Details of the development footprint alternatives considered

As per the Department of Environmental Affairs and Tourism Guideline on Criteria for determining Alternatives in EIA: “Key criteria for consideration when identifying alternatives are that they should be “practicable”, “feasible”, “relevant”, “reasonable” and “viable”. A range of alternatives exists, not all of which are necessarily appropriate for each project under consideration. The different categories of alternatives that can be identified include: (1) activity alternatives; (2) location alternatives; (3) process alternatives; (4) demand alternatives; (5) scheduling alternatives; (6) input alternatives; (7) routing alternatives; (8) site layout alternatives; (9) scale alternatives; and (10) design alternatives. The range of categories of alternatives to be evaluated should be considered along with the “no-go” alternative.

Specialist input was obtained in order to identify alternatives associated with the BBP upgrade. The following categories of alternatives have been identified by the specialist in accordance with the key criteria indicated above:

- Design alternatives; and
- No-go alternative.

#### 7.1.1 Technological alternatives

##### Preferred technological

The upgrade will entail improvements to the original design (new line will handle wear and tear better) and be able to process manure containing sand and stones more efficiently. In addition, the plant will also upgrade its output digestate handling and separation processes to produce water and bio-fertilizer as plant outputs. With the upgrade there will be no additional impacts to the existing impacts of the Biogas Plant (i.e. no additional traffic volumes).

The Biogas Plant adopted an anaerobic digestion (“AD”) process to recover value from organic wastes (fruit & vegetable, chicken sludge, food and beverage waste and cattle manure) that then generates

<sup>37</sup> Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.



biogas for power production. AD converts organic matter/waste into biogas, a source of renewable energy, and a nutrient rich organic fraction known as digestate will also be produced as a by-product.

### **Alternative technology**

The technological alternative that was investigated but not considered is wind and solar energy. Wind and solar energy are sustainable and are good generators of electricity. Wind is not particularly viable in the existing location, solar on the other hand is viable, however, it does not provide a baseload supply (only generates when sunlight is available) and there is not adequate space for the solar panels.

Wind and solar energy alternatives will not be considered for the upgrade as they were investigated and found not to be viable.

#### **7.1.2 No-go option**

The no-go option would be the status quo. The existing BBP is 4.5 MW and it is proposed to upgrade to 8.4 MW due to increased energy demands. The BBP will generate more energy than previously, to feed into the Eskom grid.

## **7.2 Details of the Public Participation Process Followed**

The public participation process for this project was conducted in terms of:

- The procedures and provisions in terms of the NEMA;
- Chapter 6 of the 2014 EIA Regulations;
- GN 807 of 2012; Public Participation Guideline; and
- Other relevant legislation such as the Promotion of Access to Information Act (“PAIA”), 2000.

A detailed public participation process was undertaken, and included the following:

- Key Stakeholder identification;
- Method of notifications, e.g. advertisements, site notices, Background Information Document (“BID”), email notifications;
- Registration of Interested and Affected Parties (“I&APs”) and key stakeholders;
- Access and opportunity to comment on the draft BAR by I&APs; and
- Consultation with the relevant authorities.

The following key stakeholder were identified and notified of the BBP upgrade:

- Landowner/s;
- Lawful occupier/s of the land;
- Landowners or lawful occupiers on adjacent properties;
- Municipal councillor;
- Municipality;
- Organs of state;
- Communities; and
- Other Competent Authorities affected.



The following notification and consultation methods were used:

- Newspaper advertisement in the Streeknuus placed on 21 August 2020.
- Site notices were placed on 21 August 2020 (refer to Annexure D for proof of site notices placed);
- Background Information Document (“BID”) sent to key stakeholders with email notifications (refer to Annexure D3 for a copy of the BID and Annexure D for proof of the notifications sent); and
- The potential key stakeholders were notified of the BBP upgrade and have been provided with the opportunity to register as an I&AP.

The draft BAR and EMPr was available to the public for review for a period of thirty (30) days, from 21 August to 19 September 2020. A hard copy was available on site at the offices. An electronic copy of the BAR and EMPr was also posted on the Shangoni’s website ([www.shangoni.co.za](http://www.shangoni.co.za)) for public comment for the same period of thirty days.

Once the public review of the draft BAR has been completed, the report will be finalised inclusive of the comments from I&APs and will be submitted to the Department of Environment, Forestry and Fisheries (“DEFF”) for review. Once DEFF has made a decision, registered stakeholders will be notified of the decision.



### 7.3 Summary of issues raised by I&APs

The table below shows the comments and issues raised and reaction to those responses.

Table 5: Comments and response table

INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
South African Heritage Resources Agency	31 August 2020	<p>Thank you for your notification regarding this development.</p> <p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.</p> <p>The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists <a href="http://www.asapa.org.za">www.asapa.org.za</a>) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.</p> <p>The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.</p> <p>Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether</p>	<p>Your comment is noted and a phase 1 heritage study (annexure E) was conducted. According to Sidney Miller 2020 “No heritage remains were observed”.</p> <p>A Palaeontological Desk Top study (annexure F) was conducted. Dr Fourie 2020 found the potential impact of the development on fossil heritage is HIGH for the Silverton Formation [and VERY LOW for the diabase] and therefore a field survey will be necessary for this development (according to SAHRA protocol) if fossils are found during construction. A Phase 2 PIA and or mitigation are generally recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations and blasting (stromatolites).</p>



INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
		<p>or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. Please note that a nationwide fossil sensitivity map is available on SAHRIS to assist applicants with determining the fossil sensitivity of a study area.</p> <p>If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for exemption from having to undertake further heritage assessments.</p> <p>Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.</p> <p>Should you have any further queries, please contact the designated official using the case number quoted above in the case header.</p>	
<p>Boschkop Community Association. Members Include: J Vermeulen(jnr); J Vermeulen; H Le Roux; J Le Roux; A Lovell; F Lovell; L Van Der Merwe; F Smit; E Vermeulen; E Steyn; G Steyn; K Wood; M Mazolli; A Van der Merwe; J Joubert; C Joubert; A Conradie; H Van der Merwe; A</p>	<p>23 September 2020</p>	<p>The Boschkop Community Association was established in 2004 to handle issues that affected our immediate community.</p> <p>The community is commercially very active and has a number of enterprises as well as private families and farmers.</p> <p>There has been a lot of dissatisfaction over the last few years about the impact that the Bio2Watt project has had on the wellbeing of resident farmers and their children.</p> <p>Other enterprises have also not been spared when it comes to offensive odours experienced in the area.</p> <p>When initially approached, most affected parties were excited to be associated with the project and looked forward to a symbiotic relationship that would benefit all. We are a community of caring individuals and would</p>	<p>Dear Frank,</p> <p>We hereby acknowledge receipt of your collective comments. The comments will be addressed in the final basic assessment report.</p>



INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
Ferreira; A Venter; R Mes; Robin Watson; S Thomas; J Conradie; L Muller.		truly like to see everyone's businesses flourish. However, this cannot be at the expense of others' health and welfare.	
		<p>When the community was approached by Bio2Watt to agree to the establishment of their plant we were guaranteed that the following criteria would be met and maintained:</p> <ol style="list-style-type: none"> <li>1. Reduction in odours</li> <li>2. Cattle manure piped wet to digester reducing dust</li> <li>3. Control of feedstock with no stockpiles</li> <li>4. Control of gas emissions</li> <li>5. Community to benefit from bi-products.</li> </ol> <p>Unfortunately, this has not materialized and, to this end, we have engaged individually and with the Boschkop Community Association, involving on-going discussions with Bio2Watt to remedy continuous transgressions that are placing severe strain on our businesses and well-being of the community.</p>	As part of the upgrade planned by BBP these items will be addressed.
		<p>We would therefore request that stringent controls be put in place with recourse measures for the community in the event of further transgressions.</p> <p>The controls should include the following:</p> <ol style="list-style-type: none"> <li>1. Testing for noxious odours. <ul style="list-style-type: none"> <li>• Monthly tests.</li> <li>• Establishment of windbreaks.</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>• Monthly tests will be conducted for noxious odours and shared with you monthly.</li> <li>• BBP propose to address the odours rather than use windbreaks. This will be achieved through constructing a 2000m<sup>3</sup> sealed storage vessel with double (redundant) automatic feedstock feeders capable of feeding up to 600m<sup>3</sup> per day. This is well above the requirements of the plant but will facilitate promptly feeding into the plant's</li> </ul>



INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
			sealed vessel and not giving odors time to emerge.
		<p>2. Only approved feedstock: cattle manure 40%; fruit; chicken daff and brewery and dairy waste.</p> <ul style="list-style-type: none"> <li>No un-approved feedstock: blood, rotten eggs, meat or industrial waste.</li> </ul>	BBP have agreed that only waste approved by the department and licensed by their waste license will be processed. There will be no unapproved feedstock such as blood, rotten eggs meat or industrial waste. There are also significant modifications proposed as part of the upgrade to filter grit/stones from manure at the plant to consume such volume.
		3. Feedstock to be fed directly into closed /sealed vessels.	BBP propose to feed the feedstock directly into the 2000m <sup>3</sup> sealed storage vessel.
		<p>4. Only the required amounts of feedstock be brought onto the site for immediate consumption.</p> <ul style="list-style-type: none"> <li>No stock-piling of over supplied feedstock outside of the digesters, that lead to unacceptable odours and contamination</li> </ul>	The 2000m <sup>3</sup> sealed vessel also serves as a buffer tank to absorb over supply days, whilst allowing consistent supply into the plant for days of no or under supply.
		<p>5. Over-supplied rotten feedstock should be removed.</p> <ul style="list-style-type: none"> <li>In the event of plant failure unused feedstock should be removed and stored far enough away from neighbours as to not inconvenience them with unacceptable odours.</li> </ul>	BBP have agreed and will set in place a waste removal contingency plan.





INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
		<p>6. Digestate or water leaving the plant should comply with the Waste Management Act. Any waste water being used to irrigate pastures on neighbouring farms should be strictly controlled to ensure that no buildup of fibre can make its way into the Osspruit, or Kleinspruit.</p> <ul style="list-style-type: none"> <li>Weekly testing to be done.</li> <li>Water found to be outside of specifications with exceptionally high levels of sodium should be sent offsite by tanker for further processing.</li> </ul>	<p>BBP have agreed that regular testing will be done.</p> <p>Sodium will be controlled by declining feedstocks before entering the plant. BBP have agreed that water found to be outside of the specifications with exceptionally high levels of sodium will be removed off site and processed at a municipal, private waste-water treatment works or even a registered liquids waste disposal site.</p>
		<p>7. Transportation of Feedstock arriving and water leaving should be in watertight well-maintained vehicles.</p> <ul style="list-style-type: none"> <li>No road spillages that offend resident or neighbouring farmers. No unroadworthy vehicles causing danger to other road users.</li> </ul>	<p>BBP have agreed will be monitoring for any road spillages. No unroadworthy vehicles will be permitted to transport any waste.</p>
		<p>8. No waste water to be stored in unlined and uncovered dams.</p> <ul style="list-style-type: none"> <li>Regular testing of groundwater to be done on neighbouring farms.</li> </ul>	<p>BBP don't have any sub-soil vessels which can contaminate ground water which will be undetected. All BBP above ground vessels have level monitoring and are sealed and gas tight, hence facilitating promptly detection of an unlikely leak.</p>
		<p>9. Implementation of ISO 9001 management system.</p> <ul style="list-style-type: none"> <li>Due to all the previous issues we feel the only way to control management processes is for the implementation of an Internationally recognized Management System to be implemented.</li> </ul>	<p>BBP are in the process of obtaining ISO accreditation. This process is timely and the BBP are required to pass a first audit before given</p>



INTERESTED AND AFFECTED PARTIES	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT AND SECTION WHERE IT IS ADDRESSED IN THE REPORT
		<p>In conclusion as a community we would be grateful if the above-mentioned interventions be implemented to enable us to respond when there is a non-compliance. It would be greatly appreciated that the measures be actively carried out by Bio2Watt so that the community doesn't always feel like they have to lodge complaints. It is highly irritating to have to live in an environment where you cannot enjoy the out doors because of offensive odours. Every person in the community has the right to live in clean and well managed environment.</p>	<p>accreditation. This is often 6 - 12 months after setting ISO procedures and policies are in place.</p> <p>BBP have taken note of your concerns and thank you for sharing these concern areas with us.</p>



## 7.4 The Environmental attributes associated with the baseline environment

### 7.4.1 Type of environment affected by the proposed activity

A baseline description or “status quo” of the present environmental situation is provided in this part of the document. The following attributes / aspects have been described in detail, in the following respective chapters:

- Chapter A: Geology
- Chapter B: Climate
- Chapter C: Topography
- Chapter D: Soil and land use
- Chapter E: Vegetation
- Chapter F: Fauna
- Chapter G: Surface water
- Chapter H: Groundwater
- Chapter I: Air Quality
- Chapter J: Noise
- Chapter K: Archaeology and Cultural History
- Chapter L: Sensitive Landscapes
- Chapter M: Visual Aspects
- Chapter N: Regional socio-economic structures

This section provides both a summary of the baseline environment as applicable to the BBP upgrade, informed by:

- Core Earth Resources. July 2008. Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193).
- Core Earth Resources. June 2013. Biomass-to-electricity plant, Bronkhorstspuit, Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193).

#### Chapter A: Geology

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The regional geology of the study area is dominated by the Transvaal Supergroup, particularly the Silverton Formation of the Pretoria group. The sedimentary rocks underlying the formation are dominantly arenaceous, consisting mainly of reddish brown, purple medium to coarse grained quartzitic sandstone, or gritstone with interlayered conglomerate or shale. The Pretoria Group overlies the



Chuniespoort Group, comprising the Black Reef Subgroup (composed of quartzite pebbles, sand and silt) and the Malmani Subgroup (composed of chert and dolomite).

The existing plant (and the proposed upgrade) is located on the shale layer between the quartzite of the Daspoort and Magaliesberg Formations. The shale layer has been extensively intruded by parallel strips of Transvaal diabase lava striking in a north-west, south-east direction. Underlying the study area is a layer of slate and hornfel which comprise the Silverton Formation. The shale areas are generally stable and do not pose a risk in terms of seismic or tectonic movement, although the diabase sills and dykes have the potential to expand and become volumetrically unstable.

## Chapter B: Climate

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The study area in question occurs within the Gauteng Highveld, the climate of which is typically mild, or cool to moderate, with warm, wet summers and cool dry winters. The average minimum and maximum temperatures recorded for the region are 3°C and 27°C respectively, with the summer maximum averaging 26°C, the winter maximum averaging 9.8°C. The winter months (June to August) are characterised by intermittent cold spells, especially during July and August, and occasionally during September.

The rainy season occurs roughly from October to March with an average rainfall of 700 mm being recorded, although this varies from 559 mm to 960 mm. The vast majority of the rainfall occurs in the form of short-duration, high-intensity thunderstorms, with extreme weather conditions (hail, fog and snow) rarely occurring. The average relative humidity throughout the year can range from 38-69%.

The winter air is typically dry, with the long clear nights and the absence of wind resulting in the occurrence of frost on average 30 days per year.

## Chapter C: Topography

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The topography for the region wherein the existing plant (and proposed upgrade) is located, consists of hills, ridges and undulating plains with low to moderate relief, forming the southern extremity of the Springbok Flats and rising to levels of between 1450 m and 1600 m above sea level. The study area itself is flat and the region can be described as gently rolling countryside with the Magaliesberg quartzite ridge to the north.



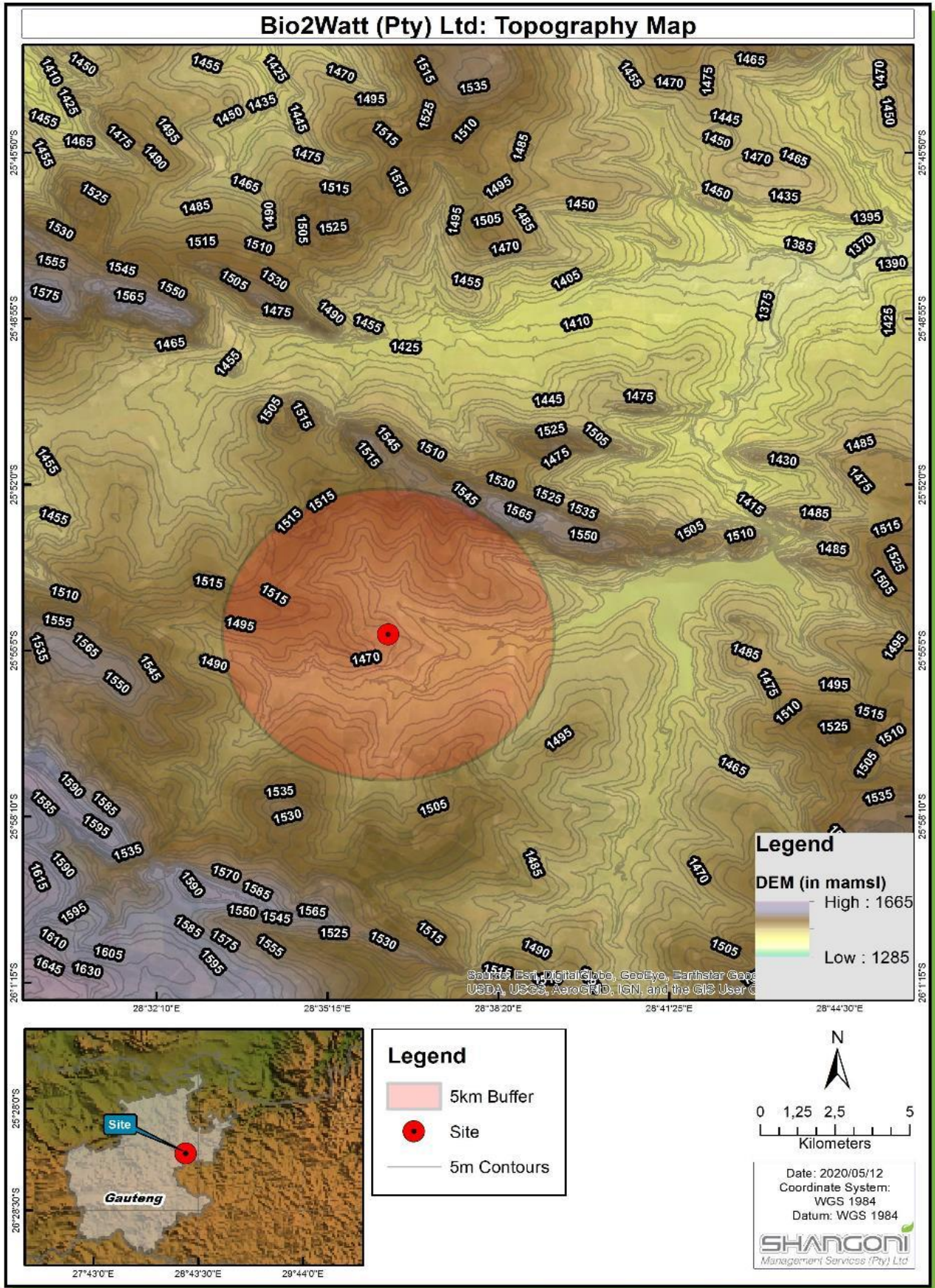


Figure 11: Topography associated with the BBP upgrade



## Chapter D: Soil and land use

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources.

### Soils

The soil profile for the area reflects the underlying geology and consists of a thin growing medium or topsoil that 03.0 is underlain by a nodular or hardpan ferricrete transition zone or pebble marker. The soils in the area are generally of a high quality and subsequently the land is zoned for agriculture. The residual soils of the diabase dykes comprise yellowish brown clayey silt, while the Silverton shales have been slightly decomposed to soft rock. Both the shales and diabase are fine-grained and as such are of low permeability, except where sections of decomposed bedrock are fissured or slightly jointed.

### Land use and surface infrastructure

The immediate study area, as well as the land upon which the plant (and proposed upgrade) is located, is zoned for agriculture and as such the principal land use is grazing for livestock and for grain crops. The area is littered with widely-scattered homesteads, while a significant number of sheds, silos, storage buildings and cattle-farming infrastructure i.e. paddocks, composting heaps and feedlots are located upon the Beefcor farm on Boschkop 543 JR (the site of the proposed development). The infrastructure of the area immediately surrounding the proposed activity comprises rural gravel access roads and single-storey steel and brick structures. The nearest major powerlines in the vicinity lie approximately 7 km north of the Magaliesberg Ridge while the nearest national road is the R25, which connects Benoni and Bronkhorstspuit and lies 4 km North West of the proposed development.

## Chapter E: Vegetation

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The area in question may be described as natural grassland and is classified as the central variation of the Transvaal Bankenveld. Any trees present within the immediate regions vary from farm to farm, with little diverse vegetation being present due to clearing of the land surface for agricultural purposes.

Naturally occurring grasses are sour and wiry with the dominant species being Narrow Heart Love Grass (*Eragrostis racemosa*), Purple Finger Grass (*Gigitaria tricholaenoides*), Creeping Brittle Grass (*Setaria flabellata*) and Wire Grass (*Heterspogan contortus*).

The site has in the past been extensively utilised for cattle grazing. The conservation plan for Kungwini/Metswedding does not identify any conservation areas on the proposed site. The nearest conservation area is the Bronkhorstspuit Dam Nature Reserve, a popular recreational area, which lies approximately 7 km to the North East of the proposed development.



## Chapter F: Fauna

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The site is largely devoid of any medium to large animals except for the cattle from the farm upon which the development is to take place. There are no recorded threatened or red data species upon the site and this was confirmed by the conservation plan supplied by Gauteng Department of Agriculture, Conservation and Environment (“GDACE”). A number of smaller animals typically associated with rural areas and land zoned for agriculture would be found on-site, including rodents i.e. rats and field-mice, lizards, grasshoppers, various beetles and the associated avifauna which prey upon these. A number of common birds were also noticed within the vicinity of the storm water dams.

According to the GDACE Biodiversity Unit the following species could potentially be found within the study area and could be impacted on by the proposed development. Mammals, with specific reference to wetland mammals (*Chrysospalax villosus*, *Mystromys lbicaudatus*, *Lutra maculicollis*, *Amblysomus septentrionalis*, *Dasymys incomtus*); Amphibians, with specific reference to the Giant Bullfrog (*Pyxicephalus adspersus*); and Birds, with specific reference to the African Grass Owl (*Tyto capensis*) and Secretarybird (*Sagittarius serpentarius*).

## Chapter G: Surface water

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008.

Two surface water bodies lying within 2 km of the proposed development serve to drain the site, namely the Kleinspruit (which is non-perennial) and the Osspruit (which is perennial), both of which fall in the catchment of the Bronkhorstspuit dam 3. The water quality of the Osspruit was tested in 2006 by SGS South Africa who reported the following results:

Table 6: Results of water quality of the Osspruit (2006)

Analysis	Results
pH at 25°C	6.5
Total Dissolved Solids	168
Conductivity at 25°C	21
Chemical Oxygen Demand	6.8
Sodium (Na)	12
Potassium (K)	16521



Analysis	Results
Cl- (Titrimetric)	<0.01
P	<0.07
Sulphate	16
Calcium (Ca)	22
Magnesium (Mg)	18
Iron (Fe)	<0.01
Manganese (Mn)	<0.01
Zinc (Zn)	<0.01

When compared to the quality of the SABS potable water supply, it can be ascertained that the water in the Osspruit is of a quality sufficient for human consumption and thus hasn't been disturbed or polluted by human or agricultural activities.

There are also a number of dams and drainage culverts upon the land where the BBP is located. The 12 dams and culverts all form part of a storm water drainage system for the Beefcor cattle farm that is also located upon farm Boschkop 543 JR. All runoff from the cattle feedlots leads into the culverts and collects in one of the dams, with the result that the water in the dams is partially contaminated with manure, cattle feed and debris. The water within these dams all have pHs of between 7 and 8, values for total dissolved solids between 1500 and 2500 mg/l, high levels of potassium between 600 and 800 mg/l and high chemical oxygen demand due to the presence of microorganisms in manure. This water is generally used for irrigation.

#### Chapter H: Groundwater

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspruit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspruit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008. Intertek Agri Laboratory certificate of analysis dated 10 July 2020.

As mentioned in the geological baseline information, the farm upon which the proposed upgrade is to be developed is located within the shale formation of the Pretoria Group, which is characterised by low hydraulic conductivities and very few primary voids. Shales typically form aquitards rather than aquifers because water is confined within narrow discontinuities like jointing and fracturing.

Groundwater primarily occurs within the weathered shale and underlying fractured shale with these two aquifers (referred to as the shallow weathered aquifer and the deeper fractured aquifer respectively) possibly being connected. The two aquifers are often separated by a confining layer and thus the deeper





fractured aquifer is considered a confined aquifer, while the weathered aquifer is considered unconfined.

The unconfined aquifer is more prone to surface-contamination during recharge from rainwater due to its dynamic nature. The aquifer system underlying the site is classified as minor, which can be defined as an aquifer system that is composed of fractured or potentially fractured rocks not having a high primary permeability. The extent of the aquifer is limited and the water quality variable, and yet they are usually important for local supplies and in supplying base flow for rivers, although they seldom produce large quantities of water.

The site topography appears to be closely linked to the regional groundwater table (which lies at between 1480 and 1500 m, see below) and thus was found to flow perpendicular to the groundwater contours at the site, to the north and northeast (see below). The underlying geology dictates that the flow of groundwater through the aquifer will be slow.

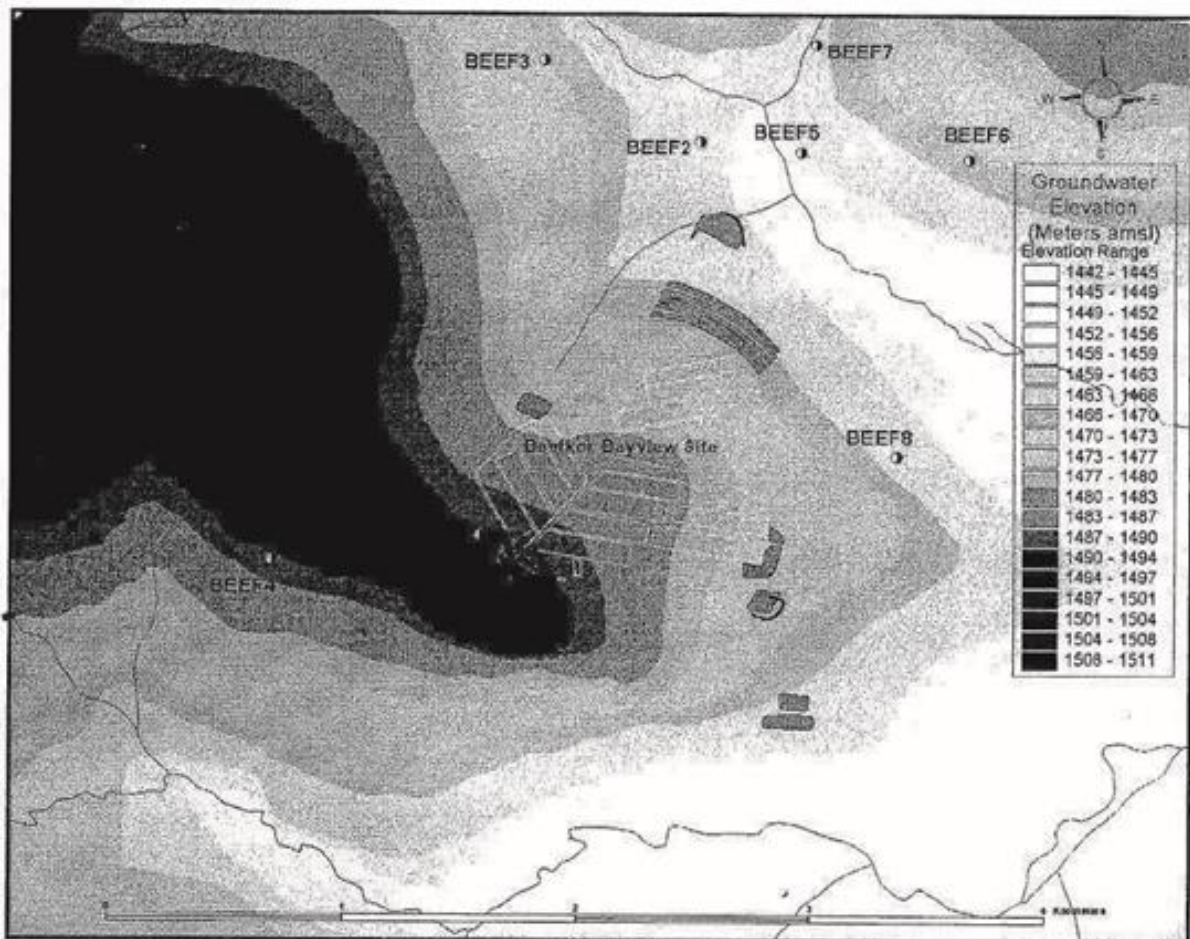


Figure 12: Regional groundwater table



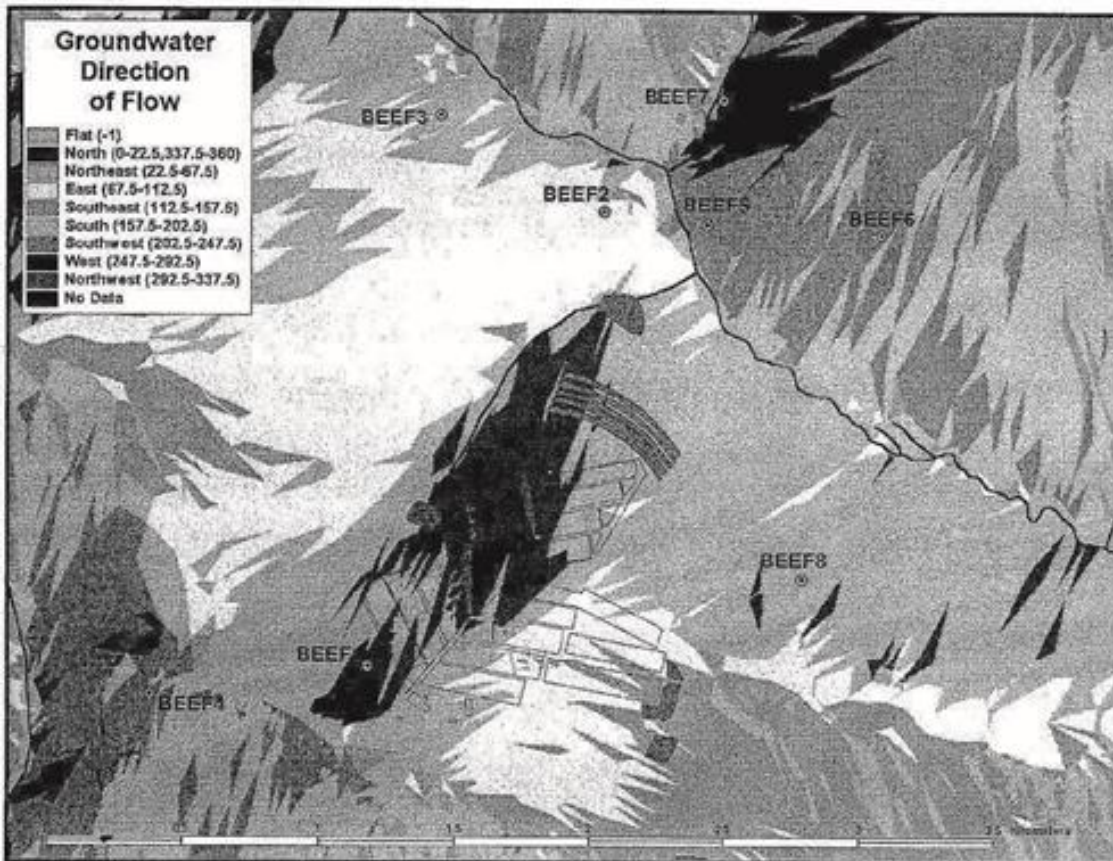


Figure 13: Direction of groundwater flow

Sampling of nearby monitoring boreholes revealed elevated concentrations of manganese (approximately 0.4 mg/l) that translates to high staining properties of the water and adverse taste but poses no health risks. High (1.2 mg/l) iron levels were also reported which are attributed to the regional geology and only pose a health risk to infants and sensitive individuals. Nitrate levels are all below the 6 mg/l but are high enough to indicate that fertilizer runoff from agricultural activities has already impacted the groundwater, while the ammonia concentrations of 1.5 mg/l indicate that manure runoff from farming activities has impacted on groundwater. Feedlot contamination of groundwater was also indicated by the chemical oxygen demand of the samples, while the use of industrial pesticides in agricultural practice was also implied by slightly elevated levels of arsenic and mercury.

Beefcorgs borehole which is used for water in the process was tested. Samples were taken on the 3 of July 2020 at 13h00 in a glass bottle and was analysed on an “as is” basis. Analysis for drinking water according to the SANS 241:2015 ed 2 was conducted. The purpose for this was to specify the quality of acceptable drinking water, defined in terms of chemical, microbiological, physical and aesthetic determinants. The following was noted on the sample:

- Fluoride

The risk posed by this is related to chronic health and it arises from the ability of a chemical determinant that causes adverse health effects after prolonged periods of exposure.



- Nitrate

The risk associated with this is acute health, which safeguards a consumer's health over a lifetime of consumption.

- Total Coliforms

This is an operational risk, which is an indicator for treatment efficiency and aftergrowth.

Based on the above analysis of the water, it would appear that it is not safe for human consumption, as the indicators exceeded that of the acceptable limits.

## Chapter I: Air Quality

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008.

The air quality for the site varies slightly between seasons. The winter atmospheric conditions typical of the region result in temperature inversions with the outcome that polluted air remains close to the surface so that winter air on the Highveld is generally of a poor quality. Winter also falls in the dry season for the region and thus the amount of dust in the air is greater during this time, although the area is already dusty due to the largely agricultural nature of the area that has resulted in large portions of land that have been stripped of vegetation by feedlot grazing. Augmenting the dust presence is the number of gravel roads in the area and the presence of vast numbers of cattle in pens.

There is little industrial smog and pollution in the area due to the zoning of land for agriculture and the only smog presence occurs in winter as a result of veld fires.

## Chapter J: Noise

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008.

The site has ambient noise levels characteristic of large-scale farming operations, namely: engine noise, exhaust reports and reversing alarms from large trucks, tractors, bulldozers and the like that are associated with agricultural activities like the transport of animals, feed and stores, the shifting of earth and general upkeep of the operation. These noises typically occur during daylight (business) hours. Other noises associated with more peri-urban areas are absent such as traffic noises, noises associated with settlements and the activities of people are all absent as there are no nearby main-roads or railways, and the nearest settlements and recreational areas lie some 10 km away.



Currently the ambient noise levels are below the limits when the doors of the generator room are closed. The Environmental Officer is monitoring the noise level on weekly basis as reported in the external audit report.

#### Chapter K: Archaeology and Cultural History

The information contained in this section is obtained from the *Biomass-to-electricity plant, Bronkhorstspuit. Final Scoping Report, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008 and compiled by Core Earth Resources, and the *Biomass-to-electricity plant, Bronkhorstspuit. Environmental Management Programme, GDACE Reference (Gaut 002/07-08/N1193)*, dated 2008

The closest heritage site is a monument commemorating the Battle of Bronkhorstspuit of 1886, which is located at the intersection of the R25 and R4233. A small graveyard was also noticed near a smallholding on the gravel road approximately 2 km from the site.

Cultural heritage also includes areas set aside for conservation, special or historical landscapes and areas of archaeological significance, none of which occur upon the farm where the proposed plant upgrade is to be developed.

According to Sidney Miller 2020 “No heritage remains were observed”.

A Palaeontological Desk Top study (annexure F) was conducted. Dr Fourie 2020 found the potential impact of the development on fossil heritage is HIGH for the Silverton Formation [and VERY LOW for the diabase] and therefore a field survey will be necessary for this development (according to SAHRA protocol) if fossils are found during construction. A Phase 2 PIA and or mitigation are generally recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations and blasting (stromatolites).

#### Chapter L: Sensitive Landscapes

The proposed upgrade of the BBP is located within the 5-km buffer, and there are NFEPA wetlands delineated (refer to figure below).



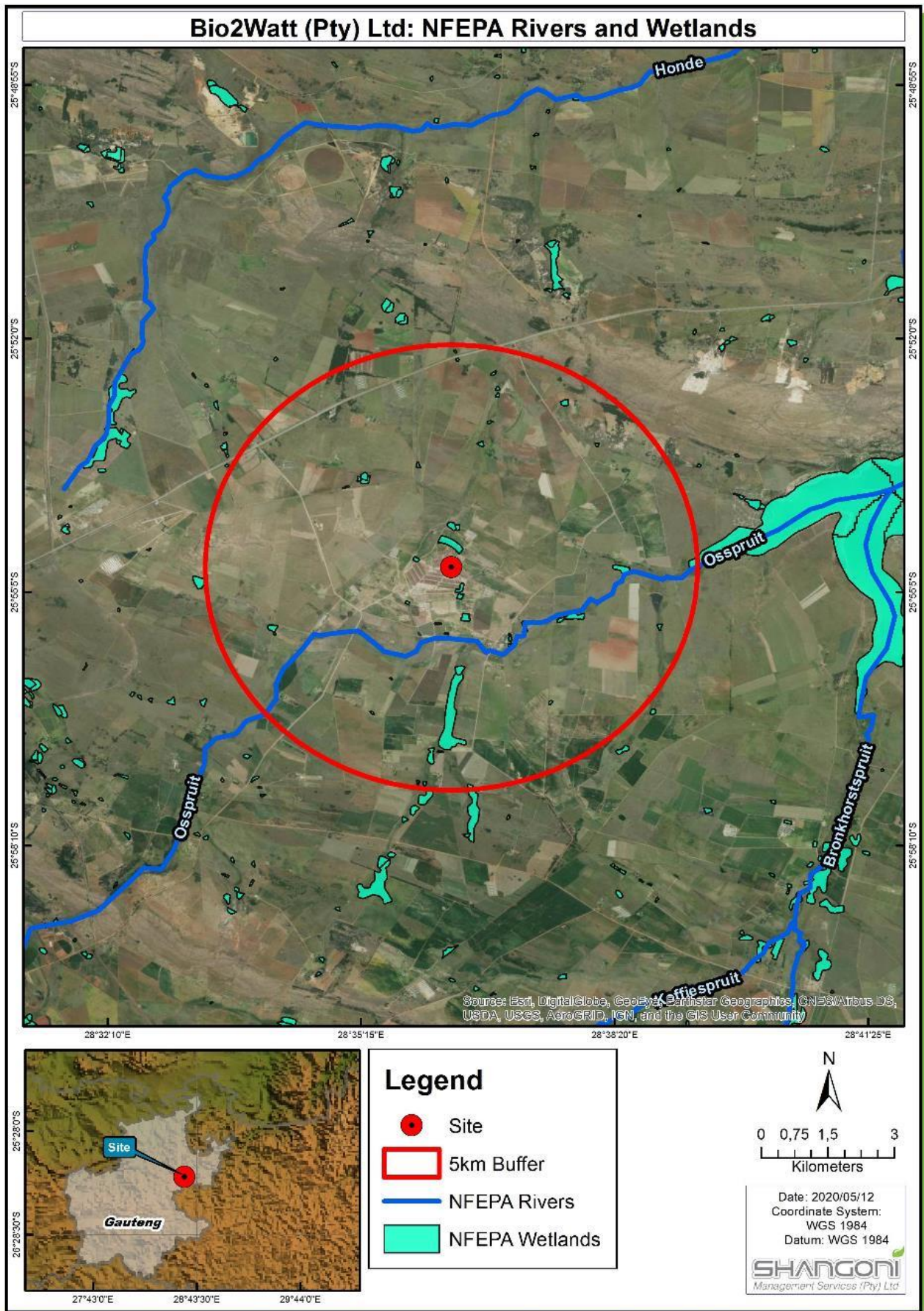


Figure 14: Wetlands associated with the BBP and associated upgrade



## Chapter M: Visual aspects

The proposed upgrade of the BBP is located within a land that is dominated by agriculture. It is situated on the premises of one of South Africa's largest feedlots, Beefcor.

## Chapter N: Regional socio-economic structure

The information contained in this section is obtained from the *City of Tshwane 2019/20 Review of the 2017/21 Integrated Development Plan, May 2019*. The BBP occurs in region 7.

Population statistics are important when analysing an economy, as the population growth directly and indirectly impacts employment and unemployment, as well as other economic indicators such as economic growth and per capita income. In the table below an 11-year trend of population estimations for City of Tshwane in comparison with the Gauteng province and the national total. The table below shows the sub-metro regions of City of Tshwane Metropolitan Municipality, 2007, 2012, 2017 (number and percentage).

With an estimated 3.31 million population, the City of Tshwane Metropolitan Municipality housed 5.8% and 24.1% of South Africa's and Gauteng's total population in 2017 respectively. Between 2007 and 2017, the population growth rate in the City of Tshwane averaged 2.92% per annum, which is close to double the growth rate of South Africa as a whole (1.56%). Gauteng's average annual growth rate came in just under at 2.57% over the same period.

*Table 7: City of Tshwane population over the years (2007, 2012, 2017)*

	2007	2012	2017	Average annual growth
<b>Region 1</b>	720 000	818 000	908 000	2.35%
<b>Region 2</b>	306 000	340 000	376 000	2.08%
<b>Region 3</b>	475 000	550 000	610 000	2.54%
<b>Region 4</b>	288 000	387 000	468 000	4.98%
<b>Region 5</b>	72 400	90 200	104 000	3.71%
<b>Region 6</b>	523 000	628 000	715 000	3.18%
<b>Region 7</b>	94 900	109 000	125 000	2.80%
<b>City of Tshwane</b>	2 478 557	2 921 997	3 306 198	2.92%



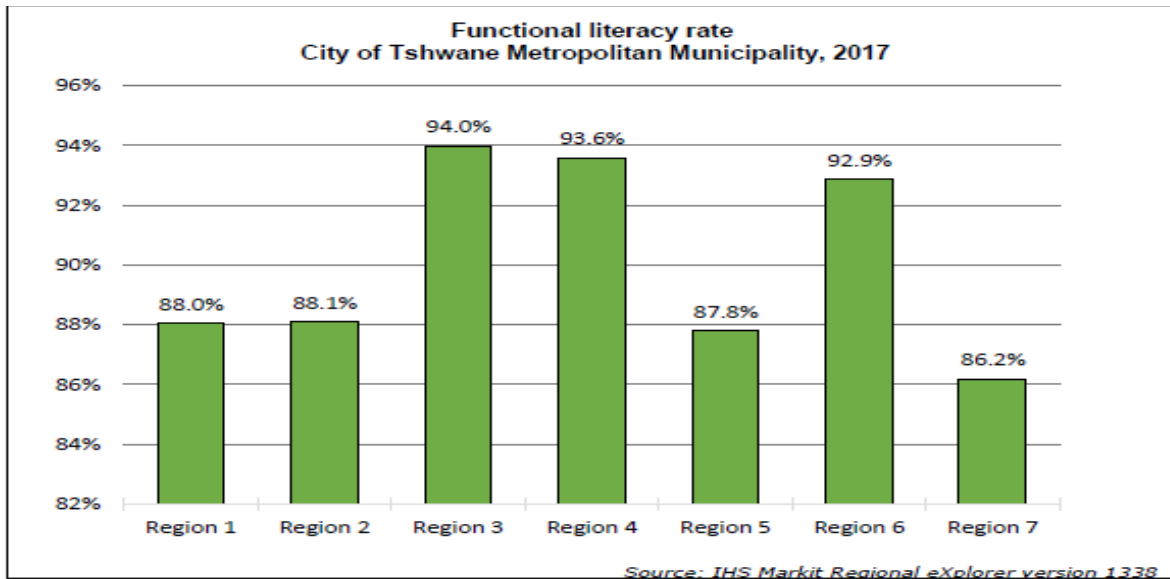


Figure 15: illustrates that region 7 has the lowest literacy rate at 86.2%.

Table 8: Illustrate that region 7 had the second lowest growth rate at 2.59%.

	2007 (Current prices)	Share of metropolitan municipality	2007 (Constant prices)	2017 (Constant prices)	Average Annual growth
<b>Region 1</b>	80.9	17.42%	37.6	53.3	3.55%
<b>Region 2</b>	24.8	5.34%	12.6	16.4	2.68%
<b>Region 3</b>	143.6	30.94%	78.9	97.3	2.13%
<b>Region 4</b>	88.8	19.13%	45.1	60.4	2.96%
<b>Region 5</b>	7.0	1.51%	3.7	4.7	2.34%
<b>Region 6</b>	108.0	23.27%	53.1	73.1	3.25%
<b>Region 7</b>	11.1	2.40%	5.8	7.5	2.59%
<b>City of Tshwane</b>	464.2		236.9	312.8	



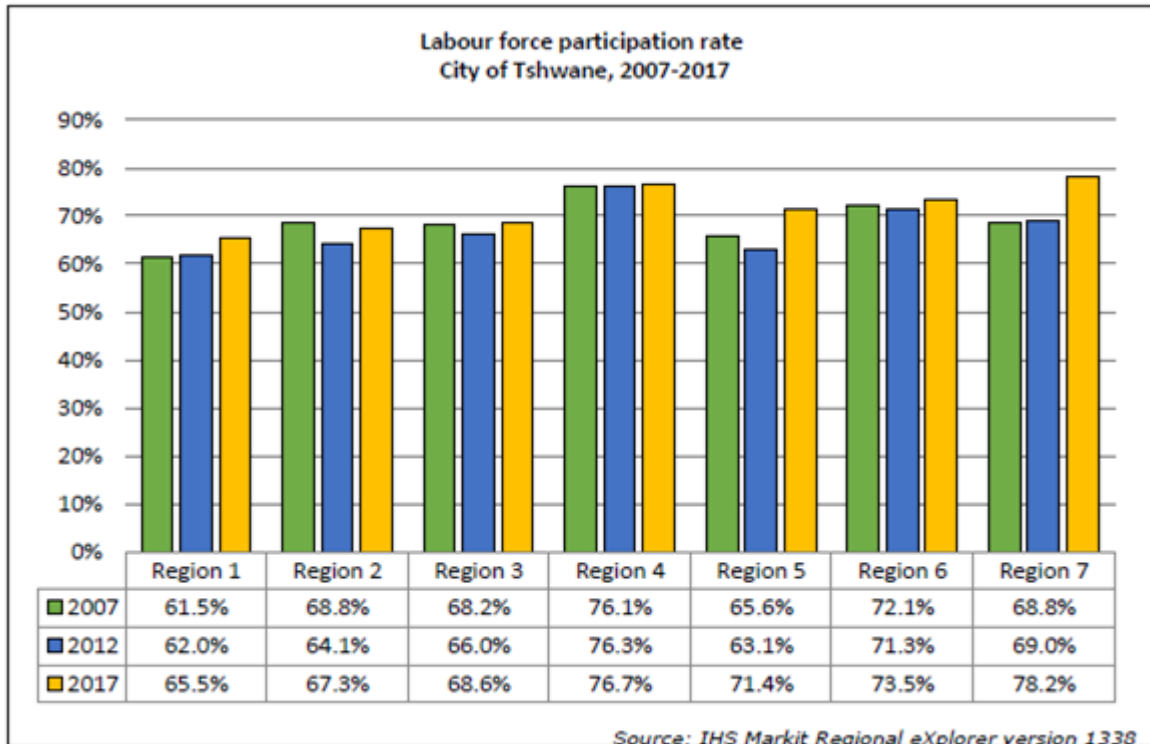


Figure 16: Labour force participation rate from 2007 to 2017.

The labour force participation rate was the highest in region 7 estimated at 78.2% in 2017.

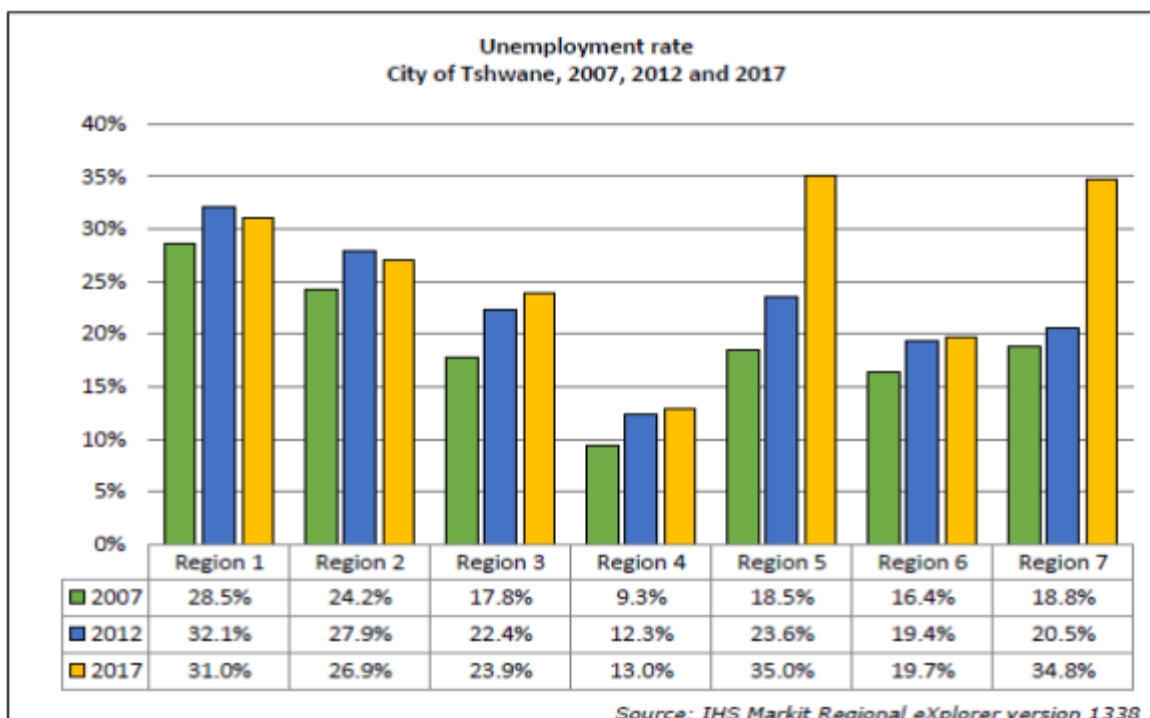


Figure 17: City of Tshwane Unemployment rate (2007, 2012 and 2017)

#### 7.4.2 Description of the current land uses

The proposed upgrade of the BBP is situated within the premises of Beefcor feedlot, which land use is agriculture.





## 7.5 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

Tables below contains preliminary potential impacts that have been identified for the activities described in the site layout plan for different phases. <sup>38</sup>

### 7.5.1 Planning/pre-construction phase

Table 9: Preliminary determination of potential impacts during the planning/pre-construction phase

Environmental Component	Activity	Impact Description	Duration	Pre-mitigation <sup>39</sup>			Reversible (Yes/No)	Irreplaceable Loss (Yes/No)	Avoided/Managed /Mitigated
				Probability	Magnitude	Significance			
Planning	Planning and design of the upgrade to the existing BBP.	Risk of non-compliance with legal requirements of national and provincial legislation in terms of the upgrade to the exiting BBP.	Planning/ pre-construction phase	1	3	L	Yes	No	Manage
Social	Planning and design of the upgrade to the existing BBP.	Poor communication and lack of transparency of project information that may lead to conflict with adjacent landowners.	Planning/ pre-construction phase	3	2	M	Yes	No	Manage
Storm water	Planning and design of the upgrade to the existing BBP.	Ineffective storm water management measures not aligned to the existing storm water management plan for the upgrade leading to potential pollution.	Planning/ pre-construction phase	1	3	L	Yes	No	Manage; Mitigate
Compliance to existing authorisations of the existing BBP, and further authorisations (e.g. AEL for upgrade)	Planning and design of the upgrade to the existing BBP.	Non-compliance with the current legal requirements of the existing environmental authorisation (“EA”), water use licence (“WUL”), waste licence (“WL”) and atmospheric emission licence (“AEL”) and future amendments and new licences	Planning/ pre-construction phase	2	2	L	Yes	No	Manage

### 7.5.2 Construction Phase

Table 10: Preliminary determination of potential impacts during the construction phase

Environmental Component	Activity	Impact Description	Duration	Pre-mitigation <sup>40</sup>			Reversible (Yes/No)	Irreplaceable Loss (Yes/No)	Avoided/Managed /Mitigated
				Probability	Magnitude	Significance			
Health and safety risk that may arise and impact on the	Construction of the upgrade to the existing BBP	Non-compliance in terms of existing health and safety protocols on site for the upgrade to the existing BBP.	Construction phase	1	3	L	Yes	No	Manage

<sup>38</sup> No decommissioning will be done as part of this Project. The BBP will be in operation until such a time the operation needs to cease. If decommissioning and closure is required, the necessary environmental authorisation will be obtained, and a rehabilitation plan will be compiled and submitted with the application.

<sup>39</sup> H = High; M = Medium; L = Low

<sup>40</sup> H = High; M = Medium; L = Low



Environmental Component	Activity	Impact Description	Duration	Pre-mitigation <sup>40</sup>			Reversible (Yes/No)	Irreplaceable Loss (Yes/No)	Avoided/Managed /Mitigated
				Probability	Magnitude	Significance			
public and construction workers.									
Soils	Construction of the upgrade to the existing BBP	Soil pollution due to hydrocarbons used on site during the upgrade.	Construction phase	1	3	L	Yes	No	Manage; Mitigate
Waste Management	Construction of the upgrade to the existing BBP	Poor waste management on site. Wastes are not separated into solids and liquids upon arrival on site	Construction phase	2	2	L	Yes	No	Manage; Mitigate
Groundwater	Construction of the upgrade to the existing BBP	Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.	Construction phase	1	3	L	Yes	No	Manage; Mitigate
	Construction of the upgrade to the existing BBP	Groundwater contamination due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used on site.	Construction phase	2	2	L	Yes	No	Manage; Mitigate
Storm water management	Construction of the upgrade to the existing BBP	Incorrect storm water management on site for the additional infrastructure in support of the upgrade of the existing BBP.	Construction phase	1	2	L	Yes	No	Manage
Atmosphere and noise	Construction of the upgrade to the existing BBP	Ambient noise levels, and dust creation are likely to increase due to the upgrade activities.	Construction phase	2	3	M	Yes	No	Manage; Mitigate
Heritage and Paleontology	Construction of the upgrade to the existing BBP	Upgrade activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	Construction phase	There are no impacts on the heritage as no heritage sites are located on the 2-hectare area applicable to the upgrade.					
		Construction activities may disturb or destroy fossils or bedrock of paleontological sensitivity.	Construction phase	1	3	L	Yes	No	Manage; Mitigate
Social	Construction of the upgrade to the existing BBP	Job creation (positive impacts)	Construction phase	Positive impacts			Positive impacts	Positive impacts	Positive impacts
		Risk associated with poor communication between landowners and the team that may arise in conflict.	Construction phase	2	3	M	Yes	No	Manage
Alien invasive plants	Construction of the upgrade to the existing BBP	Proliferation of alien invasive species on areas that will be cleared of vegetation for the upgrade.	Construction phase	2	2	L	Yes	No	Manage; Mitigate



### 7.5.3 Operational Phase

Table 11: Preliminary determination of potential impacts during the operational phase

Environmental Component	Activity	Impact Description	Duration	Pre-mitigation <sup>41</sup>			Reversible (Yes/No)	Irreplaceable Loss (Yes/No)	Avoided/Managed /Mitigated
				Probability	Magnitude	Significance			
Soil	Operation of the upgraded infrastructure to the existing BBP	Soil pollution due to hydrocarbons including fuel greases and oils used on site during the upgrade activities or spill event associated with the upgrade activities.	Operational phase	1	2	L	Yes	No	Manage; Mitigate
Groundwater	Operation of the upgraded infrastructure to the existing BBP	Groundwater pollution due to activities undertaken for the upgrade that may include: <ul style="list-style-type: none"> <li>• Potential spills of hazardous chemical substances including fuel, greases and oils used on site during maintenance activities.</li> <li>• Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.</li> <li>• Irrigation of lands with affected water not meeting the irrigation requirements as set out in table 1 of Annexure II of the Water use licence</li> </ul>	Operational phase	3	2	M	Yes	No	Manage; Mitigate
Storm water management	Operation of the upgraded infrastructure to the existing BBP	Incorrect storm water management on site for the additional infrastructure in support of the upgrade.	Operational phase	1	2	L	Yes	No	Manage; Mitigate
Noise	Operation of the upgraded infrastructure to the existing BBP	Ambient noise levels are likely to increase as a result of additional infrastructure on site that are related to the upgrade.	Operational phase	1	3	L	Yes	No	Manage; Mitigate
Atmosphere, and odour	Operation of the upgraded infrastructure to the existing BBP	Deterioration of air quality and unwanted odours associated with the upgrade.	Operational phase	1	2	L	Yes	No	Manage; Mitigate
Atmosphere, and odour	Operation of the upgraded infrastructure to the existing BBP	The methane released from animal manure is a major constituent of greenhouse gas. In using the waste and burning methane it reduces greenhouse gas emissions (The global warming potential of methane is 25 times higher than that of CO <sub>2</sub> ; the latter being a product of the combustion process)	Operational phase	Positive Impacts			Positive Impacts	Positive Impacts	Positive Impacts
Socio-economic	Operation of the upgraded infrastructure to the existing BBP	Providing additional electricity to the already strained power supply grid.	Operational phase	Positive Impacts			Positive Impacts	Positive Impacts	Positive Impacts
		Sourcing of local goods and services.	Operational phase	Positive Impacts			Yes	No	Manage

<sup>41</sup> H = High; M = Medium; L = Low



Environmental Component	Activity	Impact Description	Duration	Pre-mitigation <sup>41</sup>			Reversible (Yes/No)	Irreplaceable Loss (Yes/No)	Avoided/Managed /Mitigated
				Probability	Magnitude	Significance			
Waste management	Operation of the upgraded infrastructure to the existing BBP	Incorrect disposal of waste and not in accordance with the existing waste licence.	Operational phase	1	2	L	Yes	No	Manage; Mitigate
Access to the BBP	Operation of the upgraded infrastructure to the existing BBP	Unauthorised access to the BBP.	Operational phase	1	3	L	Yes	No	Manage



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

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk. Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, prediction and evaluation,
- Specification of the impact identification techniques,
- Criteria to evaluate the significance of impacts,
- Design of mitigation measures to lessen impacts,
- Definition of the different types of impacts (indirect, direct or cumulative), and
- Specification of uncertainties.

After all impacts have been identified, the nature of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined, and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 18 below for a model representing the above principle (as contained in the DWS's Best Practice Guideline: *G4 – Impact Prediction*).

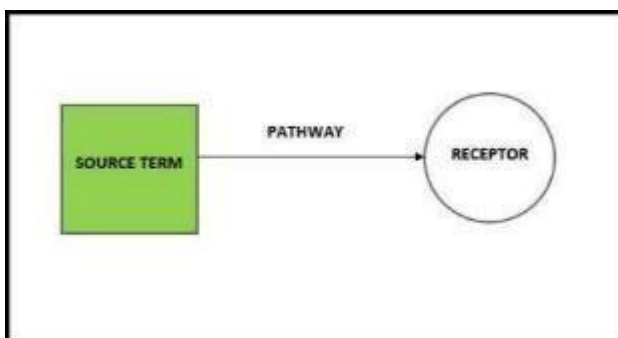


Figure 18 DWS's model for impact prediction (risk assessment).

Table 12 and Table 13 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 14 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.



Table 12 Determination of Probability of Impact.

Score	Frequency of Aspect / Unwanted Event	Availability of Pathway from the source to the receptor	Availability of Receptor
1	Never known to have happened, but may happen	A pathway to allow for the impact to occur is never available	The receptor is never available
2	Known to happen in industry	A pathway to allow for the impact to occur is almost never available	The receptor is almost never available
3	< once a year	A pathway to allow for the impact to occur is sometimes available	The receptor is sometimes available
4	Once per year to up to once per month	A pathway to allow for the impact to occur is almost always available	The receptor is almost always available
5	Once a month - Continuous	A pathway to allow for the impact to occur is always available	The receptor is always available

**Step 1:** Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor



Table 13: Environmental impact assessment

Score	Source			Receptor		
	Duration of impact	Extent	Volume / Quantity / Intensity	Toxicity / Destruction Effect	Reversibility	Sensitivity of environmental component
1	Lasting days to a month	Effect limited to the site. (metres);	Very small quantities / volumes / intensity (e.g. < 50 ℓ or < 1 ha)	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state.
2	Lasting 1 month to 1 year	Effect limited to the activity and its immediate surroundings. (tens of metres)	Small quantities / volumes / intensity (e.g. 50 ℓ to 210 ℓ or 1 ha to 5 ha)	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	Receptor of low significance / sensitivity
3	Lasting 1 – 5 years	Impacts on extended area beyond site boundary (hundreds of metres)	Moderate quantities / volumes / intensity (e.g. > 210 ℓ < 5000 ℓ or 5 – 8 ha)	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	Current environmental component(s) are moderately disturbed from the natural state.
4	Lasting 5 years to Life of Organisation	Impact on local scale / adjacent sites (km)	Very large quantities / volumes / intensity (e.g. 5000 ℓ – 10 000 ℓ or 8 ha– 12 ha)	Toxic (e.g. diesel & Sodium Hydroxide)	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	No environmentally sensitive components.
5	Beyond life of Organisation / Permanent impacts	Extends widely (nationally or globally)	Very large quantities / volumes / intensity (e.g. > 10 000 ℓ or > 12 ha)	Highly toxic (e.g. arsenic or TCE)	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	Current environmental component(s) are a mix of disturbed and undisturbed areas.

**Step 2:** Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.



Table 14: Determination of severity of the impact.

Environmental Impact Rating / Priority					
Probability	Magnitude				
	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

**Step 3:** Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.





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

The positive and negative implication of the proposed activity and the alternative identified have been provided below and assessed in terms of the following four categories:

- Environmental.
- Technical/Engineering.
- Economical.
- Social.

Table 15: Advantages and disadvantages of the technological alternative versus the no-go option.

Alternative	Advantages	Disadvantages
Technological (preferred)	<p><b>Environmental:</b> The methane released from animal manure, is a major constituent of greenhouse gas. In comparison to carbon dioxide and the global warming potential, methane is 25 times more potent (over a 100-year period) than carbon dioxide. In using the waste and burning methane it reduces greenhouse gas emissions.</p> <p><b>Technical/Engineer:</b> The upgrade will entail improvements to the original design (new line will handle wear and tear better) and be able to process manure containing sand and stones more efficiently. In addition, the plant will also upgrade its output digestate handling and separation processes to produce water and bio-fertilizer as plant outputs.</p> <p><b>Economical:</b> Cost-effective option to produce more energy due to the increased energy demand, thus assisting in reducing load shedding crisis.</p> <p><b>Social:</b> Job opportunities will be retained, providing income for the local communities.</p>	<p><b>Environmental:</b> Required upgrade of the existing plant.</p> <p><b>Technical/Engineer:</b> None Identified</p> <p><b>Economical:</b> Additional costs to finance the upgrade must be sought from investors.</p> <p><b>Social:</b> Possible complaints from surrounding communities on odours and dust generated by delivery trucks.</p>
Technological (alternative option)	<p><b>Environmental:</b> Wind and solar are sustainable and are good generators of electricity. They play a pivotal role in assisting with reducing load shedding.</p> <p><b>Technical/Engineer:</b> None identified.</p> <p><b>Economical:</b> It's a cost-effective option.</p>	<p><b>Environmental:</b> Wind energy is visually unaesthetic and creates noise pollution to the surrounding farming communities.</p> <p><b>Technical/Engineer:</b> Wind energy will not be suitable for proposed site due to environmental conditions. Solar may be viable, however, does not provide a baseload supply of electricity supply</p>



Alternative	Advantages	Disadvantages
	<p><b>Social:</b> Job opportunities will be retained, providing income for the local communities.</p>	<p>(only generates when sunlight is available).</p> <p><b>Economical:</b> Wind turbines are very expensive. Solar uses a lot space for its operation.</p> <p><b>Social:</b> None identified.</p>
No-go option:	<p><b>Environmental:</b> With the upgrade, affected water will be treated on site.</p> <p><b>Technical/Engineer:</b> None identified</p> <p><b>Economical:</b> None identified.</p> <p><b>Social:</b> None identified.</p>	<p><b>Environmental:</b> None identified.</p> <p><b>Technical/Engineer:</b> If the upgrade does not occur the plant will not be as efficient in handling stones and sand.</p> <p><b>Economical:</b> Will not be able to extend the operation and this will cause an increase in the national crisis of load shedding.</p> <p><b>Social:</b> No employment opportunities will be created, also jeopardising the current workforce.</p>

## 7.8 The possible mitigation measures that could be applied and the level of risk.

Refer to table 5 for comments or concerns that were received during the public participation process.

## 7.9 Motivation where no alternative sites were considered.

There were no alternative sites identified as the BBP is an existing plant that will be upgraded.

## 7.10 Statement motivating the alternative development location within the overall site.

No alternative site has been assessed as described in Section 7.9.

# 8 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.

All impacts and risks as identified are contained within Section 7.5 Impacts and risks identified. As further provided is an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. The methodology applied in assessing and ranking the impacts and risks on the preferred site and associated preferred alternatives is described in Section 7.6 Methodology used in determining and ranking potential environmental impacts and risks. The results of this assessments are provided below in Section 9.



## 9 Assessment of each identified potentially significant impact and risk

### 9.1 Planning/pre-construction phase

Table 16: Planning/pre-construction phase risk assessment

Environmental Component (Aspects affected)	Activity	Impact description	Phase (Construction/Operational/Decommissioning/Closure/Post Closure)	Pre-Mitigation Significance	Mitigation Type (Modify/Remedy/Control/Stop)	Post Mitigation Significance
Planning	Planning and design of the upgrade to the existing BBP.	Risk of non-compliance with legal requirements of national and provincial legislation in terms of the upgrade to the exiting BBP.	Planning/pre-construction phase	L	Control	L
Social	Planning and design of the upgrade to the existing BBP.	Poor communication and lack of transparency of project information that may lead to conflict with adjacent landowners.	Planning/pre-construction phase	M	Control	L
Storm water	Planning and design of the upgrade to the existing BBP.	Ineffective storm water management measures not aligned to the existing storm water management plan for the upgrade to take place on site leading to potential pollution of surface water.	Planning/pre-construction phase	L	Control	L
Compliance to existing authorisations of the existing BBP and further authorisations (e.g. AEL for upgrade)	Planning and design of the upgrade to the existing BBP.	Non-compliance with the current legal requirements of the existing environmental authorisation (“EA”), water use licence (“WUL”), waste licence (“WL”) and atmospheric emission licence (“AEL”) and future amendments and new licences.	Planning/pre-construction phase	L	Control	L

### 9.2 Construction phase

Table 17: Construction phase risk assessment

Environmental Component (Aspects affected)	Activity	Impact description	Phase (Construction/Operational/Decommissioning/Closure/Post Closure)	Pre-Mitigation Significance	Mitigation Type (Modify/Remedy/Control/Stop)	Post Mitigation Significance
Health and safety risk that may arise and impact on the public and construction workers.	Construction of the upgrade to the existing BBP	Non-compliance in terms of existing health and safety protocols on site for the upgrade to the existing BBP.	Construction phase	L	Control	L
Soils	Construction of the upgrade to the existing BBP	Soil pollution due to hydrocarbons used on site during the upgrade.	Construction phase	L	Control	L
Waste Management	Construction of the upgrade to the existing BBP	Poor waste management on site. Wastes are not separated into solids and liquids upon arrival on site	Construction phase	L	Control	L
Groundwater	Construction of the upgrade to the existing BBP	Ground water contamination as a result of unsanitary practices and use of chemical toilets on site.	Construction phase	L	Control	L
	Construction of the upgrade to the existing BBP	Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.	Construction phase	L	Control	L
Storm water management	Construction of the upgrade to the existing BBP	Incorrect storm water management on site. for the additional infrastructure in support of the upgrade of the existing BBP.	Construction phase	L	Control	L



Environmental Component (Aspects affected)	Activity	Impact description	Phase (Construction/Operational/Decommissioning/Closure/Post Closure)	Pre-Mitigation Significance	Mitigation Type Modify/Remedy/Control/Stop	Post Mitigation Significance
Atmosphere and noise	Construction of the upgrade to the existing BBP	Ambient noise levels, and dust creation are likely to increase due to because of the upgrade activities.	Construction phase	M	Control	L
Heritage and Paleontology	Construction of the upgrade to the existing BBP	Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	There are no impacts on the heritage as no heritage sites are located on the 2-hectare area applicable to the upgrade.			
		Construction activities may disturb or destroy fossils or bedrock of paleontological sensitivity.	Construction phase	L	Control	L
Social	Construction of the upgrade to the existing BBP	Job creation (positive impacts)	Construction phase	Positive	Control	Positive
		Risk associated with poor communication between landowners and the team that may arise in conflict.	Construction phase	M	Control	L
Alien invasive plants	Construction of the upgrade to the existing BBP	Proliferation of alien invasive species on areas that will be cleared of vegetation for the upgrade.	Construction phase	L	Control	L

### 9.3 Operational phase

Table 18: Operational phase risk assessment

Environmental Component (Aspects affected)	Activity	Impact description	Phase (Construction/Operational/Decommissioning/Closure/Post Closure)	Pre-Mitigation Significance	Mitigation Type Modify/Remedy/Control/Stop	Post Mitigation Significance.
Soil	Operation of the upgraded infrastructure to the existing BBP	Soil pollution due to hydrocarbons including fuel greases and oils used on site during the maintenance or spill event associated with the upgrade activities.	Operational phase	L	Control	L
Groundwater	Operation of the upgraded infrastructure to the existing BBP	Groundwater pollution due to maintenance activities undertaken for the upgrade activities. That may include: <ul style="list-style-type: none"> <li>Potential spills of hazardous chemical substances including fuel, greases and oils used on site during maintenance activities.</li> <li>Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.</li> <li>Irrigation of lands with affected water not meeting the irrigation requirements as set out in table 1 of Annexure II of the Water use licence.</li> </ul>	Operational phase	M	Control	L
Stormwater management	Operation of the upgraded infrastructure to the existing BBP	Incorrect storm water management on site for the additional infrastructure in support of the upgrade.	Operational phase	L	Control	L
Noise	Operation of the upgraded infrastructure to the existing BBP	Ambient noise levels are likely to increase as a result of maintenance activities that may occur related to the upgrade.	Operational phase	L	Control	L
Atmosphere, and odour	Operation of the upgraded infrastructure to the existing BBP	Deterioration of air quality and unwanted odours associated with the upgrade.	Operational phase	L	Control	L



Environmental Component (Aspects affected)	Activity	Impact description	Phase (Construction/Operational/ Decommissioning/ Closure/Post Closure)	Pre-Mitigation Significance	Mitigation Type Modify/Remedy/Control/Stop	Post Mitigation Significance.
Socio-economic	Operation of the upgraded infrastructure to the existing BBP	Providing additional electricity to the already strained power supply grid..	Operational phase	Positive impacts	Control	Positive impacts
		Sourcing of local goods and services.	Operational phase	Positive impacts	Control	Positive impacts
Waste management	Operation of the upgraded infrastructure to the existing BBP	Incorrect disposal of waste and not in accordance with the existing waste licence.	Operational phase	L	Control	L
Access to the BBP	Operation of the upgraded infrastructure to the existing BBP	Unauthorised access to the BBP (and associated upgrade).	Operational phase	L	Control	L



## 10 Summary of specialist reports

### 10.2 Heritage study

An abbreviated 1st phase 1 heritage assessment was conducted by Sidney Miller dated September 2020 and “no heritage remains were observed and it is recommended that proposed work may proceed”

### 10.3 Palaeontological study

A Palaeontological Desk Top study (annexure F) was conducted. Dr Fourie 2020 found the potential impact of the development on fossil heritage is HIGH for the Silverton Formation [and VERY LOW for the diabase] and therefore a field survey will be necessary for this development (according to SAHRA protocol) **if fossils are found during construction**. A Phase 2 PIA and or mitigation are generally recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations and blasting (stromatolites).

## 11 Environmental impact statement

### 11.1 Summary of the key findings of the environmental impact assessment

This BAR and EMPr serves to identify the potential impacts associated with the activities of the BBP upgrade. In accordance with the relevant environmental legislation, reasonable measures to mitigate the potential impacts arising from the proposed activities have been assessed and the significance of each of these impacts under both the pre- and post-mitigation scenarios identified and detailed.

The methodology utilised to undertake the impact assessment has incorporated, amongst other skills, professional experience, relevant literature and local knowledge of the site and surrounding area.

It is the EAP’s opinion that based on the process that has been followed and the findings of the impact assessment, in conjunction with the proposed mitigation measures, that no unmanageable adverse impacts are expected to occur and some positive impacts are expected.



## 12 Final Site Map

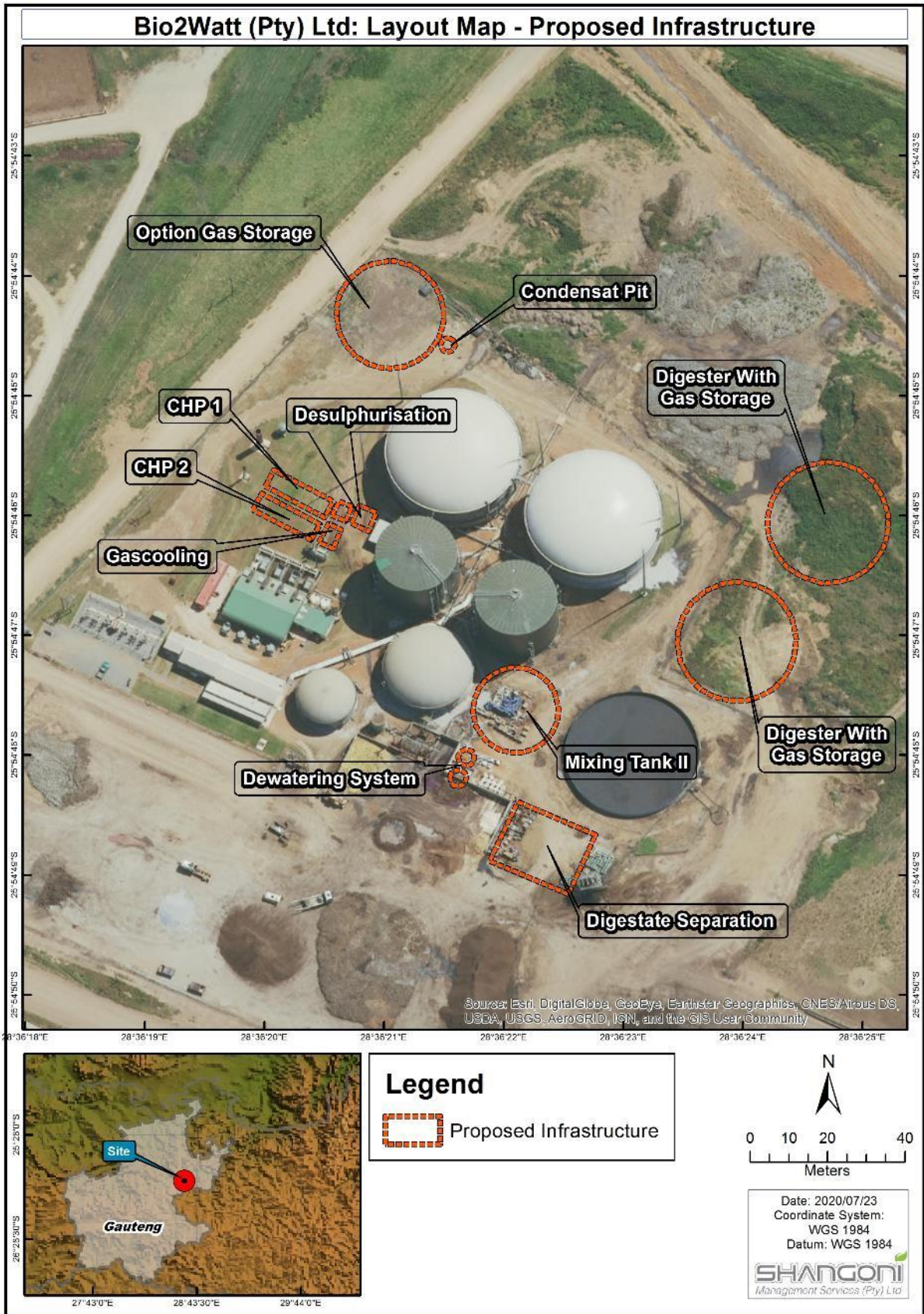


Figure 19: Site layout map



## 13 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives

Table 19: Summary of significant environmental impacts (negative), after mitigation.

Environmental Aspect	Significance Post Mitigation
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There will be no significant negative impacts after mitigation. The impacts are summarised below.

Planning/pre-construction phase potential impacts:		Significance rating of impacts prior to mitigation (positive or negative):	Significance rating of impacts after mitigation (positive or negative):
1.	Non-compliance with the current legal requirements of the existing environmental authorisation (“EA”), water use licence (“WUL”), waste licence (“WL”) and atmospheric emission licence (“AEL”) and future amendments and new licences.	Low (Negative)	Low (Negative)
2.	Poor communication and lack of transparency of project information that may lead to conflict with adjacent landowners.	Medium (Negative)	Low (Negative)
3.	Ineffective storm water management measures not aligned to the existing storm water management plan for the upgrade to take place on site leading to potential pollution of surface water.	Low (Negative)	Low (Negative)
4.	Non-compliance with the current legal requirements of the existing environmental authorisation (“EA”), water use licence (“WUL”), waste licence (“WL”) and atmospheric emission licence (“AEL”), and requirements as per new authorisations (e.g. AEL for upgrade)	Low (Negative)	Low (Negative)

Construction phase potential impacts:		Significance rating of impacts prior to mitigation (positive or negative):	Significance rating of impacts after mitigation (positive or negative):
1.	Non-compliance in terms of existing health and safety protocols on site for the upgrade to the existing BBP.	Low (Negative)	Low (Negative)
2.	Soil pollution due to hydrocarbons used on site during the upgrade.	Low (Negative)	Low (Negative)





<b>Construction phase potential impacts:</b>		<b>Significance rating of impacts prior to mitigation</b> (positive or negative):	<b>Significance rating of impacts after mitigation</b> (positive or negative):
3.	Poor waste management on site. Wastes are not separated into solids and liquids upon arrival on site	Low (Negative)	Low (Negative)
4.	Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.	Low (Negative)	Low (Negative)
5.	Groundwater contamination due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used on site.	Low (Negative)	Low (Negative)
6.	Incorrect storm water management on site for the additional infrastructure in support of the upgrade of the existing BBP.	Low (Negative)	Low (Negative)
7.	Ambient noise levels, and dust creation are likely to increase due to the upgrade activities.	Medium (Negative)	Low (Negative)
8.	Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	No heritage impacts.	
9.	Construction activities may disturb or destroy fossils or bedrock of paleontological sensitivity.	Low (Negative)	Low (Negative)
10.	Job creation (positive impacts)	Positive impacts	
11.	Risk associated with poor communication between landowners and the team that may arise in conflict.	Medium (Negative)	Low (Negative)
12.	Proliferation of alien invasive species on areas that will be cleared of vegetation for the upgrade.	Low (Negative)	Low (Negative)

<b>Operational phase potential impacts:</b>		<b>Significance rating of impacts prior to mitigation</b> (positive or negative):	<b>Significance rating of impacts after mitigation</b> (positive or negative):
1.	Soil pollution due to hydrocarbons including fuel greases and oils used on site during the maintenance or spill event associated with the upgrade activities.	Low (Negative)	Low (Negative)
2.	Groundwater pollution due to maintenance activities undertaken for the upgrade activities. That may include: <ul style="list-style-type: none"> <li>Potential spills of hazardous chemical substances including fuel, greases and oils used on site during maintenance activities.</li> </ul>	Low (Negative)	Low (Negative)



Operational phase potential impacts:		Significance rating of impacts prior to mitigation	Significance rating of impacts after mitigation
		(positive or negative):	(positive or negative):
	<ul style="list-style-type: none"> <li>Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.</li> <li>Irrigation of lands with affected water not meeting the irrigation requirements as set out in table 1 of Annexure II of the Water use licence.</li> </ul>		
3.	Incorrect storm water management on site for the additional infrastructure in support of the upgrade.	Low (Negative)	Low (Negative)
4.	Ambient noise levels are likely to increase as a result of maintenance activities that may occur during related to the upgrade.	Medium (Negative)	Low (Negative)
5.	Deterioration of air quality and unwanted odours related to the upgrade.	Low (Negative)	Low (Negative)
6.	The methane released from animal manure, is a major constituent of greenhouse gas. In using the waste and burning methane it reduces greenhouse gas emissions.	Positive impacts	
7.	Creation of jobs and transfer of skills. Providing more electricity to the already strained grid.	Positive impacts	
8.	Sourcing of local goods and services.	Positive impacts	
9.	Incorrect disposal of waste and not in accordance with the existing waste licence.	Low (Negative)	Low (Negative)
10.	Unauthorised access to the Biogas Plant (and associated upgrade).	Low (Negative)	Low (Negative)

The BBP upgrade will result in several positive impacts that relate primarily to economic growth and job creation as reflected in the table below.

Table 20: Summary of significant environmental impacts (positive), after mitigation.

Environmental Aspect	Significance Post Mitigation
<b>SOCIO ECONOMIC</b>	
The increased capacity to generate more electricity to be fed into the power grid is a positive social impact to the region.	Positive



## 14 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the table below summarises the impact management objectives and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

Table 21: Impact management objectives and the impact management outcomes

Environmental Aspect	Objective	Summary of impact management outcome
Surface water	To minimise the impacts on the surface water of the area.	Protection of the surface water resource
Ground water	To minimise the impacts on the groundwater resources of the area.	To limit degeneration of groundwater quality
Atmosphere and odour	To minimise the impacts on the atmosphere and odours related to the proposed upgrade of the BBP.	Monitoring of emissions of Hydrogen Sulphide (H <sub>2</sub> S), Sulphur Dioxide (SO <sub>2</sub> ), nitrogen dioxide (NO <sub>2</sub> ) and Nitrogen oxides (NO <sub>x</sub> ) to the atmosphere as part of compliance to the current AEL conditions.
Waste management	To minimise the incorrect handling of waste on site.	Minimise the incorrect management of waste on site.
Heritage	To minimise the impact on any heritage artefacts.	<p>According to Sidney Miller, 2020 "It is recommended that proposed work may proceed".</p> <p>Dr Fourie 2020 found the potential impact of the development on fossil heritage is HIGH for the Silverton Formation [and VERY LOW for the diabase] and therefore a field survey will be necessary for this development (according to SAHRA protocol) if fossils are found during construction. A Phase 2 PIA and or mitigation are generally recommended if a Phase 1: Field Study finds fossils or fossils are found during construction excavations and blasting (stromatolites).</p>



## 15 Aspects for inclusion as conditions of Authorisation

Should the Department of Environment, Forestry and Fisheries (“DEFF”) grant authorisation for this project, it should be subject to the following conditions:

- The upgrade to the existing BBP should remain in full compliance with the requirements of the EMPr and with all regulatory requirements;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the BAR and EMPr. Such persons must be issued with a written mandate by mine management to provide guidance and instructions to employees and contractors.

## 16 Description of any assumptions, uncertainties and gaps in knowledge

In terms of the EIA Regulations GN R982 Appendix 1(3)(o), the Environmental Assessment Practitioner (“EAP”) must provide a description of any assumptions, uncertainties and gaps in knowledge upon which the impact assessment has been based. The following assumptions, uncertainties and gaps in knowledge were identified:

The following assumptions, uncertainties and gaps in knowledge were identified:

- The current Atmospheric Emission Licence (“AEL”) does not cover the proposed upgrade to increase to 8.4 MW. An amendment to the existing licence was submitted by the BBP to the licensing authority on 4 February 2020. The AEL referred to in the risk assessment and mitigation measures of this report refers to the amended AEL to be approved.
- The BBP indicated that the water required for the process is currently abstracted from the pollution control dam, for which a Water Use Licence was issued (Licence number 04/B20C/EG/2355). Water is further produced through the digestate separation plant for reuse in the plant, hence reducing water consumption to a minimum. After the upgrade, water will continue to be abstracted from the pollution control dam for re-use in the BBP. In addition, 3 m<sup>3</sup> per day of potable water is currently provided by Beefcor to the BBP for domestic use on site. An assessment on the legal use of water currently provided by Beefcor to the BBP did not form part of the scope of this basic assessment (specifically the upgrade of the plant), therefore, it is assumed that the BBP will ensure that all other statutory requirements outside of the scope of this basic assessment are met.



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

### 17.1 Reasons why the activity should be authorised or not

The upgrades to the existing BBP have been assessed in terms of impacts that could arise during the planning, construction, and operational phase of the upgrade. Decommissioning impacts were not considered as the upgrade will result in the construction of permanent infrastructure. The impacts of the upgrade that have been identified in the planning phase have been mitigated to low impact significance. These impacts relate to possible risk of non-compliance with legal requirements of existing environmental authorisations (EA, WULA, and AEL), incorrect storm water design, risk of non-compliance with legal requirements and poor communication with interested and affected parties.

The impacts that have been identified in the construction phase relate to health and safety risk that may arise and impact on the public and construction workers, soils, waste management, groundwater, storm water management, atmosphere and noise, social and alien invasive plants. All construction impacts can be mitigated to low impact significance.

Operational phase impacts are related to potential pollution of soils, groundwater, surface water, noise, emissions, and odour generated by the BBP upgrade, socio-economic impacts relating to employment, waste management and access to the BBP upgrade. All operational impacts can be mitigated to low impact significance.

The upgrade to the existing BBP creates positive socio-economic benefits with positive impact that will occur during the construction and operational phase of the upgrade. The positive benefits include:

- Sourcing of local goods and services,
- Improved functioning of the BBP, therefore, increased capacity to generate more electricity to be fed into the power grid.
- After the upgrade, water used in the BBP will be self-provided from the process.
- Methane released from animal manure is a major constituent of greenhouse gas. In comparison to carbon dioxide and the global warming potential, methane is 25 times more potent (over a 100-year period) than carbon dioxide. Through combusting methane to CO<sub>2</sub> it reduces greenhouse gas emissions.

The proposed upgrades to the existing BBP (as opposed to the no-go option) is preferred as it possess a lower risk to the environment and provides socio-economic benefits.

## 18 Period for which the Environmental Authorisation is required

The period for which the environmental authorisation should be valid is at least 10 years.



## 19 Undertaking

The undertaking by the EAP is provided in Section 2 of Part B (Environmental Management Programme) below. This undertaking confirms: the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs (where received), the inclusion of inputs and recommendations from available specialist and monitoring reports, where relevant, and the acceptability of the BBP upgrade in relation to the finding of the assessment and level of mitigation proposed.

## 20 Specific Information required by the competent Authority

### 20.1 Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the BAR report must include the:

#### 20.1.1 Impact on the socio-economic conditions of any directly affected person.

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
<p>Bio2Watt indicates that it strives to:</p> <ul style="list-style-type: none"> <li>Promote employment and advance the social and economic welfare of all employees;</li> <li>Contributes to the transformation of the industry; and</li> <li>Is actively involved in the community whereby funds are made available for the development of local infrastructure and social upliftment.</li> </ul>	<p>Part A Section 1.4.4 of Part B</p>

### 20.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

Results of investigation, assessment and evaluation of impact on any national estate	Reference to where mitigation is reflected
<p>The closest heritage site is a monument commemorating the Battle of Bronkhorstspuit of 1886, which is located at the intersection of the R25 and R4233. A small graveyard was also noticed near a smallholding on the gravel road approximately 2 km from the site. There are no sites of cultural heritage and archaeological importance occurring upon the farm where the proposed upgrade of the BBP is located.</p>	<p>Not applicable</p>



## **21 Other matters required in terms of sections 24(4)(a) and (b) of the Act.**

An impact assessment for the BBP upgrade has been undertaken and will incorporate extensive consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management were firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. With the effective implementation of the mitigation measures, there will be no significant impacts posing threat to the environment. Furthermore, the environmental impact statement (Part A Section 7.5) summarises the key findings of the environmental impact assessment and negative implications of the BBP upgrade.



# **PART B**

## **ENVIRONMENTAL MANAGEMENT PROGRAMME**

### **REPORT**

## **1 Final environmental management programme**

### **1.1 Description of the aspects of the activity**

The requirement to describe the aspects of the activity that are covered by the final environmental management programme is included in Part A, Section 4.

### **1.2 Details of the EAP**

The requirements for the provision of the detail and expertise of the EAP are included in Part A, Section 1.2.





### 1.3 Composite Map

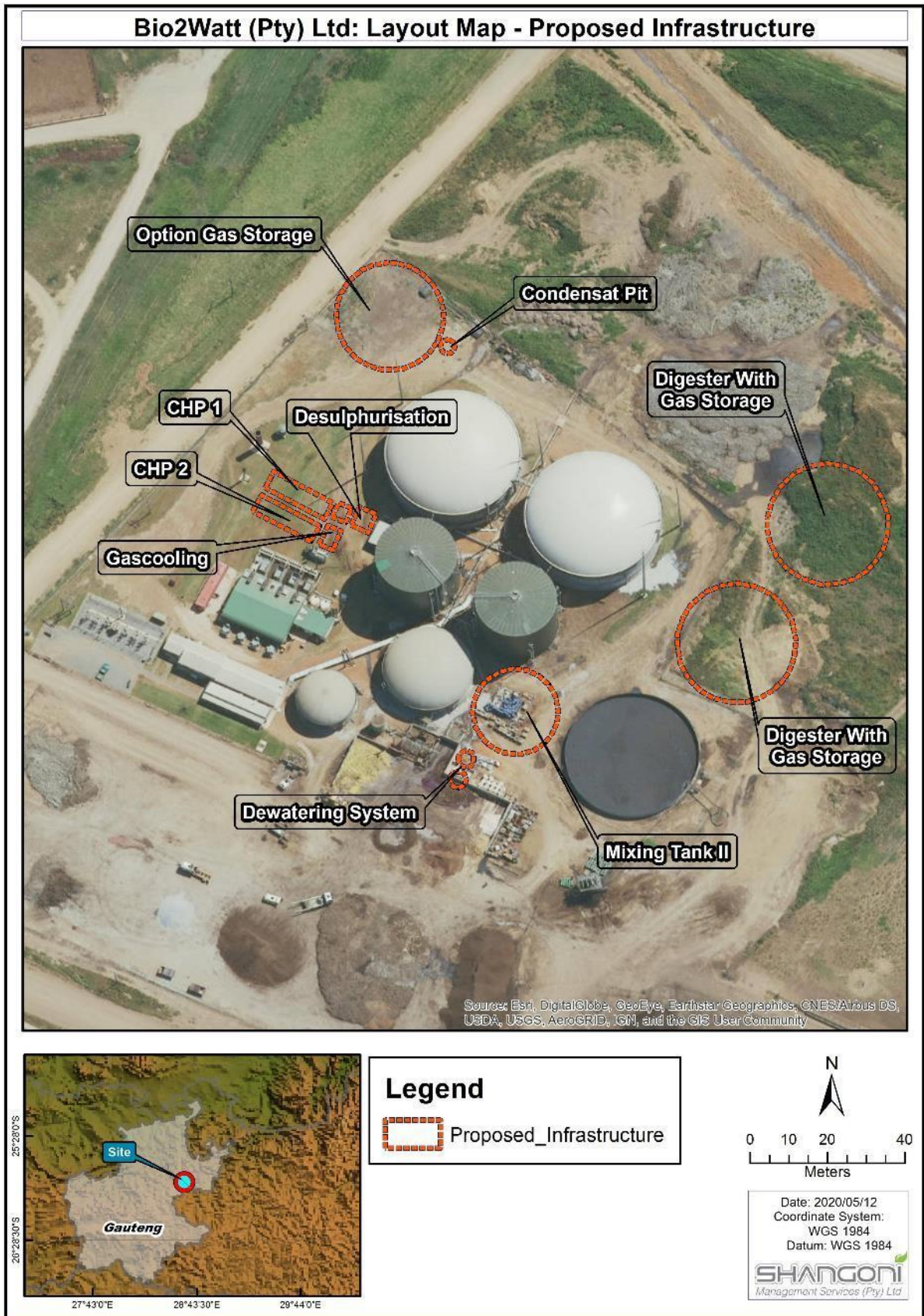


Figure 20: Site layout map



## 1.4 Description of Impact management objectives including management statements

### 1.4.1 Planning/pre-construction phase

Table 22: Measures to mitigate the impacts associated with the proposed upgrade to the Bronkhorstspuit Biogas Plant

No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
1	Planning	Planning and design of the upgrade to the existing BBP.	Risk of non-compliance with legal requirements of national and provincial legislation in terms of the upgrade.	Control	Ensure that all environmental legal requirements are considered in the planning phase for the proposed upgrade in terms of section A part 2 of the BAR report: Applicable Legislation, Policy and Guidelines.	Compliance to all legal legislation.	Adhere to the footprint areas as indicated in the layout map.	Planning/ pre-construction phase
2	Social	Planning and design of the upgrade to the existing BBP.	Poor communication and lack of transparency of project information that may lead to conflict with adjacent landowners.	Control	A complaints register should be kept on site. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed.	Clear communication channel with the surrounding communities.	Monitoring the of the complaints register on site.	Planning/ pre-construction phase
3	Storm water	Planning and design of the upgrade to the existing BBP.	Ineffective storm water management measures not aligned to the existing storm water management on site leading to potential pollution.	Control	Tie into the existing storm water management implemented on site to separate clean and affected water. All affected water will be drained to the sump and directed to the pollution control dam.	Protection of the surface water resource	Implement the existing storm water management plan on site.	Planning/ pre-construction phase
4	Compliance to existing authorisations (and required licences associated with upgrade) of the existing BBP and upgrade.	Planning and design of the upgrade to the existing BBP.	Non-compliance with legal requirements of the environmental authorisation ("EA"), water use licence ("WUL") and atmospheric emission licence ("AEL").	Control	All conditions outlined in the EA, WUL, WL and AEL must be followed, as need to be communicated to all contractors and staff that are involved in the upgrade to the existing BBP and future amendments and licences .	Compliance to the existing EA, WUL, WL and AEL (including for amended AEL with upgrade).	Annual audits to demonstrate compliance to the existing licences and future licences.	Planning/ pre-construction phase



1.4.2 Construction Phase

Table 23: Measures to mitigate the impacts associated with the BBP upgrade

No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
1	Health and safety risk that may arise and impact on the public and construction workers.	Construction of the upgrade to the existing BBP	Non-compliance in terms of health and safety on site during the upgrade.	Control	<ul style="list-style-type: none"> <li>• Ensure that all safety risks that may be present are clearly marked (e.g. through signage) and cordoned off from the public.</li> <li>• All activities must comply with the Occupational Health and Safety Act (No 85 of 1993).</li> </ul>	Compliance to the Occupational Health and Safety Act (No 85 of 1993).	Health and safety audits to be conducted.	Construction phase
2	Soils	Construction of the upgrade to the existing BBP	Soil pollution due to hydrocarbons used on site during the upgrade.	Control	<ul style="list-style-type: none"> <li>• Identify all hazardous chemical substances used on site, including fuel, greases and oils.</li> <li>• Obtain the material safety data sheets for each of the hazardous chemical substances.</li> <li>• Appropriate equipment to deal with an emergency spill incident must be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water.</li> <li>• Immediately clean all spillages of fuels, lubricants and other petroleum-based products.</li> <li>• Soil and other material contaminated with hazardous chemical substances shall be treated as hazardous waste and removed from site.</li> </ul>	Minimise the impact on the soil resources of the area.	Adhere to the footprint areas as indicated in the layout map.	Construction phase
3	Waste Management	Construction of the upgrade to the existing BBP	Poor waste management on site.	Control	<ul style="list-style-type: none"> <li>• Ensure that an adequate number of waste and spill bins are provided to prevent litter and ensure the proper disposal of waste and spills.</li> <li>• All construction rubble should be removed from the site and taken to the closest licensed landfill site.</li> <li>• Waste bins must be emptied regularly, and the waste must be removed to a suitable and licensed waste disposal facility.</li> </ul>	Minimise the incorrect management of waste on site.	Implementation of the waste management plan.	Construction phase
4	Groundwater	Construction of the upgrade to the existing BBP	Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.	Control	<ul style="list-style-type: none"> <li>• Solid wastes to be kept in skips and liquid wastes in banded aboveground tanks.</li> </ul>	To limit degeneration of groundwater quality	All tanks are is above ground and will be monitored for any leakages or spills bi-weekly. All tanks are fitted with level monitoring.	Construction phase



No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
		Construction of the upgrade to the existing BBP	Groundwater contamination due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used on site.	Control	<ul style="list-style-type: none"> <li>Identify all hydrocarbons used on site including fuel, greases and oils.</li> <li>Obtain the material safety data sheets for each of the hydrocarbons. Material safety data sheets for all hydrocarbons must be readily available on site and ensure that the material safety data sheets have enough information to enable the user to take the necessary measures to protect his/her health and safety and that of the environment.</li> <li>Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water.</li> <li>The hazardous substances must be on an impermeable surface to prevent infiltration of any spill or leaks into the surrounding environment.</li> </ul>			Construction phase
5	Stormwater management	Construction of the upgrade to the existing BBP	Incorrect storm water management on site.	Control	<ul style="list-style-type: none"> <li>Implement appropriate storm water management measures on site to separate clean and affected water.</li> <li>All affected water will be drained to the sump and then the pollution control dam. All storm water that would naturally run across the pollution areas shall be diverted via channels and trapezoidal drains designed to contain the 1:50 year flood.</li> <li>The polluted storm water captured in the pollution control dams shall be pumped to the process water treatment plant for reuse and recycling.</li> <li>Clean and affected water will be separated on site.</li> <li>There will be sufficient drainage and storm water structures surrounding the manure storage areas.</li> </ul>	Protection of the surface water resource	Implementation of storm water management measures on site	Construction phase
6	Atmosphere and noise	Construction of the upgrade to the existing BBP	Ambient noise levels, and dust creation are likely to increase due to the upgrade activities.	Control	<ul style="list-style-type: none"> <li>Noise generating activities must be conducted during daytime hours.</li> <li>Vehicles and equipment must be inspected and maintained on a regular basis.</li> <li>Working hours should be restricted to daylight hours.</li> <li>No sound amplification equipment such as sirens, loud halers or hooters are to be used on site except in emergencies.</li> </ul>	Reduce Hydrogen Sulphide (H <sub>2</sub> S) and Sulphur Dioxide (SO <sub>2</sub> ) emissions. Comply with AEL conditions.	Implementation of air quality monitoring.	Construction phase
7	Heritage and Paleontology	Construction of the upgrade to the existing BBP	Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	Control	<ul style="list-style-type: none"> <li>There are no impacts on the heritage as no heritage sites are located on the 2-hectare area applicable to the upgrade.</li> <li>Mitigation – if fossils are found a 30 m a no-go barrier must be constructed and SAHRA informed for further investigation.</li> </ul>	To preserve the cultural heritage of the area.	Adherence to the requirements of the National Heritage Resources Act (No 25 of 1999).	Construction phase



No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
			Construction activities may disturb or destroy fossils or bedrock of paleontological sensitivity.	Control	<ul style="list-style-type: none"> <li>If bedrock is exposed during excavations, a qualified specialist must be appointed to inspect excavations for the presence of fossils. If excavations will not expose bedrock, no further mitigation for paleontological heritage is recommended.</li> </ul>	To preserve the palaeontology of the area.	Adherence to the requirements of the National Heritage Resources Act (No 25 of 1999).	Construction phase
8	Social	Construction of the upgrade to the existing BBP	Job creation (positive impacts)	Control	<ul style="list-style-type: none"> <li>Source of local labour from the Bronkhorstspuit area.</li> <li>Source required materials and goods locally where possible.</li> </ul>	Prevent socio economic impacts by employment opportunities.	Use of local labour.	Construction phase
			Risk associated with poor communication between landowners and the BBP team that may arise in conflict.	Control	<ul style="list-style-type: none"> <li>A complaints register should be kept on site. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed.</li> <li>Transparent information with the relevant contacts especially during the public participation process.</li> </ul>	Clear communication channel with the surrounding communities.	Monitoring of the complaints register on site.	Construction phase
9	Alien invasive plants	Construction of the upgrade to the existing BBP	Proliferation of alien invasive species on areas that will be cleared of vegetation for the upgrade.	Control	<ul style="list-style-type: none"> <li>Disturbed areas need to be revegetated with indigenous grass species to help stabilise the soil surface.</li> <li>Implement an alien eradication plant programme to systematically control/eradicate the declared invasive plant species, especially during rehabilitation.</li> <li>All alien vegetation in the footprint area as well as immediate vicinity of the upgraded area should be removed.</li> </ul>	Minimise the proliferation of alien invasive plant species on site.	Implementation of an alien invasive plant species plan.	Construction phase

### 1.4.3 Operational phase

Table 24: Measures to mitigate the impacts associated with the proposed upgrade to the Bronkhorstspuit Biogas Plant

No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
1	Soil	Operation of the upgraded infrastructure to the existing BBP	Soil pollution due to hydrocarbons including fuel greases and oils used on site during the upgrade activities. associated with the upgrade .	Control	<ul style="list-style-type: none"> <li>Immediately clean all spillages of fuels, lubricants and other petroleum-based products that can take place during maintenance activities.</li> <li>All generators will be placed on drip trays to reduce the potential of spillages.</li> <li>All transformers on site will be serviced <i>in situ</i> by a reputable company.</li> <li>The sump will collect any affected water.</li> </ul>	Minimise the impact of hydrocarbons on the soil resources of the area.	Develop and implement a spill clean-up and maintenance procedure.	Operational phase



No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
2	Groundwater	Operation of the upgraded infrastructure to the existing BBP	<p>Groundwater pollution due to maintenance activities undertaken for the upgrade activities. That may include:</p> <ul style="list-style-type: none"> <li>• Potential spills of hazardous chemical substances including fuel, greases and oils used on site during maintenance activities.</li> <li>• Groundwater contamination from liquid and solid wastes stored on site in above ground concrete tank and skip.</li> <li>• Irrigation of lands with affected water not meeting the irrigation requirements as set out in table 1 of Annexure II of the Water use licence.</li> </ul>	Control	<ul style="list-style-type: none"> <li>• Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water.</li> <li>• Soil contaminated with hydrocarbons shall be treated as hazardous waste and removed from site.</li> <li>• Groundwater resources must be protected by quarterly monitoring of the integrity of the digester lining.</li> <li>• All tanks are is above ground and will be monitored for any leakages or spills bi-weekly. All tanks are fitted with level monitoring.</li> <li>• Affected water will be treated on site when the plant has been upgraded.</li> </ul>	To limit degeneration of groundwater quality	All tanks are is above ground and will be monitored for any leakages or spills bi-weekly. All tanks are fitted with level monitoring.	Operational phase
3	Stormwater management	Operation of the upgraded infrastructure to the existing BBP	Incorrect storm water management on site for the additional infrastructure in support of the upgrade.	Control	<ul style="list-style-type: none"> <li>• Stormwater leaving the Licensee’s premises shall in no way be contaminated by any substance, whether such substance is a solid, liquid, vapor or gas or a combination thereof which is produced, used stored, dumped or spilled on the premises.</li> <li>• Stormwater shall be diverted from the plant area and shall be managed in such a manner as to disperse runoff and concentrating the storm-water flow.</li> <li>• Where necessary works must be concentrated, operated, and maintained in a sustainable manner throughout the impacted area (upgraded area).</li> <li>• Water will be treated in aerobic treatment systems to ensure the water quality is within the irrigation standards as stated by the water use licence 04/B20C/EG/2355 annexure ii.</li> <li>• The pollution control dam must maintain at least a freeboard of 0.8 m.</li> </ul>	Protection of the surface water resource	Implementation of storm water management measures on site.	Operational phase



No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
					<ul style="list-style-type: none"> <li>The pollution control dam must be fenced with warning signs.</li> <li>All storm water culverts must be cleaned regularly.</li> <li>Collection trenches between the land being irrigated and the Kleinspurit must be regularly maintained.</li> <li>All hazardous materials to be stored on site in a bunded area. The bunded area must be able to contain 110% of the volume of the hazardous materials..</li> </ul>			
4	Noise	Operation of the upgraded infrastructure to the existing BBP	Ambient noise levels are likely to increase as a result of the upgrade activities	Control	<ul style="list-style-type: none"> <li>Activities that will be undertaken as part of the upgrade that may generate noise must be conducted during daytime hours.</li> <li>Vehicles and equipment must be inspected and maintained on a regular basis.</li> <li>Working hours should be restricted to daylight hours.</li> <li>No sound amplification equipment such as sirens, loud halers or hooters are to be used on site except in emergencies.</li> <li>A complaints register should be kept on site. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed.</li> </ul>	To prevent noise nuisance to surrounding environment	Adhere to the regulations regarding health and safety.	Operational phase
5	Atmosphere, and odour	Operation of the upgraded infrastructure to the existing BBP	Deterioration of air quality and unwanted odours associated with the upgrade.	Control	<ul style="list-style-type: none"> <li>All gravel access roads will be maintained to reduce dust creation.</li> <li>The gas flare must be maintained in good working order.</li> <li>The functionality of the scrubber will be monitored to ensure the gas thresholds are maintained.</li> <li>The generating equipment will be kept in good working order and will be serviced regularly to minimise the release of harmful emissions.</li> <li>Complaints regarding odours must be recorded in the complaints register which will be monitored by the environmental officer on site.</li> <li>All pumping systems will be fitted with pressure monitors to detect for any leaks.</li> <li>Delivery trucks delivering the wastes (feed material to the BBP) must be covered to avoid spillages and unwanted odours.</li> </ul>	Monitoring of emissions of Hydrogen Sulphide (H <sub>2</sub> S) and Sulphur Dioxide (SO <sub>2</sub> ) to the atmosphere. Comply with AEL conditions.	Implementation of air quality monitoring.	Operational phase
6	Waste management	Operation of the upgraded infrastructure to the existing BBP	Incorrect disposal of waste and not in accordance with the existing waste licence.	Control	<ul style="list-style-type: none"> <li>Adequate and covered waste drums will be provided at the BBP (and associated upgrade) within the storm water control area.</li> <li>No burning or burying of waste is permitted.</li> <li>Waste skips will be emptied regularly at licensed landfill sites.</li> <li>Copies of the safe disposal certificates to be retained and kept for record purposes.</li> </ul>	Minimise the incorrect disposal of waste.	Implementation of the waste management plan.	Operational phase



No.	Aspect affected	Activity	Potential Impact	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
					<ul style="list-style-type: none"> <li>Wastes that can be recycled must be recycled such as paper and plastics.</li> </ul>			
7	Access to the BBP	Operation of the upgraded infrastructure to the existing BBP	Unauthorised access to the BBP.	Control	<ul style="list-style-type: none"> <li>Ensure adequate access control to the BBP (and associated upgrade). All visitors must sign a visitors' register.</li> <li>A weatherproof durable sign must be displayed at the entrance to the BBP (and associated upgrade). The sign must be in three official languages (appropriate to the area). The sign must indicate the hours of the operation, the name, address and contact number of the licence holder and responsible person on site.</li> </ul>	Control access to the BBP.	Implement a visitors' register and induction to be done before entering the Plant.	Operational phase





## 1.5 Mechanisms for monitoring compliance with and performance assessment against the environmental management programme

The following monitoring will be conducted as part of the BBP (and associated upgrade) is listed in the table below.

Table 25: Monitoring at the BBP (and associated upgrade)

Type of monitoring	Frequency of data collection
Groundwater quality monitoring	Quarterly, quarterly reporting
Air quality (ambient)	Monthly, Bi-annual reporting
Noise monitoring	Monthly, quarterly reporting

### 1.5.1 Groundwater quality monitoring

Table 26: Groundwater monitoring locations

Location name	Type of Monitoring	Description
Beefcor borehole	Quality	All tanks are is above ground and will be monitored for any leakages or spills bi-weekly. All tanks are fitted with level monitoring.

### 1.5.2 Air quality monitoring

The existing atmospheric emission licence requires biannual reporting. The amended atmospheric emission licence will have its own conditions for monitoring and reporting that will also need to be complied with.

Table 27: Air quality monitoring locations for the existing atmospheric emission licence that may be amended based on the amended licence conditions.

Location name	Type of Monitoring	Description
Gas flare	Emissions of Hydrogen Sulphide (H <sub>2</sub> S) and Sulphur Dioxide (SO <sub>2</sub> )	The licence holder must complete and submit, to the City of Tshwane, a biannual report. The report must include information for the year under review. The report must be submitted to the City of Tshwane not later than 30 (thirty) days after the end of each reporting period. The biannual report must include,
Engine 1 exhaust		
Engine 2 exhaust		
Engine 3 exhaust		
Engine 4 exhaust		
Engine 5 exhaust		
Engine 6 exhaust		

Location name	Type of Monitoring	Description
Engine 7 exhaust		<p>amongst others, the following items:</p> <ul style="list-style-type: none"> <li>• Pollutant emission trends;</li> <li>• Compliance audit report(s);</li> <li>• Major upgrade projects (i.e. process equipment); and</li> <li>• Greenhouse gas emissions.</li> </ul> <p>The holder of the licence must keep a copy of the biannual report for a period of at least 5 (five) years.</p>
Engine 8 exhaust		

### 1.5.3 Noise monitoring

Table 28: Noise monitoring locations

Location name	Type of Monitoring	Description
Generator room and offices	Noise levels	Noise levels to be taken at the generator room and offices, and in event of complaints (if required), at the appropriate location.

## 1.6 Indicate the frequency of the submission of the performance assessment/ environmental audit report.

According to the existing waste management licence Ref: 12/9/11/L348/3, internal and external audits must be conducted.

### Internal Audits

Internal audits must be conducted quarterly by the Licence Holder and on each audit occasion an official report must be compiled by the relevant auditor to report the findings of the audits, which must be made available to the external auditor.

### External Audits

The Licence Holder must appoint an independent external auditor to audit the site biennially and this auditor must compile an audit report documenting the findings of the audit.

Future waste licences issued will have their own conditions that need to be complied to. Similarly, auditing requirements as may be relevant to the amended AEL need to be complied with as well as the conditions as set out in the water use licence.

## 1.7 Environmental Awareness Plan

### 1.7.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

All visitors and contractors that enter the site must complete an onsite safety and environmental induction.

Air quality, waste management and water use management training are conducted bi-annually at the BBP for all relevant employees on site. The last training was conducted on the 5<sup>th</sup> and 15<sup>th</sup> of May 2020.

### 1.7.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The BBP has implemented an Environmental Management System ("EMS") on site. This EMS is based on a cycle of planning, implementing, reviewing and continual improvement. The EMS will facilitate the processes and actions that the BBP undertakes to meet its environmental obligations and continually improve its environmental performance.

According to the environmental policy, the BBP is committed to the generation of renewable energy in order to promote sustainable development within South Africa and contribute to the reduction of greenhouse gas emissions and in so influence the effects of climate change. The BBP purely green energy approach is based on the production of clean energy from a variety of organic sources and the utilisation of what typically goes into landfills in the energy generation processes.



Senior management of the BBP firmly believe in and is committed to good environmental performance during the operational phase of the Biogas Plant and commit to monitoring and improving environmental performance, pollution prevention and environmental protection.

The ISO 14001 compliant EMS is applicable to the 5-hectare fenced off BBP located within the Beefcor Feedlot. All employees, contractors and sub-contractors, services and goods entering the site will be managed as per the requirements of the EMS.

The BBP aims at achieving continual environmental improvement through implementing a management system with objectives and targets to minimise our environmental footprint by working with staff and other stakeholders through pollution prevention practices in compliance with legal and other requirements and be a role model for others to follow.

Therefore, we will manage our businesses according to the following principles:

- Comply with environmental laws, regulations, and other requirements;
- Understand and reduce, where practical, the environmental impacts of our activities and demonstrate that understanding in planning and executing our work;
- Establish objectives, guidelines and detailed procedures as needed to implement this policy;
- Provide adequate resources to meet our environmental commitments;
- Encourage cost-effective opportunities to prevent pollution and to reuse and recycle used materials. Handle and dispose of waste materials in ways that minimize environmental risk;
- Work with environmental agencies and organizations to ensure timely, reasonable and cost-effective resolutions to environmental issues;
- Encourage employee participation in environmental protection and enhancement efforts;
- Review conformity with these environmental principles on a regular basis to ensure compliance and improve performance;
- Communicate this policy and our environmental values to our employees and interested stakeholder.

## 1.8 Specific information required by the Competent Authority

No specific information has been requested by the Competent Authority to date.

## 2 Undertaking

The EAP herewith confirms

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;
- the inclusion of inputs and recommendations from the specialist reports where relevant;  and
- the acceptability of the upgrade in relation to the finding of the assessment and level of mitigation proposed;





October 2020

Signature of EAP

Date

### 3 Declaration of independence

Shangoni hereby declares that it is an independent EAP in that it has no business, financial, personal or other interest in this project in respect of which Shangoni is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Shangoni, excluding fair remuneration for work performed in connection with this project.

Report compiled  
by:

Name:	Lee-Anne Fellowes
Professional Registration	Pr.Sci.Nat, EAPASA
Date:	20/09/2020
Reference:	BIO-BRO-20-03-13

**Lee-Anne Fellowes**  
**(Pre.Sci.Nat)**  
**(EAPASA)**

Report reviewed by:

Name:	Brian Hayes
Professional Registration	Pr.Eng
Date:	20/09/2020
Project Code	BIO-BRO-20-03-13

**Brian Hayes (Pr Eng)**

