environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. This report format is current as of **1 September 2012**. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

14. Two (2) colour hard copies and one (1) electronic copy of the report must be submitted to the competent authority.
15. Shape files (.shp) for maps must be included on the electronic copy of the report submitted to the competent authority.

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SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section? | ~~YES~~ | **NO** |

If YES, please complete the form entitled "Details of specialist and declaration of interest" for the specialist appointed and attach in Appendix I.

1. PROJECT DESCRIPTION

a) Describe the project associated with the listed activities applied for

Background Information

The Applicant (Beatrix Gold Mine) proposes to install a cogeneration facility at Shaft Four (4) of the Beatrix Gold Mine utilising mine methane. Beatrix Mine is located between Theunissen and Virginia in the Free State (see **Appendix A**). Access to the site is from the R30 to Bloemfontein (Theunissen / Virginia Rd), and is located within the Matjhabeng Local and Lejweleputswa District Municipalities.

Beatrix Gold Mine: Beatrix Gold Mine is operated by Gold Fields which is one of the world's largest producers of gold with production of 3.5 million gold equivalent ounces from eight operating mines in Australia, Ghana, Peru and South Africa. Beatrix Gold Mine consists of four shafts that are in operation; these shafts access the various gold-bearing reefs at depths between 600 and 2,155 meters below surface. The mine has a workforce of approximately 9,563 employees.

Beatrix Gold Mine has appointed Promethium Carbon to design a project on its behalf to mitigate the global warming effects of the methane gas released by the mine industrial activities. This project has been registered under the Clean Development Mechanism of the Kyoto Protocol and the Project Design Document. As part of this initiative, Beatrix is in the process of applying for the conversion of this right to a Production Right in terms of Section 84 of the Minerals and Petroleum Resource Development Act (MPRDA). It is important to note that Beatrix Mine currently has an exploration right on the gas in terms of Section 80 of the Minerals and Petroleum Resource Development Act (MPRDA).

Methane is released by mining activities in the Beatrix shaft 4. The gas is released when mining activity intersects methane carrying geological faults. Currently, the methane is diluted with ventilation air to below its explosion limits and released into the atmosphere through ventilation shafts.

The proposed project will install structures underground to capture the methane and pipe it to the Beatrix West ventilation shaft where it will be piped to surface. Once at surface, the methane will be flared and used to generate electricity. Electricity will be generated in internal combustion engines. Waste heat from the internal combustion engines will be used in absorption chillers. The excess methane that cannot be handled by the engines will be flared in an enclosed flare. The electricity generated in the project activity will be used as captive capacity to displace grid electricity at the Beatrix Shaft 4. The refrigeration produced by the absorption chillers will replace refrigeration from compressor chillers using grid electricity.

The project will reduce greenhouse gasses in three ways:

- The flaring of methane will reduce the amount of methane released into the atmosphere to below that of the baseline.
- The use of methane to generate electricity will reduce the amount of electricity Beatrix needs to import from the Southern African grid. The Southern African grid electricity is generated predominantly from low grade coal.
- The use of waste heat in absorption chillers will further reduce the amount of electricity imported from the grid by displacing chilling capacity from electrically driven compressor chillers.

GIBB was thereafter appointed by Beatrix Mine as the environmental assessment practitioner (EAP) to undertake the relevant environmental authorisation processes.

Why is an environmental Basic Assessment Required?

The proposed development line involves the following listed activities, as per Government Notice No. R. 544 & R545 Listing Notice 1 and 2 of the National Environmental Management Act (No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, as detailed below.

NEMA Regulations 33306: GNR 544, 18 June 2012: Activity No. 28 – Listing Notice 1	The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply
NEMA Regulations 33306: GNR 545, 18 June 2012: Activity No. 4 – Listing Notice 1	The construction of facilities or infrastructure for the refining, extraction or processing of gas, oil or petroleum products with an installed capacity of 50 cubic metres or more per day, excluding facilities for the refining, extraction or processing of gas from landfill sites.

The above listed activities trigger both Listing 1 and 2, and as such an Environmental Impact Assessment (EIA) process is required to be undertaken for environmental authorisation for the proposed development. However, due to the nature and scale of the project the EAP requested the Competent Authority (Department of Environmental Affairs, DEA) in a letter dated 28 March 2012 (attached in Appendix E), that the proposed project be changed from a Scoping and Environmental Impact Assessment to a Basic Assessment process.

The Department of Environmental Affairs subsequently responded in a letter dated 19 October 2012 (Refer to Appendix E) that "*The Department has decided to grant permission, in terms of regulation 20 (4) of the Environmental Impact Assessment (EIA) regulations of June 2010, to apply for a basic assessment instead of a Scoping Environmental Impact Reporting (S&EIR) process for the proposed installation of a cogeneration plant at Shaft 4 of Beatrix Mine*".

This Final Basic Environmental Assessment Report (BAR) has been compiled in support of the application for environmental authorisation, as required by the NEMA and associated EIA Regulations.

The Proposed Cogeneration facility at Shaft Four (4)

The purpose of the cogeneration facility is to capture naturally occurring methane gas from underground via Shaft 4 (28°11'10.14"S & 26°43'18.47"E), thereafter the gas is used to:

- Generate 4MW electricity. Electricity will be generated in internal combustion engines. The electricity generated in the project activity will be used as captive capacity to displace grid electricity at the Beatrix Shaft 4.
- Waste heat from the internal combustion engines will be used in absorption chillers. The refrigeration produced by the absorption chillers will replace refrigeration from compressor chillers using grid electricity. The excess methane that cannot be handled by the engines will be flared in an enclosed flare.

Technical Description: The Proposed Cogeneration Facility at Shaft 4

The proposed facility would consist of the following infrastructure:

- Four containerized internal combustion engines with closed circuit radiators and exhaust silencers, with a total generating capacity of 4MW will be installed.
- A single flare would be installed at Shaft Four (4) to burn excess methane.
- Gas fans to boost the off-gas pressure in order to meet the engine requirements.
- Absorption chillers.
- Flame arrestors.
- Demister.
- Instrumentation and control equipment.
- Piping to route the methane to the engines (quote the threshold to indicate that the pipeline activity will not be triggered).
- Containerised electrical switchgear and distribution cables from the engines to the electrical sub-station on site.
- A containerized control room.
- An oil storage facility for engine lubrication oil (not exceeding 30 cubic meters).

Engines: The containerized internal combustion engines located near Shaft 4 would combust methane gas extracted via the shaft 4 to simultaneously generate both electricity and useful heat. The heat will drive absorption chillers to produce chilled water for the site's industrial processes.

Flare: The gas from the borehole at Shaft Four (4) will be flared to reduce the negative impacts of methane such as explosions and atmospheric pollution. Methane is a potent greenhouse gas that has a global warming potential of 21 times that of CO_2.

Electrical switchgear room and control room: The electrical switchgear room and control room will all be containerised to minimise the negative impacts on the mine which also enables it to be removed from the mine with minimal rehabilitation requirements.

Containers: The containers will be installed on concrete footings that will be removed upon decommissioning.

Installation Phases for the proposed Cogeneration Facility

1. The **first phase** will be the installation of the flare at Shaft Four (4). At this stage, all the methane extracted from underground will be flared and not used to generate electricity as yet. The first phase will occur in 2013.

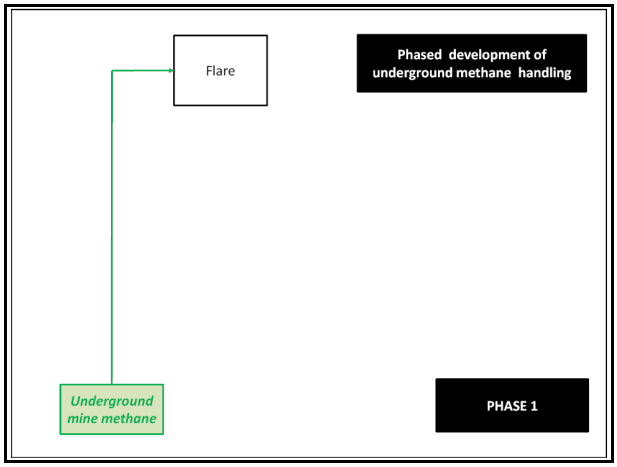

Figure 1: Phase One

2. The second phase will be the installation of the power plant. In phase two, the mine methane will be used to generate electricity and any excess methane will be flared instead of being released into the atmosphere.

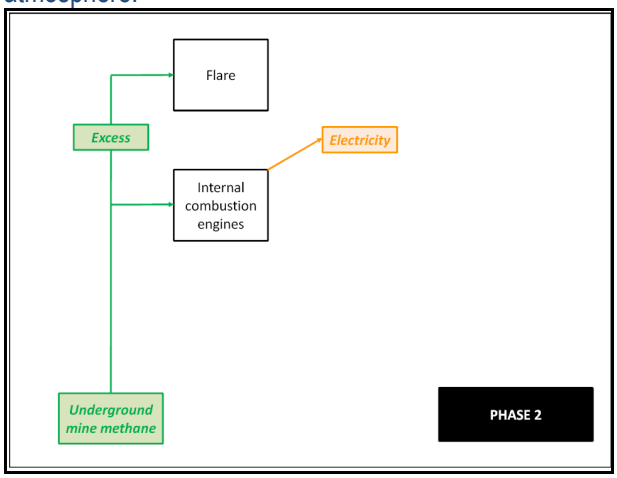

Figure 1: Phase Two

3. The third phase will include electricity and chilled water generation.

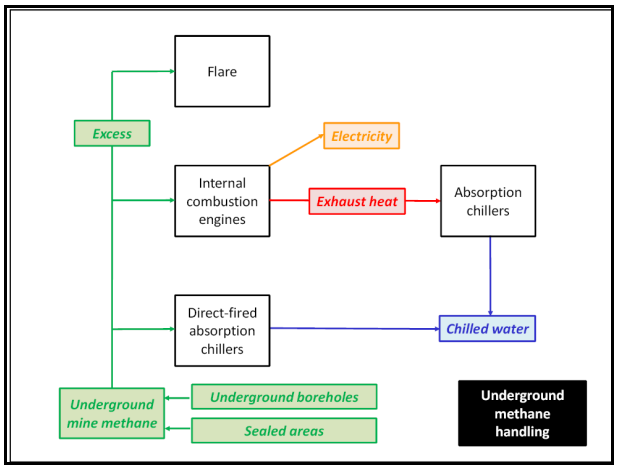

Figure 3: Phase Three

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN R.544, 545 and 546	Description of project activity
GN R.544 Item (28): *The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or*	The facility would require an Air Emission license, in terms of The National Environmental Management: Air Quality Act (39 of 2004), 10 (4) Subcategory 1.4 triggered by the installation of a gas combustion generator.

activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	
GN R.545 Item (4): *The construction of facilities or infrastructure for the refining, extraction or processing of gas, oil or petroleum products with an installed capacity of 50 cubic metres or more per day, excluding facilities for the refining, extraction or processing of gas from landfill sites.*	The proposed facility intends to process / combust methane gas for with an installed capacity of more than 50 cubic metres or more per day.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application as required by Regulation 22(2) (h) of GN R.543. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity alternatives (including different processes, etc.) or both are appropriate needs to be informed by the specific circumstances of the activity and its environment. Upon receipt of this report, the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

a) Site alternatives

There are no **feasible alternatives** for the proposed development except the No Go Alternative. According to the regulations GNR543 27(e), the applicant must identify feasible and reasonable alternatives for the proposed activity.

There are however no feasible alternatives as justified below:

- **Site alternatives:** The proposed development is only feasible at Shaft 4 from where the methane will be extracted. There are four Shafts on Beatrix mine, however Shaft 1, 2,& 3 are linked underground and the methane generated there is currently being used for flaring and will eventually be used for energy generation. There are therefore no other feasible shafts located at Beatrix Mine that can be used for this purpose.

- **Layout alternatives:** Beatrix Mine is currently an operational gold mining regulated by health and safety conditions. The Cogeneration facility is ideally located within the limited space adjacent to Shaft 4. It is also located next to the shaft where the methane will be extracted from.

- **Technology & Operational Alternatives:** The basis for constructing the cogeneration facility at shaft 4 is due to the success of the developed technology in use at the Cogeneration facility at Shaft 1. The aim of the technology is to be safe, simple and practical. The tried and tested Swiss technology is currently best practice.

- **Implementation alternatives:** Each phase of the proposed activity as described above must be implemented in a specific sequence to culminate in the successful operation and set up of the facility.

The **No Go Alternative** relates to the proposed Cogeneration facility not being developed. As such, the flare which is part of the proposed development would not be installed. It must be noted that the proposed project will destroy both the underground mine methane at Shaft 4. The destruction of this methane will result in the elimination of methane released directly into the atmosphere. Since methane has 21 times the global warming potential of carbon dioxide, the project will result in a significant reduction of greenhouse gas emissions from the mine. The preferred and only alternative is detailed in the Table below.

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Beatrix Mine is located between Theunissen and Virginia in the Free State	28°11'10.14"S	26°43'18.47"E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

In the case of linear activities: ***(The proposed development is not a linear activity)***

Alternative: **Latitude (S):** **Longitude (E):**

Alternative S1 (preferred)
- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

Alternative S2 (if any)
- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

Alternative S3 (if any)
- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in **Appendix A.**

b) Lay-out alternatives (Layout Alternatives are unfeasible due to the limited space near shaft 4)

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)

Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives: **Technology & Operational Alternatives** as the basis for constructing the cogeneration facility at shaft 4 is due to the success of the developed technology in use at the Cogeneration facility at Shaft 1. The aim of the technology is to be safe, simple and practical. Tried and tested processes are best practice.

Alternative 1 (preferred alternative)
Alternative 2
Alternative 3

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

Alternative 1 (preferred alternative)		
Alternative 2		
Alternative 3		

e) No-go alternative

The **No Go Alternative** relates to the proposed Cogeneration facility not being developed. As such the flare which is part of the proposed development would not be installed. It is important to note that the proposed project will destroy both the underground mine methane at Shaft 4. The destruction of this methane will result in the elimination of methane released directly into the atmosphere. Since methane has 21 times the global warming potential of carbon dioxide, the project will result in a significant reduction of greenhouse gas emissions from the mine.

Paragraphs 3 – 13 below should be completed for each alternative.

3. PHYSICAL SIZE OF THE ACTIVITY

a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Alternative A1[1] (preferred activity alternative)	1100 m²
Alternative A2 (if any)	m²
Alternative A3 (if any)	m²

[1] "Alternative A.." refer to activity, process, technology or other alternatives.

or, for linear activities:

Alternative:	Length of the activity:
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

b) **Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):**

Alternative:	Size of the site/servitude:
Alternative A1 (preferred activity alternative)	m^2
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

4. SITE ACCESS

Does ready access to the site exist?	YES		■	
If NO, what is the distance over which a new access road will be built				m

Describe the type of access road planned:

Access to the mine is regulated. The mine is not accessible to the general public due to Health and Safety Regulations. There will be no new access roads constructed for the proposed development. There is a current access road.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following: *(Please refer to Appendix A for the attached site plan)*

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s)
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal

minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

6. LAYOUT/ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. SENSITIVITY MAP

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A.

8. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report**.** It must be supplemented with additional photographs of relevant features on the site, if applicable.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

10. ACTIVITY MOTIVATION

Motivate and explain the need and desirability of the activity (including demand for the activity):

1. Is the activity permitted in terms of the property's existing land use rights?	**YES**	~~NO~~	Please explain
Shaft 4 is located within the Beatrix Mine complex. The area is zoned for mining and exploration activities.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	**YES**	~~NO~~	Please explain
The PSDF planning shows Beatrix Mine as an area demarcated for mining and exploration activities, and as such the proposed development is in line with the PSDF.			
(b) Urban edge / Edge of Built environment for the area	**YES**	~~NO~~	Please explain
The proposed development is entirely within the Beatrix Mining Facility and is not in conflict with the urban edge or any urban area. Therefore the proposed development is within the Urban edge for the area. Note that the area is zoned for the proposed activity.			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	**YES**	~~NO~~	Please explain
The proposed development does not compromise the integrity of the existing IDP or SDF. Beatrix Mine has been in operation since 1985 and has been incorporated into the forward planning for the greater area.			
(d) Approved Structure Plan of the Municipality	**YES**	~~NO~~	Please explain
Beatrix Mine is a recognised established industry within the municipal area. The municipality has taken the Beatrix Gold Mine into account within its structure plan.			

(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	~~YES~~	**NO**	Please explain
The proposed development would not compromise the integrity of the existing environmental management priorities for the area as the proposed development inherently promotes the Sustainability of Beatrix Mine. Furthermore the existing priorities such as conservation are not in conflict considering that the entire development falls within the existing Mining Complex.			
(f) Any other Plans (e.g. Guide Plan)	~~YES~~	**NO**	Please explain
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	**YES**	~~NO~~	Please explain
Beatrix Mine has obtained a mining right valid from 7 February 2007 to 6 February 2019 in respect of a mining right totalling 16,874 hectares in the Free State Province. All development within this area promoting employment and economic growth associated with mining is therefore an accepted land use for the aforementioned area.			

4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	**YES**	~~NO~~	Please explain

Methane is a greenhouse gas. The proposed project will reduce greenhouse gases by:

- The flaring of methane which will reduce the amount of methane released into the atmosphere.
- The use of methane to generate electricity which will reduce the amount of electricity Beatrix requires from Eskom.
- The use of waste heat in absorption chillers which will further reduce the amount of electricity imported from the grid by displacing chilling capacity from electrically driven compressor chillers.

Potential impacts of Greenhouse gases on the environment are:

1. The sea levels may rise. Technically this may be caused by melting ice from the polar ice caps or an increase in sea height as the less dense water is less compressed. Low lying land like many Pacific Islands and certain coastal zones will be under water.
2. Serious climate changes may result from diverted ocean currents. As an example, the Gulf Stream keeps Europe warm. If the Stream is not running Europe may be much cooler and drier, which may affect crop growth.
3. Ecology changes on the land could include species of animals and plants extending their range to the polar regions. Local flora and fauna may become extinct. A good example is the spread of Africanized bees and Fire Ants beyond their indigenous habitats. Sea life may also be impacted both through the introduction of competitive species presently kept in other areas by water temperature changes, and by failure to adapt to less saline water.
4. Human society may be disrupted if changes in rainfall and temperature cause crop failure. Famine refugees may require significant humanitarian attention by the "lucky" nations.

The aforementioned impacts may not necessarily be local or immediate, or even quantifiable. However climate change and global warming is a global reality that has proven to have detrimental effects to human and animal life and health. There is no local community that would be directly impacted by the proposed facility, as the project is contained within the Beatrix Mining Complex. The nearest community is the town of Virginia ~ 17 Km north east from the Shaft 4.

5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	**YES**	~~NO~~	Please explain

The proposed facility would be located within the Beatrix Mining Complex. No additional services would be required from the municipality. Furthermore, the aim of the facility is to generate electricity and reduce the mine's dependence on Eskom.

6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	~~YES~~	~~NO~~	Please explain
N/A This question is not applicable for this proposed facility as the mining complex provides its own infrastructure. The Beatrix Mining complex would not require any further infrastructure development from the municipality in future should the proposed development be operational.			

7. Is this project part of a national programme to address an issue of national concern or importance?	YES	~~NO~~	Please explain

Yes, Sustainable development is a priority for South Africa and in July 2008, the Cabinet passed the National Framework for Sustainable Development (NFSD). The NFSD is designed to "initiate a broad framework for sustainable development in South Africa that can serve as a basis from which to develop and consolidate a national strategy and action plan". The NFSD proposes a national vision, principles, trends, strategic priority areas, and a set of implementation measures that are intended to enable and guide the development of the national strategy and action plan.

The NFSD discusses the various environmental and social risk areas facing South Africa and maps out five strategic priority areas.

1. Enhancing systems for integrated planning and implementation.
2. **Sustaining our ecosystems and using resources sustainably.**
3. **Investing in sustainable economic development and infrastructure.**
4. Creating sustainable human settlements.
5. Responding appropriately to emerging human development, economic and environmental challenges.

This proposed development falls directly in line with the point two and three above. By reducing Beatrix Mine's dependence on energy from Eskom (Eskom uses coal fired power stations to produce electricity), the mine would therefore be less dependent on coal as a resource.

The project makes positive contributions to sustainable development. The South African Designated National Authority (DNA) evaluates sustainability in three categories: Economic, environmental and social. The contribution of the project towards sustainable development is discussed in terms of these three categories:

- **Economic**: The project will contribute to foreign reserve earnings for South Africa via the carbon credit sales revenue.
- **Environmental**: At a regional level, the project will have a positive impact on the environment. This positive impact relates to a reduction in the generation of coal-based electricity and its associated environmental impacts. As a result the project would reduce greenhouse gas emissions by eliminating the release of methane (Methane has a global warming potential of 21 times that of carbon dioxide).
- **Social**: The project will create jobs in both the construction and operations phase. Gold Fields Mining South Africa has committed to contributing a percentage (R0.20 per ton of CO2 and 0.5% of pre-tax profit) of their carbon credit revenue to The Gold Fields Foundation. This is similar to the contribution Gold Fields Mining South Africa makes out of gold mining revenue in terms of its social sustainable development obligations as dictated by the South African mining legislative framework relating to sustainable development.

8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	**YES**	~~NO~~	Please explain
The Proposed development is located within the Beatrix Mining Complex; the proposed activity would be located within the complex to efficiently manage the methane emissions escaping from the Shaft 4 of the mine. The activity is in line with the land use for the area.			
9. Is the development the best practicable environmental option for this land/site?	**YES**	~~NO~~	Please explain
Yes, this option is the best practicable environmental option as the area is currently an established operational mining shaft. As such this additional infrastructure to generate electricity using the gas emissions from the shaft only enhances the environmental sustainability of the existing operations. It is estimated that in total, the project would reduce greenhouse gas emissions of Beatrix Mine by 28%.			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	**YES**	~~NO~~	Please explain
Yes, as the infrastructure is containerised and minimal construction is required to develop the proposed Co-Generation Facility. The site is previously disturbed by the existing mining operations. This proposed development would increase the sustainability of the existing operations. Thirty five temporary jobs and two permanent jobs would be created. This positive impact vastly outweighs the impact of construction and operation of the proposed Co-Generation facility at Shaft 4.			
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	~~YES~~	**NO**	Please explain
The proposed development can only occur in certain conditions. That is, there must be a mining shaft, underground methane and a certain level of services, in order for a Co-Generation Facility to be developed. Taking this into account the proposed development would not set a precedent in the local municipality for other applicants to undertake similar activities. Furthermore, in future it would only be Beatrix Mine which may consider setting up similar structures at the other two Shafts within the Beatrix Mining Complex, should it be feasible.			
12. Will any person's rights be negatively affected by the proposed activity/ies?	~~YES~~	**NO**	Please explain
To date no person's rights has been negatively affected by the proposed development.			

13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO	Please explain
N/A, as the proposed development is located within the Beatrix Mining Complex which has been zoned for the mining activities.			
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES	■	Please explain
This proposed development is aligned with the SIP 8. SIP 8: Green Energy in support of the South African economy promotes sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IPR2010 and to support biofuel production facilities.			
15. What will the benefits be to society in general and to the local communities?			Please explain
The reduction in greenhouse gases has benefits to society, as South Africans hope to reserve our resources for future generations. Furthermore, on a local scale South Africa faces shortages in the supply of electricity. While this electricity crisis continues, the local people would benefit from the mine becoming less dependent on Eskom for services.			
16. Any other need and desirability considerations related to the proposed activity?			Please explain
N/A			
17. How does the project fit into the National Development Plan for 2030?			Please explain
The National Development Plan (NDP) speaks to South African goals in terms on energy efficiency. One of the Enabling milestones of the plan is to: *"Produce sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing carbon emissions per unit of power by about one-third."* As such the proposed development is aligned to the NDP, as it relates to industry aiming to reduce its emissions by reducing the amount of electricity required from the Eskom Grid.			

18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.

As per NEMA the general objectives of integrated environmental management is noted below in italics. A description of how the each objective is related to this proposed development is noted in green script.

(a) *promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;* **The decision to undertake the proposed development arose out of the need to be cognisant of Beatrix Mine's current emissions into the environment. The integrated approach resulted in multiple fields collaborating (Biophysical environment, Sustainability and Engineers) to develop a better and more efficient operation for the Mine.**

(b) *identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;* **The potential impacts for the proposed facility ha been evaluated and detailed in the sections that follow. Each potential impact was rated and given a defined significance rating.**

(c) *ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;* **Yes, potential effects / impacts of installing the proposed Co-Generation facility on the environment have been considered in this Basic Assessment Process. Each impact was identified by the EAP. The assessment found that the area had been previously degraded; as such minimal environmental impacts were noted. All identified impacts were evaluated and mitigated where possible. An environmental Management Programme has been established to ensure that these mitigation measures are implemented during construction and operation.**

(d) *ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;* **Equitable public participation process was undertaken. The public was notified in provincial and local newspapers, in the respective languages of the local community. Neighbouring residents were notified by hand-delivered letters. IAPs were afforded the opportunity to comment and request additional information in any mode of written communication acceptable to them.**

(e) *ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and.* **The Proposed Co-generation Facility is inherently an environmental attribute. The facility will significantly reduce methane emissions into the environment. It will also increase employment opportunities and reduce the mine's dependence on Eskom for electricity. Furthermore, South-Africa currently faces an energy crisis and the environmental contribution of this facility is therefore paramount.**

(f) *identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2."* **The proposed development has the following modes to ensure that the activity is in accordance with the principals of environmental management:**

- **Aligned to all relevant municipal and district by-laws, spatial planning and environmental frameworks for the proposed development area;**
- **Ensuring equitable public participation process was undertaken. The public was notified in provincial and local newspapers, in respective languages of the local community. Neighboring residents were notified by hand-delivered letters. IAPs were afforded the opportunity to comment and request additional information in any mode of written communication acceptable to them.**

The proposed development would adhere to the all the principles of NEMA, which would be implemented by the Environment Management Programme (EMP) during construction and operation of the proposed facility. Refer to Appendix G for the Final EMP for the proposed facility.

19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.
The proposed development involves the construction of a co-generation facility at Shaft 4 within Beatrix Mine. The following points demonstrate how the principles in Section 2 of NEMA have been applied: • The potential pollution or degradation to the environment has been minimised through the proposed mitigation measures detailed in the EMPr. • The site is already somewhat disturbed and no cultural or heritage resources are present on the site. • Any general waste generated from the development will be disposed of at the relevant registered waste facilities. • The potential risks to human health have been considered and included in the assessment of impacts. • The new facility to be constructed will be in accordance with all applicable environmental and international legislation/standards and any other applicable legislation or standards. • The proposed project will provide both temporary and permanent job opportunities for the local communities. • Throughout the Basic Assessment process information has been made freely available to any Interested and Affected Party requesting information ensuring transparency in the process.

11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
The Constitution of the Republic of South Africa, Section 24 (Environmental Right)	1) 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."	National Government	1996
National Environmental Management Act 107 of 1998 (NEMA)	In terms of NEMA and associated Environmental Impact Assessment (EIA) Regulations published in August 2010, an Environmental	Department of Environmental Affairs	1998

	Authorisation (Basic Assessment) must be obtained from the relevant decision-making authority, prior to the commencement of certain listed activities that may result in potential negative impacts on the environment. The environmental principals and requirements of NEMA were considered during the assessment of impacts and development of mitigation measures and in turn the EMP.		
National Environmental Management: Air Quality Act 39 of 2004	The construction of Co-Generation facility requires an Atmospheric Emissions License (AEL), in terms of National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs	2004
National Heritage Resources Act 25 of 1999	A heritage specialist has considered the potential of heritage resources on site and concluded that it is unlikely that any important resources exist at the site.	South African Heritage Resources Agency (SAHRA)	1999
Occupational Health and Safety Act 85 of 1993	A number of OHSA requirements are also relevant to environmental control and were as such considered in the identified mitigation and the EMP (e.g. bunding for flammable substances, Material Safety Data Sheets).	Department of Labour	1993
Hazardous Substances Act 15 of 1973	Use and or handling of any hazardous substances.	Department of Environmental Affairs	1973

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

There will be minimal on-site construction. The flare and the combustion engines would be assembled (not constructed on site) and housed in containers. Construction activities would consist of forming concrete foundation slabs to support the containers and flare. Note that other infrastructure such as the control room would also be containerized. Any solid (general) waste produced would be minimal and not significantly greater than the usual solid waste produced by Beatrix Mine.

Will the activity produce solid construction waste during the construction/initiation phase?	~~YES~~	**NO**
If YES, what estimated quantity will be produced per month?		m^3

How will the construction solid waste be disposed of (describe)?

Where will the construction solid waste be disposed of (describe)?

Will the activity produce solid waste during its operational phase? ~~YES~~ **NO**
If YES, what estimated quantity will be produced per month? m^3
How will the solid waste be disposed of (describe)?

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. **N/A**

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?	~~YES~~	**NO**

If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

Is the activity that is being applied for a solid waste handling or treatment facility?	~~YES~~	**NO**

If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	~~YES~~	**NO**
If YES, what estimated quantity will be produced per month?		m^3
Will the activity produce any effluent that will be treated and/or disposed of on site?	~~YES~~	**NO**

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	~~YES~~	**NO**

If YES, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		**Cell:**	
E-mail:		**Fax:**	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

There would be no waste water during the operation of the proposed facility.

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other that exhaust emissions and dust associated with construction phase activities?	**YES**	~~NO~~
If YES, is it controlled by any legislation of any sphere of government?	**YES**	~~NO~~

If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If NO, describe the emissions in terms of type and concentration:

Currently, the Shaft 4 emits naturally occurring greenhouse gases into the atmosphere. The proposed development would reduce the amount of emissions into the atmosphere.

It is estimated that the shaft contains the following gas composition:
Note: The below tabled gas composition is subject to change.

Propane	Carbon Dioxide	Ethane	Oxygen	Nitrogen	Methane
<50ppm_vol	2764ppm_vol	240ppm_vol	4.72%	24.18%	70.8%

The proposed developed aims to reduce emissions as noted below.

Years	Annual estimation of emission reductions in tonnes of CO2e*
1	76 264
2	171 128
3	171 128
4	171 128
5	171 128
6	171 128
7	171 128
8	171 128
9	171 128
10	171 128
Total estimated reductions (tonnes of CO2e)	**1 616 416**
Total number of crediting years	**10**

d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?	~~YES~~	**NO**

If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?	**YES**	NO
If YES, is it controlled by any legislation of any sphere of government?	YES	**NO**

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If NO, describe the noise in terms of type and level:

The noise generated would arise from the combustion generators, however considering that the proposed Co-Generation facility is enclosed within a mining complex there are no noise receptors affected by the proposed development. The generator noise would not be higher than the acceptable limits considered for the mining area. All Mine Health and Safety protocols will be implemented as part of the construction and operational EMP requirement.

13. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box (es):

Municipal	~~Water board~~	~~Groundwater~~	~~River, stream, dam or lake~~	~~Other~~	~~The activity will not use water~~

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:	litres
Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?	~~YES~~ **NO**

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

14. ENERGY EFFICIENCY

Describe the design measures, if any that have been taken to ensure that the activity is energy efficient:

The proposed development is inherently energy efficient as one of the purposes for the facility is to reduce the mine's dependency on Eskom for electricity.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The proposed development is inherently an alternative energy source for Beatrix Mine.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? ~~YES~~ **NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Free State
District Municipality	Lejweleputswa District Municipality
Local Municipality	Matjhabeng Local Municipality
Ward Number(s)	24
Farm name and number	Palmietkuil 328
Portion number	Sub 6
SG Code	F 033 000 000 000 328 000 06

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:

Mining

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? YES **NO**

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline	x	2.4 Closed valley	x	2.7 Undulating plain / low hills	x
2.2 Plateau	x	2.5 Open valley	x	2.8 Dune	x
2.3 Side slope of hill/mountain	x	2.6 Plain	x	2.9 Seafront	x

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following?

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

4. GROUNDCOVER

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E]	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	~~YES~~	**NO**	~~UNSURE~~
Non-Perennial River	~~YES~~	**NO**	~~UNSURE~~
Permanent Wetland	~~YES~~	**NO**	~~UNSURE~~
Seasonal Wetland	~~YES~~	**NO**	~~UNSURE~~
Artificial Wetland	~~YES~~	**NO**	~~UNSURE~~
Estuarine / Lagoonal wetland	~~YES~~	**NO**	~~UNSURE~~

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Natural area	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station[H]
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential[A]	Church	Agriculture
Retail commercial & warehousing	Old age home	River, stream or wetland
Light industrial	Sewage treatment plant[A]	Nature conservation area
Medium industrial [AN]	Train station or shunting yard [N]	Mountain, koppie or ridge
Heavy industrial [AN]	Railway line [N]	Museum
Power station	Major road (4 lanes or more) [N]	Historical building

Office/consulting room	Airport [N]	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam[A]	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	Other land uses (describe)

If any of the boxes marked with an "[N] "are ticked, how will this impact / be impacted upon by the proposed activity?

N/A

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

The proposed cogeneration facility would integrate with the operations of the mine. The facility would assist in providing chilled water to cool the underground mine.

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)	~~YES~~	**NO**
Core area of a protected area?	~~YES~~	**NO**
Buffer area of a protected area?	~~YES~~	**NO**
Planned expansion area of an existing protected area?	~~YES~~	**NO**
Existing offset area associated with a previous Environmental Authorisation?	~~YES~~	**NO**
Buffer area of the SKA?	~~YES~~	**NO**

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

7. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:	~~YES~~	**NO**
	Uncertain	

If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

The Local Municipality indicated in their 2012 IDP the following Unemployment levels:

Employed: 14936
Unemployed 10866
Not Economically Active 16239.

The above figures show that increasing employment in the area is crucial to this community where the majority of the people are unemployed or not economically active. Furthermore the majority of employed individuals earn less than R10 000 per month.

Economic profile of local municipality:

According to the Matjhabeng IDP *"The economy of Matjhabeng has been characterized by negative growth between the period 1996 to 2001 accounting for annual economic compound of about -3,07% and since then no significant change occurred. This scenario can be attributed to the fact our area was built around mining. The slowing down of this industry had a very devastating outcome"*

As such developing and contributing to a more efficient mining environment would be beneficial to the local area. The proposed development increases the stability of Beatrix Mine in the longer term considering the monetary benefit of the energy saving for the mine.

Level of education:

A high level of illiteracy exists in the region especially in the rural areas and efforts to address this problem are hampered by a lack of facilities and unavailable resources. There is general lack of technical and agricultural training facilities throughout the region. Vista is the only university in the region and although there are satellite campuses of other institutions in Welkom it is not always accessible to remote urban and rural areas.

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 28.5 million	
What is the expected yearly income that will be generated by or as a result of the activity?	R 3.2 million	
Will the activity contribute to service infrastructure?	YES	**NO**
Is the activity a public amenity?	~~YES~~	**NO**

How many new employment opportunities will be created in the development and construction phase of the activity/ies?	35
What is the expected value of the employment opportunities during the development and construction phase?	R 3.0 million
What percentage of this will accrue to previously disadvantaged individuals?	57%
How many permanent new employment opportunities will be created during the operational phase of the activity?	2
What is the expected current value of the employment opportunities during the first 10 years?	R 4.8 million
What percentage of this will accrue to previously disadvantaged individuals?	50%

9. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				**If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan**
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	Other Natural Area (ONA)	**No Natural Area Remaining (NNR)**	

b) Indicate and describe the habitat condition on site

Habitat Condition	**Percentage of habitat condition class (adding up to 100%)**	**Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).**
Natural	0 %	
Near Natural (includes areas with low to moderate level of alien invasive plants)	0 %	
Degraded	40%	

(includes areas heavily invaded by alien plants)		The proposed development site occurs on an operational mining facility. As such over the years the area has been severely degraded by the mining operations. The area has no agricultural potential. Invader weeds and grasses occur on the boundary of the site. The majority of the site has barren impacted soils with mining infrastructure (such as the actual shaft 4) surrounding the site.
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	70%	The majority of the site has barren impact soils with mining infrastructure such as the actual shaft 4 surround the site.

c) Complete the table to indicate:

(i) the type of vegetation, including its ecosystem status, present on the site; and

(ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		**Aquatic Ecosystems**						
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
	Endangered							
	Vulnerable							
	Least Threatened	~~YES~~	**NO**	~~UNSURE~~	~~YES~~	**NO**	~~YES~~	**NO**

d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

The proposed development site has no vegetation type. The area is developed with mining infrastructure with barren exposed soil patches between the structures. There is existence of invader plant species and common grasses.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICE

Publication name	The Vista (Local Paper - English)	
Date published	8 November 2012 and	
Site notice position	**Latitude**	**Longitude**
Main road	28°09'52.46"S	26°45'08.64"E
4# Main gate	28°11'24.11"S	26°43'29.91"E
Date placed	**8 November 2012**	

Publication name	Die Volksblad (Provincial Paper Afrikaans)	
Date published	6 November 2012	
Site notice position	**Latitude**	**Longitude**
Main road	28°09'52.46"S	26°45'08.64"E
4# Main gate	28°11'24.11"S	26°43'29.91"E
Date placed	**8 November 2012**	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 54(2)(e) and 54(7) of GN R.543.

Key stakeholders (other than organs of state) identified in terms of Regulation 54(2)(b) of GN R.543:

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)

No additional key stakeholders were identified.

Include proof that the key stakeholder received written notification of the proposed activities. (**Appendix E2**) This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
No comments were received to date.	

4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Final BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Mineral Resources	Meshack Mudau	057 391 1385	057 357 6003	Meshack.Mudau@dmr.gov.za	Private Bag X33, Welkom 9460
SARHA	Andrew Salomon	021 4624502	057 4624509	asalomon@sarha.org.za	111 Harrington Cape Town 4000
Lejweleputswa District Municipality	Matthews Dlamini	057 3913459	057 3524585	matthews@lejwe.co.za	
Masilonyana Local Municipality (Ward Councillor)	Afred Mphikeleli	083 3686088			Theunissen
Sedibeng Water	Deon Dippenaar	083 630 3075			

Include proof that the Authorities and Organs of State received written notification of the proposed activities as Appendix E4.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as Appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

Methodology for Impact Significance Scoring

The significance (quantification) of potential environmental impacts identified during the Basic Assessment have been determined using a ranking scale, based on the following (terminology has been taken from the Guideline Documentation on EIA Regulations, of the Department of Environmental Affairs and Tourism, April 1998):

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?)
- Duration of occurrence (how long may it last?)

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?)
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

Each of these factors has been assessed for each potential impact using the following ranking scales:

Probability	Duration
1 - very improbable (probably will not happen 2 - improbable (some possibility, but low likelihood) 3 - probable (distinct possibility) 4 - highly probable (most likely) 5 - definite (impact will occur regardless of any prevention measures)	1 - of a very short duration (0–1 years) 2 - of a short duration (2-5 years) 3 - medium-term (5–15 years) 4 - long term (> 15 years) 5 - permanent
Extent	**Magnitude**
1 - limited to the site 2 - limited to the local area 3 - limited to the region 4 - will be national 5 - will be international	0 - small and will have no effect on the environment 2 - minor and will not result in an impact on processes 4 - low and will cause a slight impact on processes 6 - moderate and will result in processes continuing but in a modified way 8 - high (processes are altered to the extent that they temporarily cease) 10 - very high and results in complete destruction of patterns and permanent cessation of processes

The environmental significance of each potential impact is assessed using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The maximum value is 100 Significance Points (SP). Potential environmental impacts were rated as high, moderate or low significance on the following basis:

< 30 significance points = **LOW** environmental significance.
31- 60 significance points = **MODERATE** environmental significance
> 60 significance points = **HIGH** environmental significance

The table below summarises all the identified impacts and their significance ratings without and with mitigation, while detailed descriptions of each impact are provided there under.

*Note there are no feasible alternatives for the proposed development of the Cogeneration Facility **EXCEPT** the NO GO Alternative.*

1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A (2) of this report.

Note: There are no planning and design phase impacts associated with the proposed development. Refer below for the construction phase, operational phase, decommissioning phase impacts identified and assessed.

CONSTRUCTION PHASE POTENTIAL IMPACTS

<table>
<tr><th>Activity</th><th>Impact summary</th><th>Significance</th><th>Proposed mitigation</th></tr>
<tr><td colspan="4">Alternative 1 (preferred alternative)</td></tr>
<tr><td></td><td>
Direct impacts:

Health and Safety Impacts: During the assembly of the flare and the engines, there is potential for fire and explosions during extreme cases should management and expertise be inadequate. However the potential of this occurring is unlikely as the installation and operation is highly specialist skill requiring that specific people undertaking the task.

As a result there would a Low significance impact (Positive).

Significance Table: Safety at Beatrix Mine
<table>
<tr><th>Duration</th><th>Magnitude</th><th>Extent</th><th>Probability</th><th>Significance</th></tr>
<tr><td>1</td><td>4</td><td>1</td><td>3</td><td>18</td></tr>
</table>

There are no Indirect or cumulative impacts during the construction phase for the proposed development.
</td><td>Low</td><td>Adhere to all health and safety standards as regulated by Beatrix mine.</td></tr>
</table>

Activity	Impact summary	Significance	Proposed mitigation
No-go option: There would be no impacts the status quo would stay the same.			

OPERATIONAL PHASE POTENTIAL IMPACTS

<table>
<tr><th>Activity</th><th>Impact summary</th><th>Significance</th><th>Proposed mitigation</th></tr>
<tr><td colspan="4">Alternative 1 (preferred alternative)</td></tr>
<tr><td></td><td>Direct impacts:

Noise Impacts: The four combustion engines proposed would create low level noise, however taking into consideration that that facility is within an industrial zone, with no noise receptors. The significance is low.

<table>
<tr><th colspan="5">Significance Table: Increase Safety at Beatrix Mine</th></tr>
<tr><td>Duration</td><td>Magnitude</td><td>Extent</td><td>Probability</td><td>Significance</td></tr>
<tr><td>5</td><td>6</td><td>2</td><td>4</td><td>44</td></tr>
</table>

Health and Safety Impacts: Underground (mine) methane is a hazardous gas as it has wide explosion limits in air and has the potential to cause explosions if not efficiently and safely managed through safe mine ventilation systems underground. Methane gas is a recognised significant safety risk for underground mine workings. Although methane awareness and safety is improving, it is still a deadly and justifiably feared hazard of the mining industry. The problem is that methane is unavoidable and unlike coal mine methane, it is not a direct result of mining. In coal mines, the methane production is a function of the coal being mined. In gold mines, the methane is in geological faults and when these faults are intersected, this methane gas is released. Hence, methane emits continuously from certain areas in the mine. The properties of methane make it as difficult to detect. It is colourless, odourless and non-toxic, so there are no obvious physical signs such as coughing or streaming eyes to warn of its proximity (it will cause suffocation if it builds up in a badly ventilated space). Once present in the atmosphere of the mine, methane can easily ignite. Mine operators must ventilate or drain methane gas away from the face of the mine to keep levels well below the explosive range. It is a hazard to miners. The extraction of the methane will result in a safer working environment for the personnel at Beatrix Mine. Methane from both the underground working areas and from the boreholes will be destroyed either by flaring or by utilising it in power</td><td>Low Significance

MODERATE Significance</td><td>Ensure the noises are within the acceptable limits for Beatrix Mine.

Adhere to all health and safety regulations for Beatrix Mine.</td></tr>
</table>

<table>
<tr><th>Activity</th><th>Impact summary</th><th>Significance</th><th>Proposed mitigation</th></tr>
<tr><td></td><td>
generation equipment or absorption chillers. The proposed development will have a moderate significance impact (Positive).
<table>
<tr><th colspan="5">Significance Table: Increase Safety at Beatrix Mine</th></tr>
<tr><td>Duration</td><td>Magnitude</td><td>Extent</td><td>Probability</td><td>Significance</td></tr>
<tr><td>5</td><td>6</td><td>2</td><td>4</td><td>44</td></tr>
</table>
Air Emissions: Aspects may contribute to potential air pollution include:
- Diesel emissions from mechanically driven equipment. (Minimal qualities)
- Methane and other natural gas.

The operation of the flare would reduce the amount of air pollution as the flare would destroy methane that entering the atmosphere.
<table>
<tr><th colspan="5">Significance Table: Increase air quality at Beatrix Mine</th></tr>
<tr><td>Duration</td><td>Magnitude</td><td>Extent</td><td>Probability</td><td>Significance</td></tr>
<tr><td>5</td><td>6</td><td>2</td><td>4</td><td>44</td></tr>
</table>
There are no Indirect or cumulative impacts during the construction phase for the proposed development.

Indirect Impact:

Social Impact: The proposed facility would Thirty five temporary and two permanent create additional employment. The local community has a large number unemployed people. Job creation by strengthening the mining sector in this area is crucial as stated in the IDP as the area is highly dependent on the mining industry.
<table>
<tr><th colspan="5">Significance Table: Increase air quality at Beatrix Mine</th></tr>
<tr><td>Duration</td><td>Magnitude</td><td>Extent</td><td>Probability</td><td>Significance</td></tr>
<tr><td>3</td><td>6</td><td>2</td><td>4</td><td>44</td></tr>
</table>
</td><td>MODERATE Significance (Positive)

MODERATE environmental significance (Positive)</td><td>No mitigation required.

No mitigation required.</td></tr>
</table>

Activity	Impact summary	Significance	Proposed mitigation
No-go option			
	Direct impacts: The **No Go Alternative** refers to the proposed development not occurring. As such the following positive benefits would not come to light: - **The destruction of methane**: The proposed project will destroy both the underground mine methane and the borehole methane. The destruction of this methane will result in the elimination of methane released directly into the atmosphere. Since methane has 21 times the global warming potential of carbon dioxide, the project will result in a significant reduction of greenhouse gas emissions from the mine. - **The displacement of grid electricity:** Methane will be extracted from underground and piped up the Shaft 4 to the surface. This methane will fuel internal combustion engines to produce electricity. The electricity will be used on the mine; reducing the amount of electricity that Beatrix Mine needs to import from the national grid. The methane and the waste heat from the engines will be used to generate chilled water. This chilled water would otherwise have been generated using electricity in conventional electric chillers. Hence, the production of chilled water in this project will further displace grid electricity. - **Social Impact:** The project will create jobs in both the construction and operations phase. The project will contribute to foreign reserve earnings for South Africa via the carbon credit sales revenue. The carbon credits obtained from the destruction of methane will be owned by Gold Fields. The current earning profile of the mine changes with the fluctuating gold price and the cyclical changes associated with the South African currency. The revenue from the carbon credits will decrease the volatility of the normal earnings profile of the mine. As noted, the above benefits would not come to light if the project does not go ahead. As such the overall cumulative impact of not developing the Co - generation Facility is negative, with a high environmental significance.	**HIGH** environmental significance (Negative)	N/A

Activity	Impact summary	Significance	Proposed mitigation

Significance Table: Increase air quality at Beatrix Mine

Duration	Magnitude	Extent	Probability	Significance
5	8	5	5	90

Decommissioning of the proposed facility is consists of the removal of the containers on site. This would be conducted in a short timeframe with no direct, indirect cumulative or impacts.

2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

It is evident from this document that a major concern with regards to the existing operations of Beatrix Mine is their current methane emissions into the atmosphere. This assessment illustrates that there are various potential negative and positive impacts that may result from the proposed Co-Generation facility and associated infrastructure.

From an environmental perspective and with the consideration of the potential impacts detailed above, the EAP is of the view that the preferred alternative A will result in Moderate Positive impacts with mitigation.

The Impact Summary Report in **Table 1** below indicates that with the implementation of mitigation measures, all impacts will be of low significance to the receiving environment. However, given the degraded environment and considering the proposed site is currently a working mining operation, the impacts associated with the proposed installation of the Co-Generation facility is minimal. Construction of the Co-Generation facility would not be labour intensive, as the facility would be containerised and equipment assembled.

Health and Safety Impacts is an important environmental aspect requiring careful mitigation and control. The danger of working with highly flammable gases must be recognised. The mitigation measures recommended is to ensure that the National Health and Safety Regulations must be adhered to with appropriate measures included into the Environmental Management Programme (See Appendix G).

Several mitigation measures have been proposed to minimise the anticipated environmental impacts together with an environmental management programme report to monitor the effectiveness of these mitigation measures.

Table 1: Potential Impact Summary Report.

ALTERNATIVES	A1 (Preferred Alternative)		No-Go	
CONSTRUCTION PHASE IMPACTS				
POTENTIAL IMPACT	Without mitigation	With mitigation	Without mitigation	With mitigation
Health and Safety (Direct Impact)	**Low (-)**	**Low (-)**	-	-
OPERATIONAL PHASE IMPACTS				
POTENTIAL IMPACT	Without mitigation/ enhancement	With mitigation/ enhancement	Without mitigation	With mitigation
Health and safety (Indirect Impact)	**Moderate (-)**	**Low (-)**	-	-
Noise Impacts (Direct Impact)	**Low (-)**	**Low (-)**	-	-
Air Emissions	**Moderate (+)**	**N/A**	-	-
Social Impact (Indirect Impact)	**Moderate (+)**	**N/A**	High (-)	-

Key:

	High negative impact	(-)	Negative Impact
	Moderate negative impact	(+)	Negative Impact
	Moderate positive impact	(-)	Positive Impact
	Low	(-)	Negative Impact

Alternative A (preferred alternative)

On the basis of the findings in this report, it is suggested that **Alternative A** be approved for the construction of the proposed Co-Generation Facility.

No-go alternative (compulsory)

The "No-Go" alternative was briefly assessed and compared as shown above.

The proposed Co-Generation Facility has positive environmental and social impacts. The purpose of the proposed facility is to increase the sustainability of the mine, reduce methane emissions and create an alternative energy supply.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	YES √	~~NO~~

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

Refer to Appendix F attached and to the EMP attached in Appendix G

Is an EMPr attached?	YES	~~NO~~

The EMPr must be attached as Appendix G.

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Any other information relevant to this application and not previously included must be attached in Appendix J.

Sukendrie Paras

_____

NAME OF EAP

07/02/2013

_____ _____

SIGNATURE OF EAP DATE

SECTION F: APPENDICES

The following appendices must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Declaration of Independence

Appendix J: Additional Information