ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

The purpose of this Environmental Management Programme (EMPr) is to ensure 'good environmental practice' by taking a holistic approach to the management of environmental impacts during the construction and operation of the proposed clearance of 40,537 hectares of indigenous vegetation in order to establish a Feed Mill, Agricultural Recreation Area, Solar Farm and Sheep Feedlot on Portion 15 of Portion 1 of the Farm Bultfontyn, Inxuba Yethemba Local Municipality, Eastern Cape Province. The proposed development will also entail the construction of three Sedimentation ponds and two Evaporation ponds. **This EMPr should also be read in conjunction** with the EMPr that has been compiled for the proposed establishment of a composting facility with the capacity to process 3 tons of organic waste per day on Portion 15 of Portion 1 of the farm Bultfontyn, Inxuba Yethemba Local Municipality, Eastern Cape Province. This EMPr therefore sets out the methods by which proper environmental controls are to be implemented by the applicant and his nominated contractor and operator. However, where necessary, these methods have been expanded upon and additional issues addressed in order to ensure that all environmental aspects are appropriately considered and monitored.

It is important to note that this EMPr is focused primarily on the construction and operational phases of the project. Due to the projected lifespan, a detailed Site Closure and Decommissioning has not been included. Design specifications from an environmental point of view were taken into consideration, the Environmental Assessment Practitioner (EAP) have provided input with regard to possible mitigation measures for reducing environmental impacts.

This EMPr is also intended to ensure that the principles of sound Environmental Management and the general "Duty of Care" specified in the National Environmental Management Act are promoted on site during all phases of the development.

This EMPr has been designed to suit the particular activities and needs of the proposed clearance of 40,537 hectares of indigenous vegetation in order to establish a Feed Mill, Agricultural Recreation Area, Solar Farm and Sheep Feedlot on Portion 15 of Portion 1 of the Farm Bultfontyn, Inxuba Yethemba Local Municipality, Eastern Cape Province. The proposed development will also entail the construction of three Sedimentation ponds and two Evaporation ponds, and incorporates specific project mitigation measures. This EMPr therefore identifies the following:

- Construction and operation activities that will impact on the environment;
- Specifications with which the contractor and operator of the facility shall comply in order to protect the environment from the identified impacts; and
- Actions that shall be taken in the event of non-compliance.

It is important to note that the EMPr is a dynamic document subject to similar influences and changes as are brought by variations to the provisions of the project specification. Any substantial changes shall be submitted to the contractor, operator of the facility and relevant environmental authorities in writing for approval.

A professional team consisting of the following experts have been assembled in order to ensure the success of the proposed development:

- A Civil and Geotechnical Engineer
- A Town and Regional Planner
- A SAHRA Specialist and Palaeontological specialist.
- An Ecological Fauna and Flora Habitat specialist
- Wetland Specialist
- Aviation Specialist
- Agricultural Specialist
- Registered Environmental Assessment Practitioner (EAP)

They were responsible for the following actions:

1) The EAP was contracted by the land owner, De Heus (PTY) Ltd as their Independent Environmental Assessment Practitioner.
2) A Geotechnical Engineer was appointed to determine whether the Geology and Soils of the site is suitable for the proposed development
3) The Civil Engineer has been appointed to determine the capability of existing infrastructure to be linked to proposed development and readily available bulk services. He will also design the proposed infrastructure.
4) A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
5) A Paleontological specialist was appointed to determine the impact of the proposed development on the fossils that might be found on site.
6) A Fauna and Flora Habitat specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
7) A Wetland Specialist was appointed to assess the status of the canal/drainage line that intersects the site.
8) An Aviation Specialist was appointed to assess the impact of the proposed development on the airfield that is located towards the south of the site. His assessment also included a “glint and glare” visual impact assessment to determine if the proposed development will have any negative impacts in this regard.
9) An Agricultural Specialist was appointed to assess the agricultural potential of the site.
10) A Hydrogeologist has been appointed to determine optimal borehole positions for water abstraction.
11) An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
12) Desk top studies were conducted and alternatives assessed.
13) Site inspections were carried out to verify the outcomes of the desktop studies, and the preferred alternative defined.
14) A full Public Participation Process is being followed to obtain inputs from interested and affected parties.
15) All the information obtained from the above mentioned processes is being used to assess the Environmental Impact that the proposed development may have on the Environment and vice versa.
16) The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP is being used to determine measures to avoid, mitigate and manage potential impacts. These measures are described in the Environmental Management Programme.

2. Contents of the Environmental Management Programme

The contents of an EMPr, shown below, are contained in Appendix 4 of the NEMA EIA Regulations 982 of 2014 as amended and published in Appendix 4 of Government Notice No. R 326 of 2017.

1. (1) An EMPr must comply with section 24N of the Act and include-

(a) details of

(i) the EAP who prepared the EMPr; and
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;

(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;

(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;

(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-

(i) planning and design;
(ii) pre-construction activities;
(iii) construction activities;
(iv) rehabilitation of the environment after construction and where applicable post closure; and
(v) where relevant, operation activities;

(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes and outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to –

(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) comply with any prescribed environmental management standards or practices;
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and
(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(i) an indication of the persons who will be responsible for the implementation of the impact management actions;

(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;

(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;

(m) an environmental awareness plan describing the manner in which-
(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and

(n) any specific information that may be required by the competent authority.

3. Details of Environmental Assessment Practitioner

Environmental Assessment Practitioner (EAP):1	**Mr J.P. de Villiers of AB Enviro Consult CC**		
Contact person:	**Mr. JP de Villiers**		
EAPASA Registration number	**2019/808**		
Postal address:	**7 Louis Leipoldt Street**		
Postal code:	2531	Cell:	083 5488 105
Telephone:	018 294 5005	Fax:	018 293 0671
E-mail:	jp@abenviro.co.za		

4. Expertise of the Environmental Assessment Practitioner

AB Enviro Consult (CC) is a registered consultancy, owned and operated as an independent unit by the registered owner and consultant**: Prof. A.B. de Villiers**

- **Mr J.P. De Villiers** joined the consultancy during 2004
- **Mrs J.E. du Plooy** is a consultant since 2001

EXPERIENCE OF THE CONSULTANCY

Over a period of 26 years (1996-2022) this consultancy has successfully applied for, and obtained positive ROD's and EA's for more than 390 projects. Environmental Control Officer's duties are also performed on various projects.

The company was involved (from 1992-1994) in evaluation of 114 applications for the subdivision of land, 23 applications for resort developments, and 54 applications for business rights for the Department of Agriculture, Conservation and the Environment - North West Province.

The consultancy is qualified to undertake professional studies in waste management and is still involved in the development of waste disposal- (solid and liquid effluent), and emission studies. These studies are conducted both academically and practically. This work relates to mine waste, domestic waste and effluent as well as to the monitoring of waste disposal. Environmental audits in this respect are undertaken on a regular basis.

PERSONAL PARTICULARS AND CAREER HISTORY OF PROF DE VILLIERS

ACADEMIC AND PROFESSIONAL QUALIFICATIONS

Post–Matric Qualifications

YEAR	Qualification	Institution	Field of Study
1968	B.Sc.	PU FOR CHE	Geography, Geology
1970	HONNS. B.Sc.	PU FOR CHE	Soil Science
1974	M.Sc.	PU FOR CHE	Geography
1981	Ph.D.	UOFS	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

YEAR	Qualification/ Registration	Institution	Field of Study
1986	Professional Natural Scientist	S.A. Council for Na Scientists	Environmental Science
1994	Quality Auditor	ESKOM	Auditing
1998	Personnel & Verifying Auditor	SAATCA	Environmental Auditing
2006	Environmental Assessment Practitioner	Interim Certification E EAPSA	Environmental Science

MEMBERSHIP AND PARTICIPATION IN SOCIETIES, COUNCILS, ETC.

Name of professional societies	**YEAR**	**Capacity**
S.A. Geographical Society.	1967-1996	Board Member
Society for Geography	1968-2004	Member
SAGS Western Transvaal	1985-1989 1987-1989	Chairman
Africa Geographical Association	1993-1995	Vice-President.
Society for the Vaal River Catchment	1980-1999	Member
S.A. Society for Photogrammetry, Remote Sensing Cartography	1984-1996	Member
Dendrological Society	1986-2005	Member
Birdlife South Africa	2003-present	Member
British Geomorphological Research Group	1985-1997	Member
Int Com on Water Resource Systems	1985-1997	Member
Int Com on Continental Erosion	1986-1990	Member
Int Com on Remote Sensing and Data Transmission	1986-1991	Member
Society for S.A. Geographers	1995-2005	Member
SA Photogrammetrical and Geo. Info.	1995-2003	Member
S.A. Association of Geomorphologists	1994-1999	Board Member and member
SADC Mine Dump Study Group	1996-2005	Member

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MR J.P. DE VILLIERS

YEAR	Qualification	Institution	Field of Study
1993	BA	PU FOR CHE	Geography, Economics
1994	HED	PU FOR CHE	Geography Economics
2006	B.Sc.(Honns) Cum Laude	North-West University	Environmental Management
2007	M.Sc.	North-West University	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

YEAR	Qualification/ Registration	Institution	Field of Study
2008	Basic Principles of Ecological Rehabilitation and Mine Closure	Centre for Environmental Management (North West University)	Ecological Rehabilitation
2019	Registered as Environmental assessment Practitioner	EAPASA Registration number: 2019/808	

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MRS J.E. DU PLOOY

YEAR	Qualification	Institution	Field of Study
1999	BA	PU FOR CHE	Geography, Tourism
2000	BA (Honns) Cum Laude	PU FOR CHE	Geography
2002	Master's degree: Environmental Management	PU FOR CHE	Environmental Management
2001	Aquabase Intro	AQUABASE	Hydrology
2001	Geomedia Professional	INTERTECH	GIS
2001	Map Info	SPATIAL TECHNOLOGY	GIS

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

YEAR	Qualification/ Registration	Institution
2020	Registered as Environmental assessment Practitioner	EAPASA Registration number: 2019/1573

5. DESCRIPTION OF THE ACTIVITY

The proposed development will be for the establishment of a Feed Mill, Agricultural Recreation Area, Solar Farm and Sheep Feedlot on Portion 15 of Portion 1 of the Farm Bultfontyn, Inxuba Yethemba Local Municipality, Eastern Cape Province. The proposed development will also entail the construction of three Sedimentation ponds, two Evaporation ponds and a Manure Composting area in order to treat the manure and the carcasses that will originate from the Sheep Feedlot.

Please see Figure 1 below for a copy of the proposed Layout Plan. Please note that the Golf Club that is indicated on the Layout Plan is an existing feature on site and no eradication of indigenous vegetation will take place on this erf. Also note that the blue line on the Layout plan is a furrow that was used (Prior to 1990) to divert water that overflowed from a reservoir that was built in the Groot Brak River towards a farm dam that is situated south west of the proposed development. The dam wall of the reservoir was broken down in the early 1990's and no water has since flown in this furrow. The servitude that was registered for this furrow has also since been cancelled.

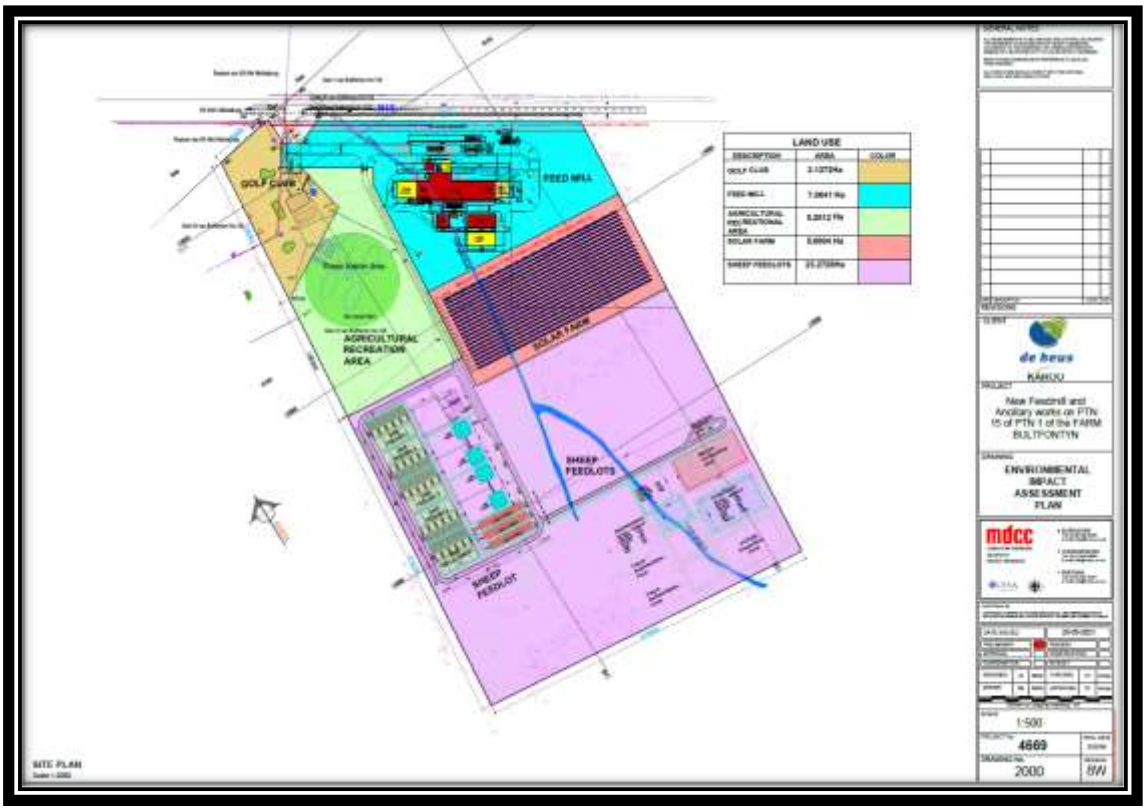


Figure 1: Proposed Layout Plan

The proposed **Feed Mill** will consist of an Industrial building covering an area of approximately 55m x 170m. This structure will be housing the following activities: Feed mixing, pill making, packaging and ancillary works including grain and feed storage. This area will be a Bio secure area with entrance control. Please see Figure 2 below for a copy of the proposed layout of the Feed Mill.

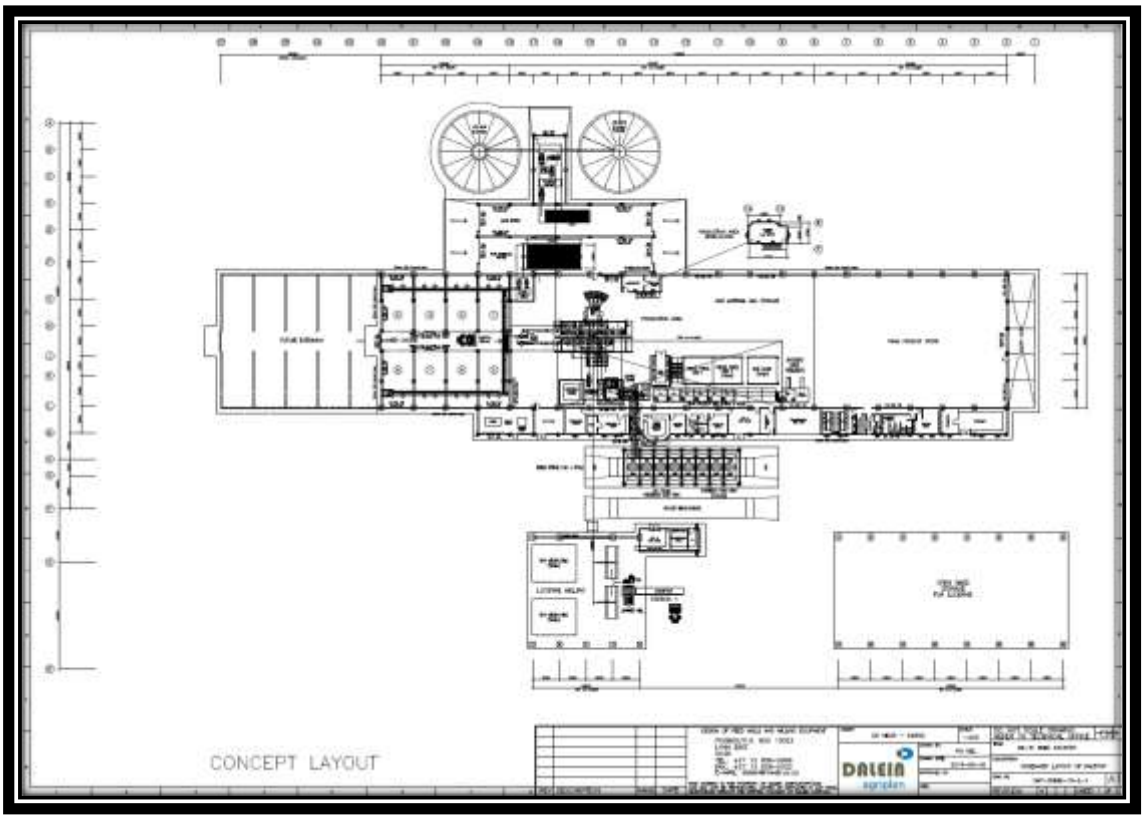


Figure 2: Layout Plan of the Feed Mill

As part of the operations of the Feed Mill, steam will have to be generated. This will be done means of a 2,5 ton, 10 bar coal boiler. The thermal output of the boiler is 1.567 MWA. A sealed bunker for the storage of coal has been designed to ensure that it will not cause any soil or water pollution. See Figure 3 for a copy of the design details for the coal storage area.

It is also proposed to store 23 000 litres of diesel and 800 litres of oil on site for the purpose of refuelling of trucks and machinery. Please see Figure 4 for the storage area designed for the oil and Figure 5 for the design of the proposed diesel tank and bunker.

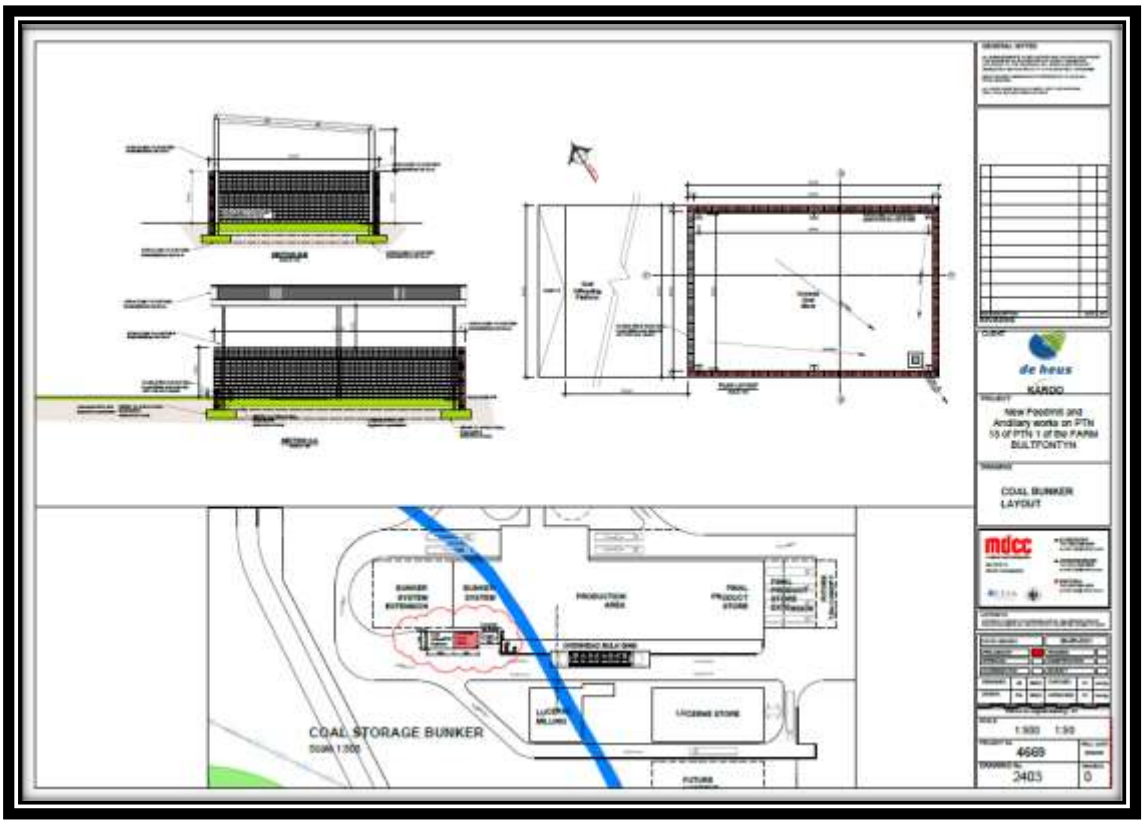


Figure 3: Storage facility for coal.

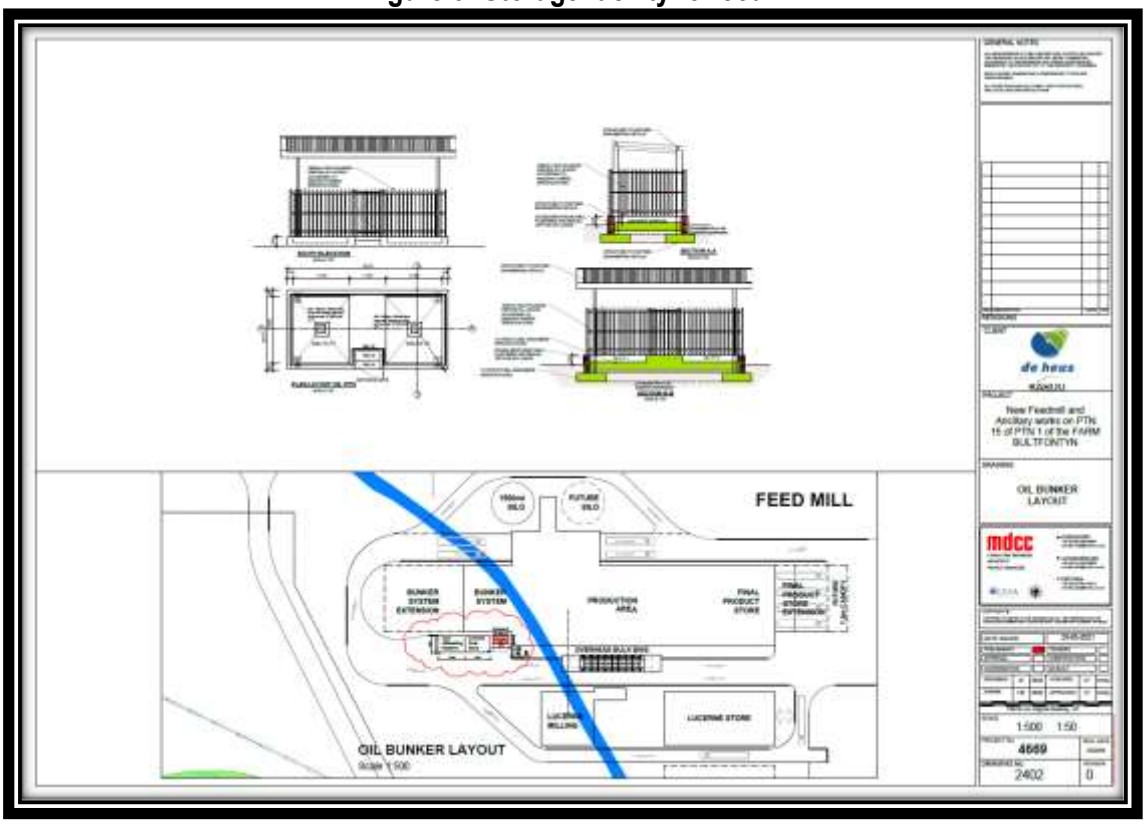


Figure 4: Storage facility for oil.

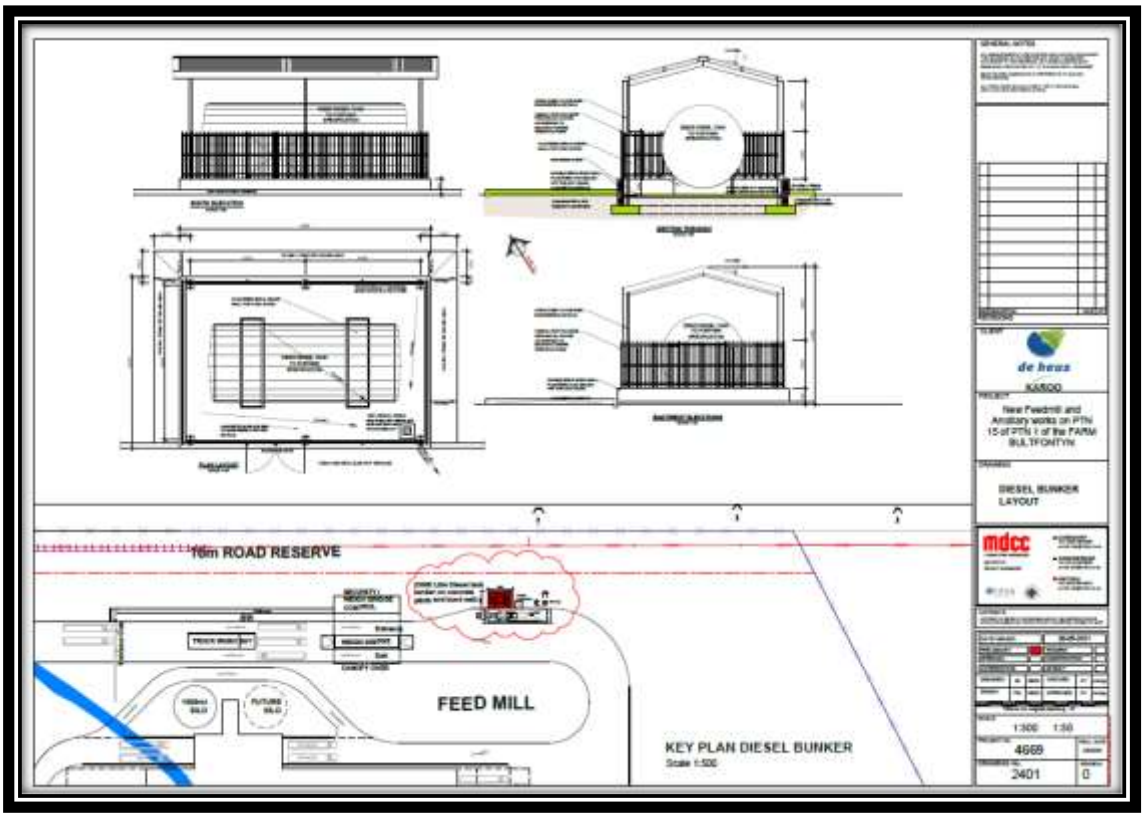


Figure 5: Storage facility for Diesel.

The **Agricultural recreational area** will be for Animal display and demonstrations, auctions and ancillary activities and will be Open to the public.

The proposed **Solar Farm** will be constructed to ensure sufficient, sustainable electricity for the development. The PV Solar plant can be described as follows:

- Grid-tied topology connected on the internal electrical network
- 2000kVA (0.8pf) = 2,500kW installed maximum PV output capacity
- PV panels to be used is 550W Monocrystalline (all required approval obtained for this implementation)
- Inverter equipment (DC to AC converting) will be SMA, Fronius or ABB
- Plant will function either on 400V or 11kV
- PV panels will be mounted on steel solar mounting system with casted concrete foundation blocks (see sample image on layout drawing, Figure 6)
- Crusher rock will be used for topsoil underneath the mounted PV panels

The proposed layout is illustrated in figure 6.

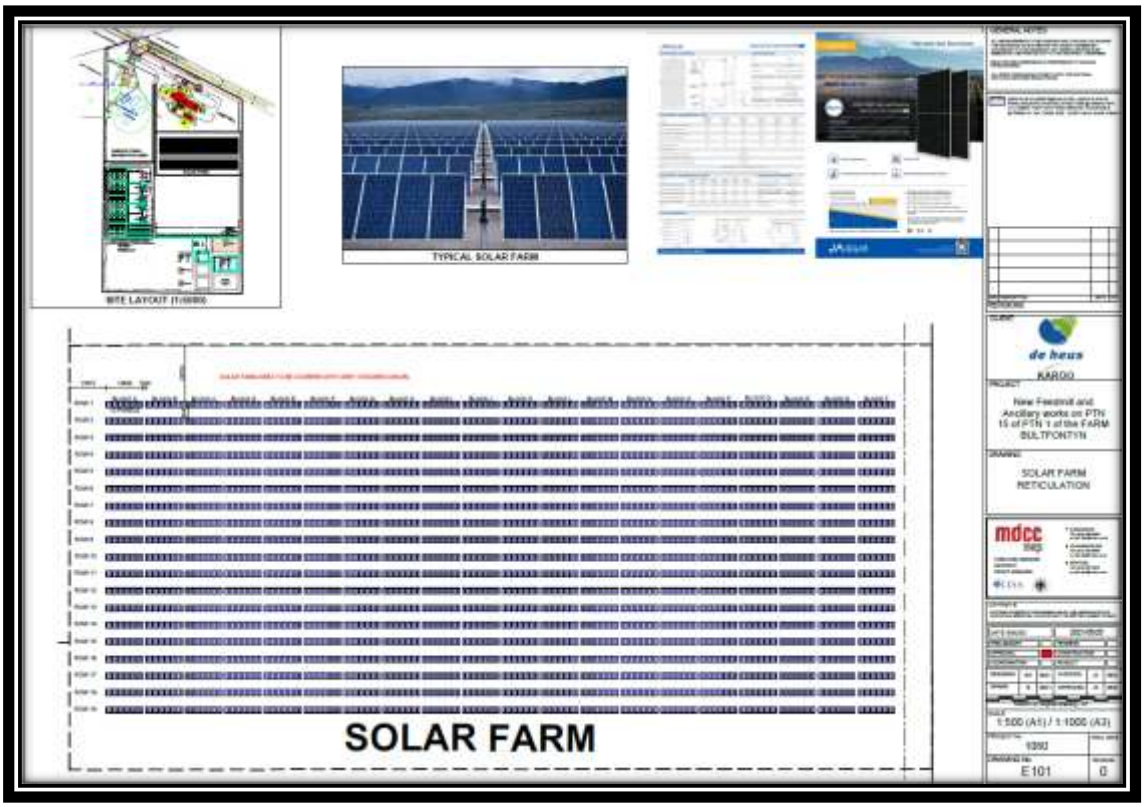


Figure 6: Proposed Layout plan for the Solar Farm.

The **Sheep Feedlot** will be designed for 10 880 head of sheep. Figure 7 is a copy of the proposed layout plan for the sheep feedlot.

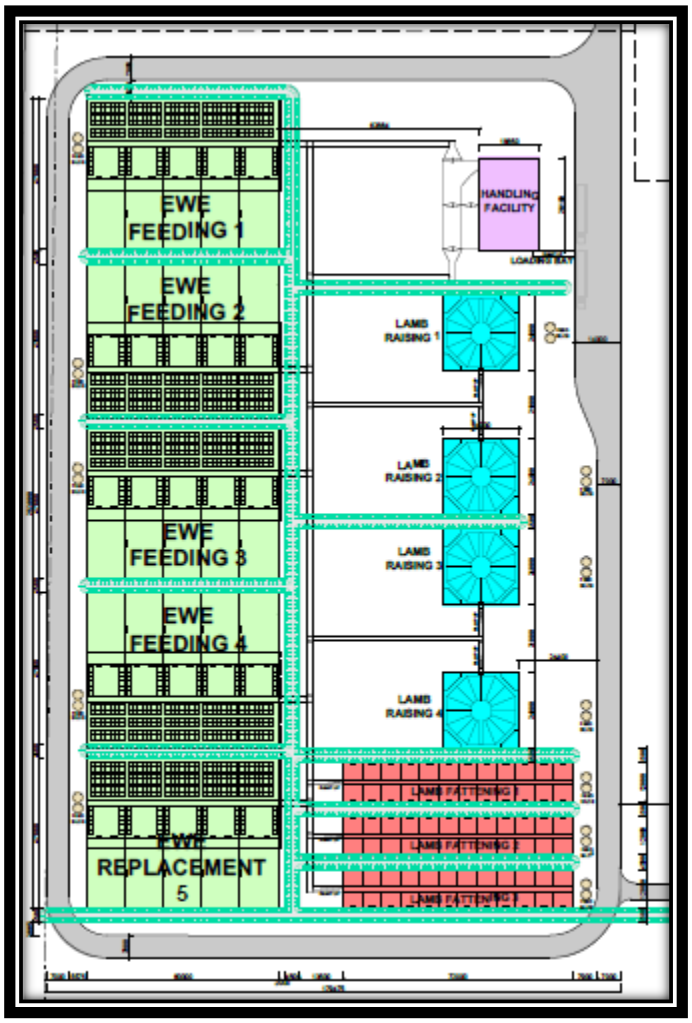


Figure 7: Layout Plan for proposed sheep feedlot.

In order to treat the manure and the carcasses that will originate from the Sheep Feedlot the construction of three **Sedimentation ponds**, two **Evaporation ponds** and a Composting area is proposed.

Sedimentation ponds

- The purpose of the sedimentation system is to remove settleable solid material from the feedlot runoff and prevent it from entering the evaporation ponds.
- The sedimentation pond is designed to have an overflow weir structure to discharge to the Evaporation pond.
- The sedimentation pond is sized, based on the number of head of sheep the facility will operate at and the peak rainfall (1:20 year return) characteristics of the area.
- The pond will have a volume of 1520m^3,
- Bank Height 1.0m
- Bank Slopes 1V:3H
- 2.5m
- Length 46m
- Width 40m
- Depth 1.2m

- Constructed using Cut to Fill method, with selected material from site (Excluding Topsoil and Vegetation) Cut to Form the base of the pond and fill to form the side embankments. Each pond to receive a 300mm thick clay liner or Synthetic equivalent to provide a design permeability of less than 0.1mm/d. The Earth embankment shall also have a clay core.

Evaporation ponds

- The Evaporation pond is sized based on calculation of the annual water balance (Annual Rainfall versus Evaporation Statistics) and is designed to contain the runoff/ effluent from the feedlot site.
- Only in extreme rainfall events will the pond discharge treated effluent via an overflow spillway, designed to comply with a 1:50 year return.
- The pond will have a volume of 4500m^3,
- Bank Height 1.0m
- Bank Slopes 1V:3H
- 2.5m
- Length 90m
- Width 55m
- Depth 1.2m
- Free Board 0.375m
- Constructed using Cut to Fill method, with selected material from site (Excluding Topsoil and Vegetation) Cut to Form the base of the pond and fill to form the side embankments. Each pond to receive a 300mm thick clay liner or Synthetic equivalent to provide a design permeability of less than 0.1mm/d. The Earth embankment shall also have a clay core.
- Water from this pond can be utilised for irrigation purposes.

The manure composting area will have a concrete base and will be able to accommodate the composting activities. The area allowed is 100x50m (0,5ha).

Please see Figure 8 for a copy of the proposed layout plan for the treatment facilities described above and Figure 9 for a flow chart of this facility.

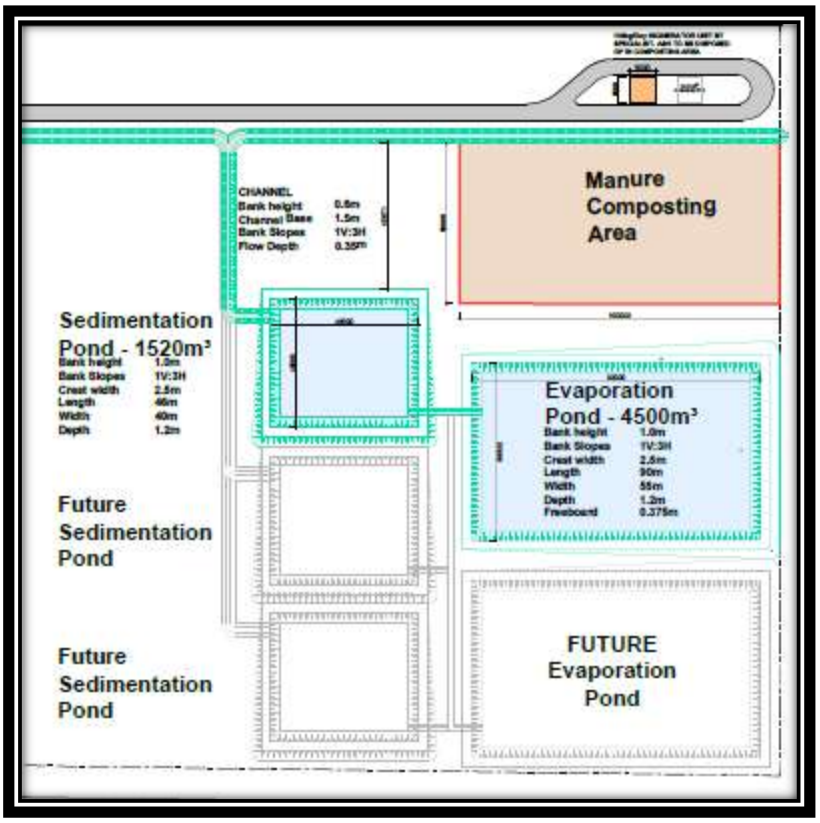


Figure 8: Layout Plan for proposed treatment facilities

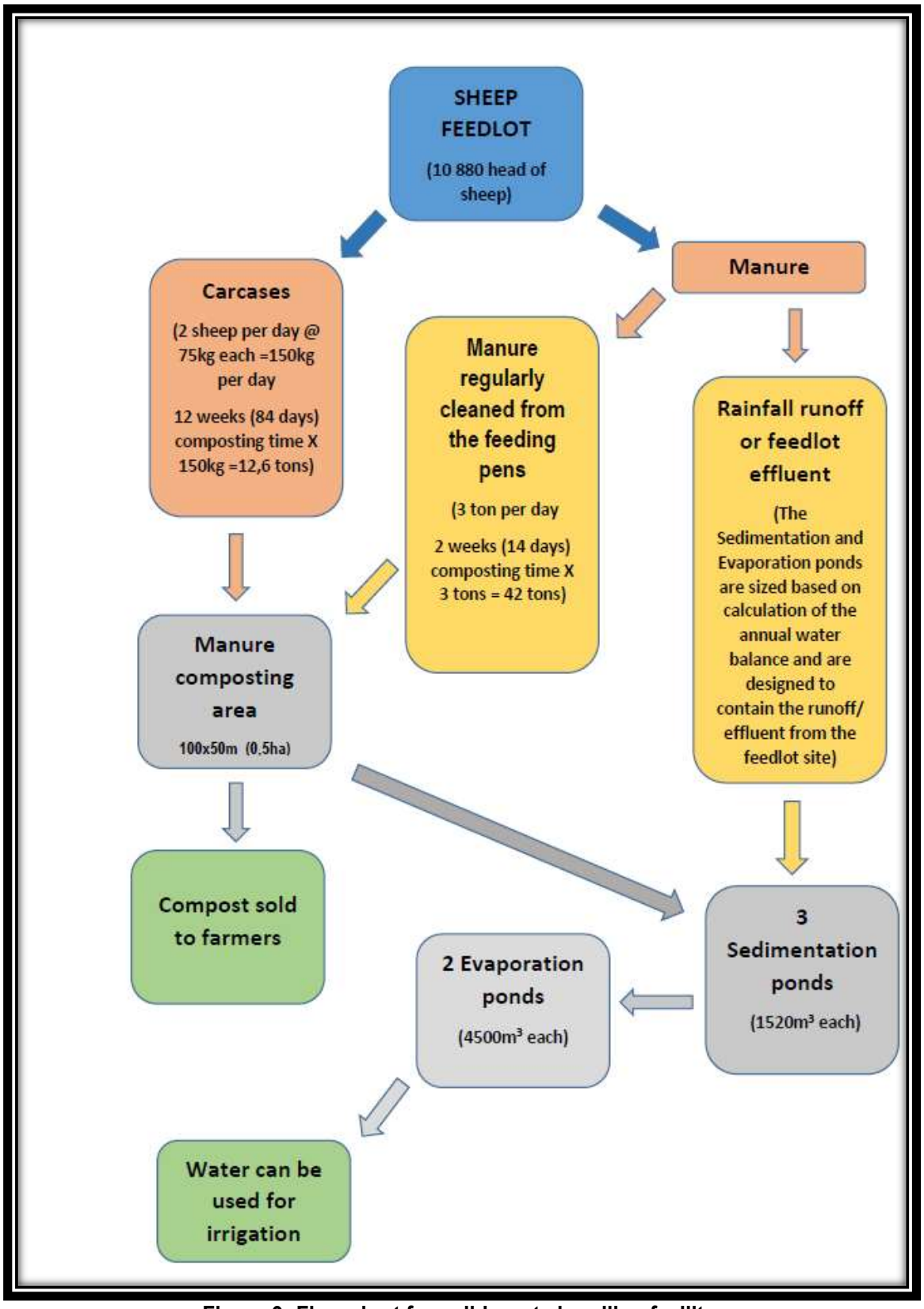


Figure 9: Flow chart for solid waste handling facility.

CIVIL SERVICES

BULK WATER SUPPLY

No municipal Bulk Water lines are available to supply the site with its calculated water demand. As part of the development of the site, new borehole/s will be installed to supply the site's water demands.

The Hydrogeologist's preliminary findings following a site visit to the study area, resulted in the placement of the proposed boreholes at the following locations (Figure 9a below):

- Borehole 1 (25º01'59.61"E, 31º31'35.2"S) – near sample site DH2 (Geotechnical test pit), and;
- Borehole 2 (25º02'02.26"E, 31º31'39.8"S) – near sample site DH10 (Geotechnical test pit).

Drilling of the borehole can occur within a 5m radius of the proposed coordinates. The depth of the boreholes would be between 30 to 40 meters and the yield would vary from 3 to 7 liters per second.

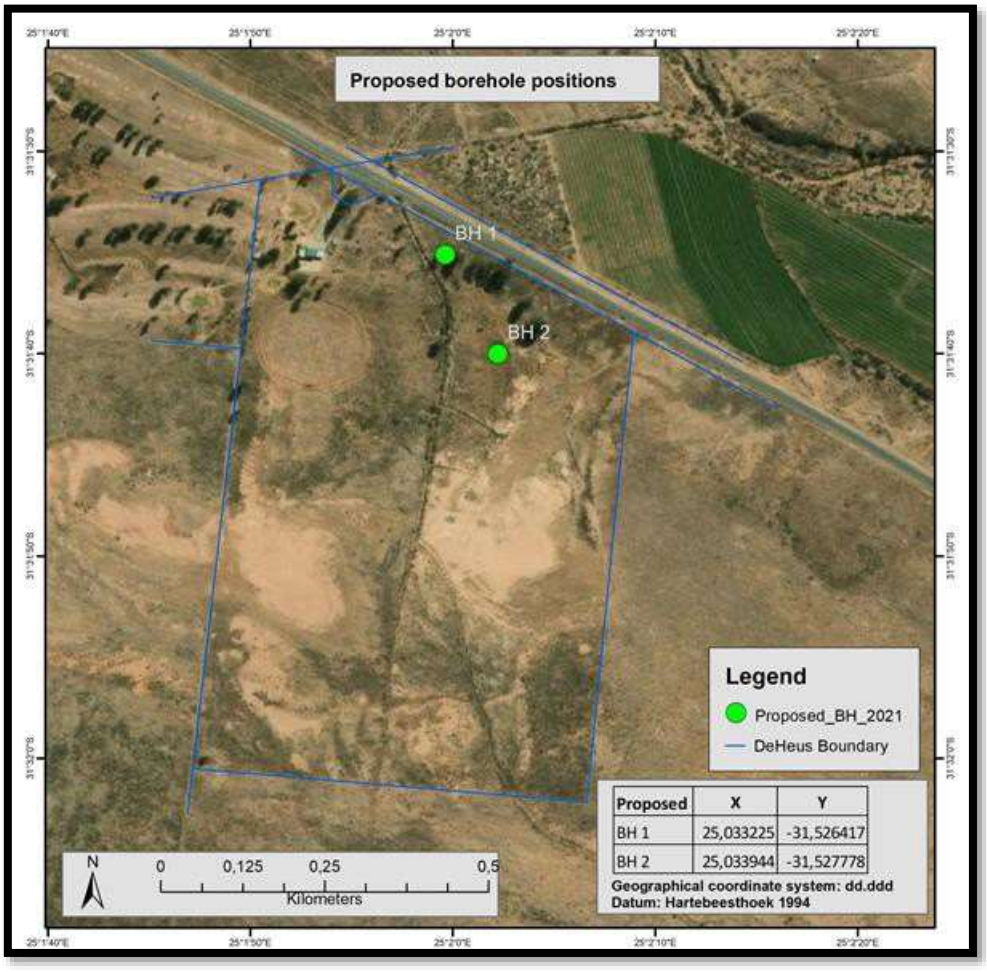


Figure 9a. Proposed borehole positions

The proposed layout of the development in relation to the proposed boreholes are indicated in Figure 9b below:

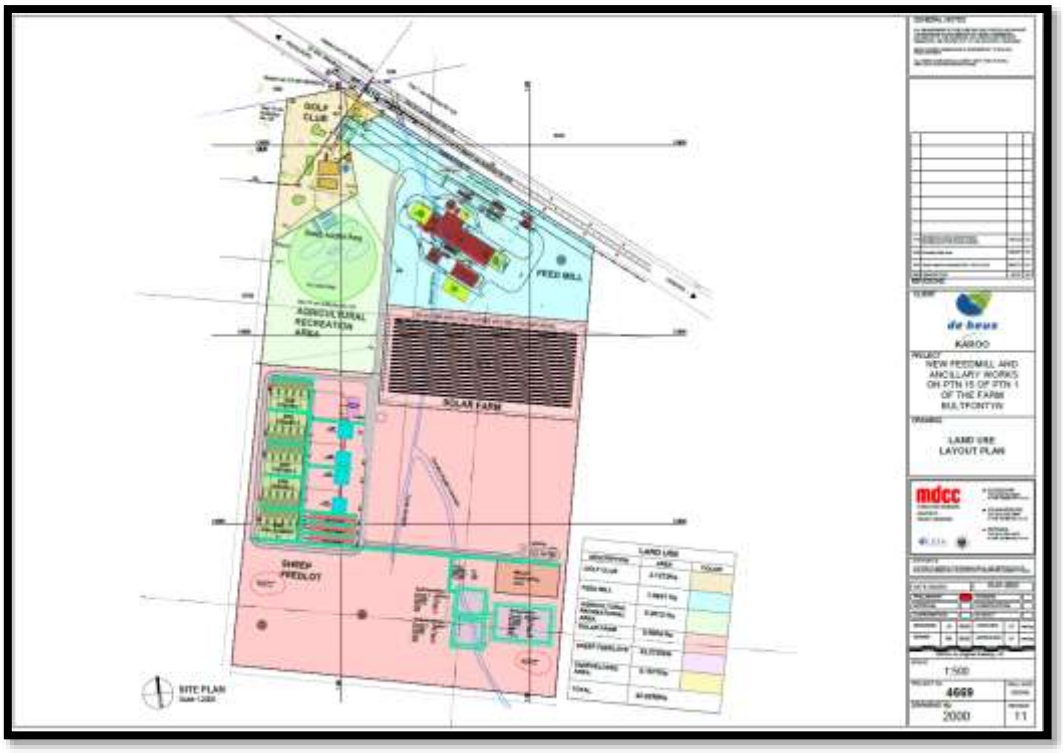


Figure 9b: Proposed development layout plan with proposed borehole positions

Pipe routing

The design of the water reticulation network is done to provide water to demand nodes within the site, which will include fire hydrant nodes.

Hydraulic analysis of the water reticulation network

The water distribution network is analysed by utilizing Civil Designer's Aquanet Software. The appropriate pipe diameters were established by calculating peak draw-off flows from nodes and then adding fire hydrant flow (40 l/s) at each specific location. Water storage tanks will be installed on site to accommodate the water storage requirements. From there the water will be distributed to the network. Pipes are sized to limit flow velocities below 1,5 m/s for peak domestic flow only and 2,2 m/s for fire flow included.

SEWER DESIGN

Existing Infrastructure

No Existing municipal Sewerage systems exist for the site. Sewerage generated by the site will discharge into the conventional pipe network and make its way to a new Waste water package plant. The Package plant will be designed to accommodate all the effluent generated from the human populated areas. A specialist company will be approached to provide a turn-key solution for the site. Treated greywater will discharge from the package plant and will be let out into the evaporation pond.

The internal sewer drainage network was designed as a gravity system. The design was done to provide a sewerage connection to each required point with an optimised route to the Waste Water Package Plant.

The sewer reticulation network is hydraulically analysed by utilising Civil Designer software. The appropriate pipe diameter is determined by Civil Designer and adjusted to the minimum requirements of 160mm.

ROADS AND STORM WATER DESIGN

Existing Infrastructure

The following existing infrastructure is applicable to this proposed development:

- The N10, which forms the northern boundary of the site has periodic concrete culverts beneath it which assist the movement of stormwater from north to south, in line with the natural topography, these culverts disperse the stormwater on to the lower areas, where evaporation and infiltration to the soil occurs
- There is an existing stormwater drainage ditch which runs north to south across the site, which is abandoned due to changes up stream, it was previously protected by a servitude, which has since been cancelled. This ditch will be filled and closed up.
- Access to the proposed development will be from the N10, from which there is an existing widening of the road and a splay for dedicated traffic to the site.

Access to site

The internal roads will be private roads, the Roads will be 7m wide and be designed to accommodate slow moving heavy livestock trucks.

- The internal roads will be classified as a local distributor, class 4, primarily due to the heavy load requirements.

The structural design of the road pavement will be done according to the standards prescribed in the "Guidelines for Human Settlement and Planning" and TRH 14 (Catalogue Specification for Pavements). Provision will be made for the installation of pre-cast concrete kerbs or edge beams on both sides of streets.

The long sectional gradient of the road will be varied, but will be a minimum of 0.5%.

Storm Water Design Criteria

Stormwater will be accommodated on the surface in the road prism. Shallow earth lined channels will be created to direct stormwater away from the roads and eventually discharge to the sedimentation pond and then the Evaporation Pond.

For the Sheep feedlot area, a special stormwater management plan will be implemented to comply to guidelines.

The following Standard Reference Documents, Codes of Practice, Policies and Guidelines will be used in the design of the stormwater drainage systems:

- TRH 15 – Subsurface Drainage for Roads.
- Guidelines for Human Settlement Planning and Design – (Red Book).
- Guideline for the Provision of Engineering Services in Residential Townships (Blue book).
- DoT Minimum Standards for Civil Engineering Services in Townships Draft
- SANRAL Road Drainage Manual
- SANS 1200 DB : 1989 – Earthworks (Pipe Trenches)
- SANS 1200 GA : 1982 – Concrete (Small Works)
- SANS 1200 GE : 1984 - Precast Concrete (Structural)
- SANS 1200 LB : 1983 – Bedding (Pipes)
- SANS 1200 LE : 1982 - Stormwater Drainage

General Development Considerations

- Shallow earth lined stormwater channels will be allowed, for ease of maintenance**.**
- Runoff will be caught in stormwater channels and eventually discharge into the sedimentation pond from where settling occurs and then overflow into the evaporation pond.
- Periodic Maintenance of the stormwater system will be needed to clean out sludge. The sludge will be transported to the manure composting area where it will be mixed and utilised for compost.

Connections to existing road and stormwater infrastructure

- New roads of the proposed development will link with existing main surfaced National Road N10
- All stormwater systems will discharge into the new Sedimentation and Evaporation ponds as part of the sheep feedlot design

SOLID WASTE MANAGEMENT

Existing Infrastructure

The following existing infrastructure is applicable to this proposed development:

- No existing Solid Waste management exists for the site.
- The site is not serviced by municipal Waste collection services

Feed Mill Production

The Waste generated by the feed mill will be dumped into skips and transported to the nearest municipal waste disposal site, this will be managed by the Clients' operations team and will occur on routine frequency as required.

Sheep Feed lot Production

Manure effluent will be cleaned from the feeding pens routinely. Two actions takes place in terms of management:

- Manure is manually collected and transported to the Manure Composting Area where it will be aired, dried and process as a by-product from the sheep feedlot.
- In the event of rainfall, the manure will discharge into the Stormwater channels and flow towards the sedimentation pond, where settling will occur and then overflow into the evaporation pond.
- The evaporation pond has been sized to accommodate the 1:20 year rainfall return period, and accompanied with high evaporation (Based on S-Pan) values, will only overflow on rare occurrences.

Waste generated by the Sheep Feedlots will be managed by the Clients' operations team and will occur on routine frequency as required

Composting

"Composting is the biological decomposition and stabilization of organic material. The process produces heat that, in turn, produces a final product that is stable, free of pathogens and viable plant seeds, and can be beneficially applied to the land. As the product stabilizes, odours are reduced and pathogens eliminated."

Manure will be cleaned from the feeding pens routinely. Two actions take place in terms of management:

- Manure is manually collected and transported to the Manure Composting Area where it will be aired, dried and process as a by-product from the sheep feedlot
- In the event of rainfall, the manure will discharge into the Stormwater channels and flow towards the sedimentation pond, where settling will occur and then overflow will then enter the evaporation pond.

A predicted mortality rate of 2 sheep / day have been considered whereby each sheep could have a maximum estimated mass of 75kg. Therefore, an anticipated mass of 150kg / day have been considered in the disposal process. Carcasses will be disposed into the manure composting area, whereby it will take approximately 5-6 months to decompose, per carcass, with respect to mass.

The manure composting area will have a concrete base and will be able to accommodate the composting activities. Runoff water from this facility will drain towards the Sedimentation Ponds. The composting facility will generate additional income as the compost will be sold, thus ensuring that a potential source of pollution has been processed to a usable product.

The composting process

Under controlled conditions, composting is accomplished in two main stages: an active stage and a curing stage (Figure 10). In the active composting stage, microorganisms consume oxygen (O_2) while feeding on organic matter in manure and produce heat, carbon dioxide (CO_2) and water vapour. During this stage, most of the degradable organic matter is decomposed. A management plan is needed to maintain proper temperature, oxygen and moisture for the organisms. Testing temperature, moisture content, and oxygen levels can help make decisions on composting activities, such as turning, aerating, or adding moisture. These tests can be performed quite simply on site giving quick feedback - from minutes for temperature or oxygen to overnight for moisture content. In the curing phase, microbial activity slows down and as the process nears completion, the material approaches ambient air temperature. Finished compost takes on many of the characteristics of humus, the organic fraction of soil. The material will have been reduced in volume by 20 to 60%, the moisture content by 40% and the weight by up to 50%. One of the key challenges in composting is to retain as much nitrogen as possible.

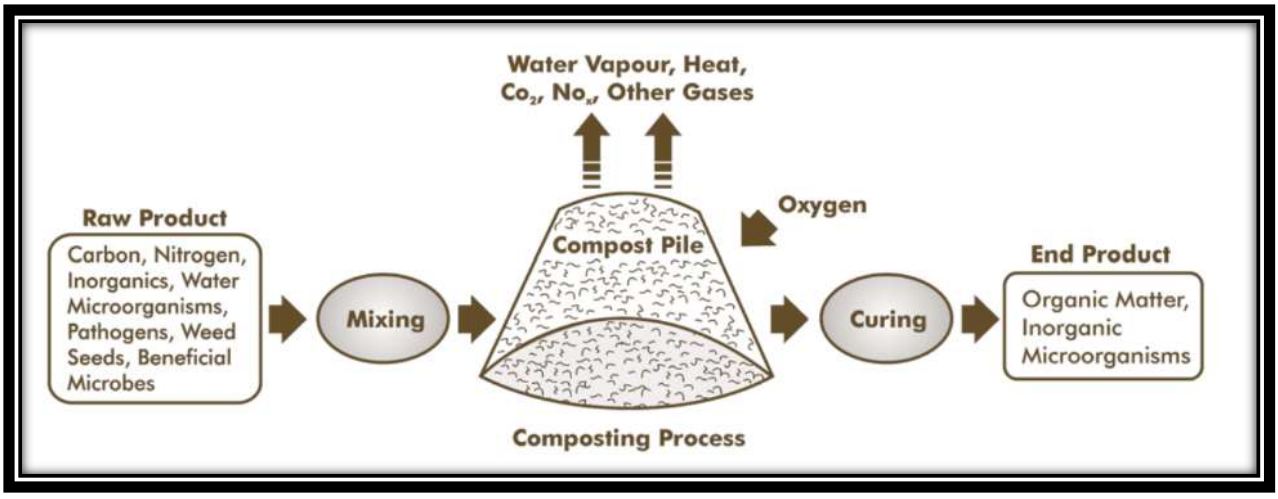


Figure 10: Material flow for the conventional composting process. (Source: Alberta Agriculture, Food and Rural Development, 2005)

Controlling the process factors can accelerate the natural composting process. Each of these factors has the potential to significantly affect the composting process. Some of the important factors in the composting process are shown in Table 2 with their acceptable ranges.

Table 2. Factors affecting the composting process and acceptable ranges (Source: Alberta Agriculture, Food and Rural Development, 2005)

Factor	Acceptable Range
Temperature	54 - 60°C
Carbon to Nitrogen ratio (C:N)	25:1 - 30:1
Aeration, percent oxygen	> 5%
Moisture content	50 - 60%
Porosity	30 - 36
pH	6.5 - 7.5

Temperature

Temperature is a very good indicator of the process occurring within the composting material. The temperature increases due to the microbial activity and is noticeable within a few hours of forming a pile as easily degradable compounds are consumed. The temperature usually increases rapidly to 50 - 60°C where it is maintained for several weeks. This is called the active composting stage. Biochemical reaction rates approximately double with each 10°C increase in temperature, yet higher temperatures will increase ammonia loss during the composting process. The temperature gradually drops to 40°C as the active composting slows down and the curing stage begins. Eventually, the temperature will become that of the surrounding air. The highest rates of decomposition occur when temperatures are in the range of 43 - 66°C. During the active composting stage, the temperature may start to fall because of a lack of oxygen. Turning the material introduces new oxygen and the active composting stage continues. The temperatures can exceed 70°C but many microorganisms begin to die, which stops the active composting stage. Cooling the material by turning helps to keep the temperature from reaching these damaging levels. Heat loss occurs primarily because of water evaporation from the material. Heat loss can also occur if the pile is too small or is exposed to cold weather. If the moisture content falls too low it increases the chance of obtaining damaging high temperatures.

The temperature should be maintained at 55°C or higher for a minimum of 14 days to destroy the viability of many pathogens and weed seeds. Remember, the edges of the windrow are cool, therefore they must be turned into the centre to kill the weed seeds.

Carbon to Nitrogen Ratio

The carbon to nitrogen ratio (C:N) of manure is a very important factor that affects the whole composting process because microbes need 20 to 25 times more carbon than nitrogen to remain active. The ratio should be between 25:1 and 30:1 at the beginning. The microorganisms digest carbon as an energy source and ingest nitrogen for protein and reproduction. Softwood shavings, sawdust and straw are good sources of carbon. Other inexpensive sources of carbon include municipal waste and shredded newsprint or cardboard. Most manures are a good source of nitrogen but may be low in carbon depending on the amount of bedding used. The content of materials can be estimated using the table or a laboratory can perform the analysis. If the ratio is too high (insufficient nitrogen), the decomposition slows. If the ratio is too low (too much nitrogen), it will likely be lost to the atmosphere in the form of ammonia gas. This can lead to odour problems. Most materials available for composting do not fit the ideal ratio so different materials must be blended. Proper blending of carbon and nitrogen helps ensure that composting temperatures will be high enough for the process to work efficiently and ensures other nutrients are available for microbes in adequate supply.

Aeration

The minimum desirable oxygen concentration in the composting material is 5%. Greater than 10% is ideal to avoid anaerobic conditions and high odour potential. Aeration adds fresh air in the centre of the composting material. Rapid aerobic decomposition can only occur in the presence of sufficient oxygen. Aeration occurs naturally when air warmed by the compost rises through the material, drawing in fresh air from the surroundings at the base of the windrow. Initial mixing of materials usually introduces enough air to start composting. Porosity and moisture content affect air movement through the composting material. Regular mixing of the material, referred to as turning, enhances aeration in the composting material. Good aeration during composting will encourage complete decomposition of carbon (C) to carbon dioxide (CO_2) rather than releasing carbon as methane (CH_4). Too much aeration, however, can actually reduce the rate of decomposition by cooling the composting material and may cause the release of too much CO_2 . Excessive air flow can remove a lot of moisture. Another consequence of excessive aeration is ammonia loss, especially with high nitrogen (low C:N ratio) mixes. As the material dries out, more ammonia volatilizes and consequently, more nitrogen is lost. The oxygen concentration can be measured with an oxygen probe. However, temperature provides an adequate indication of the process conditions. If the supply of oxygen is limited, the composting process slows and the temperature begins to fall. In this case the composting materials should be turned.

Moisture Content

Moisture plays an essential role in the metabolism of microorganisms and indirectly in the supply of oxygen. Microorganisms can utilize only those organic molecules that are dissolved in water. Moisture content between 50 and 60% (by weight) provides adequate moisture without limiting aeration. If the moisture content falls below 40%, bacterial activity will slow down and will cease entirely below 15%. When the moisture content exceeds 60%, nutrients are leached, porosity is reduced, odours are produced (due to anaerobic conditions) and decomposition slows. The squeeze test can be used to check the moisture content. The material is too wet if water can be squeezed out of a handful and too dry if the material doesn't form a ball when squeezed.

If the pile becomes too wet, it should be turned. This allows air to circulate back into it and loosens the materials for better draining and drying. Adding dry material, such as straw, sawdust or finished compost can also remedy excess moisture problems. If the material is too dry, water can be added. An effective practice is to turn the material and rewet materials in the process. Shaping the pile can assist in shedding excess water from the pile. A windrow cover can be used to keep unwanted moisture from the elements out of the windrow and conserve moisture within the windrow. Optimum moisture content of raw materials should be between 50 and 60% (wet basis), depending on particle size, available nutrients and physical characteristics.

Porosity

Porosity refers to the spaces between particles in the compost material. These spaces are partially filled with air that can supply oxygen to the organisms and provide a path for air circulation. As the material becomes water saturated, the space available for air decreases, thus slowing the composting process. Compacting the composting material reduces the porosity. Excessive shredding can also impede air circulation by creating smaller particles and pores. Turning fluffs up the material and increases its porosity. Adding coarse materials such as straw or woodchips can increase the overall porosity, although some coarse materials will be slow to decompose.

pH of Materials

The optimum pH for microorganisms involved in composting lies between 6.5 and 7.5. The pH of most animal manures is approximately 6.8 to 7.4. Composting alone leads to major changes in materials and their pH as decomposition occurs. For example, release of organic acids may, temporarily, lower the pH (increase acidity), and production of ammonia from nitrogenous compounds may raise the pH (increase alkalinity) during early stages of composting. On-site laboratory tests of pH can be used to maintain process control and product quality at a composting site.

Nutrients

Adequate levels of phosphorus (P), potassium (K), carbon (C), nitrogen (N), etc. are important in the composting process and are normally present in farm organic materials such as manure and livestock mortalities. Nutrient loss can occur through volatilization, losses to the atmosphere and leaching. Composting converts the nutrients in manure to stable forms that have a low ability to be lost by volatilization and leaching when applied to the land. However, during the composting process substantial amounts of nitrogen will be lost through ammonia volatilization. The ammonia emissions during composting reduce the fertilizer value of the finished compost. Nitrogen losses can also occur from emission of nitrous oxides or nitrogen gas.

Active Windrow Composting (Turned)

This will be the preferred method of composting. Active windrow composting is the production of compost in windrows using mechanical aeration by a front-end loader or a specially designed windrow turner. Loaders, although inexpensive compared to turners, have a tendency to compact the composting material, are comparatively inefficient, and can result in longer composting periods and less consistent quality. Turned windrow composting represents a low technology and medium labour approach and produces a uniform product.

The most commonly used windrow turners have a series of heavy tines that are placed along a rotating horizontal drum, which turns, mixes, aerates and reforms the windrow as the machine moves forward. These windrow turners are either self-contained units that straddle the row or are towed by a tractor and powered by a tractor PTO (Figure 11). The optimum height and width of the windrows depends on the type of equipment used to turn them.

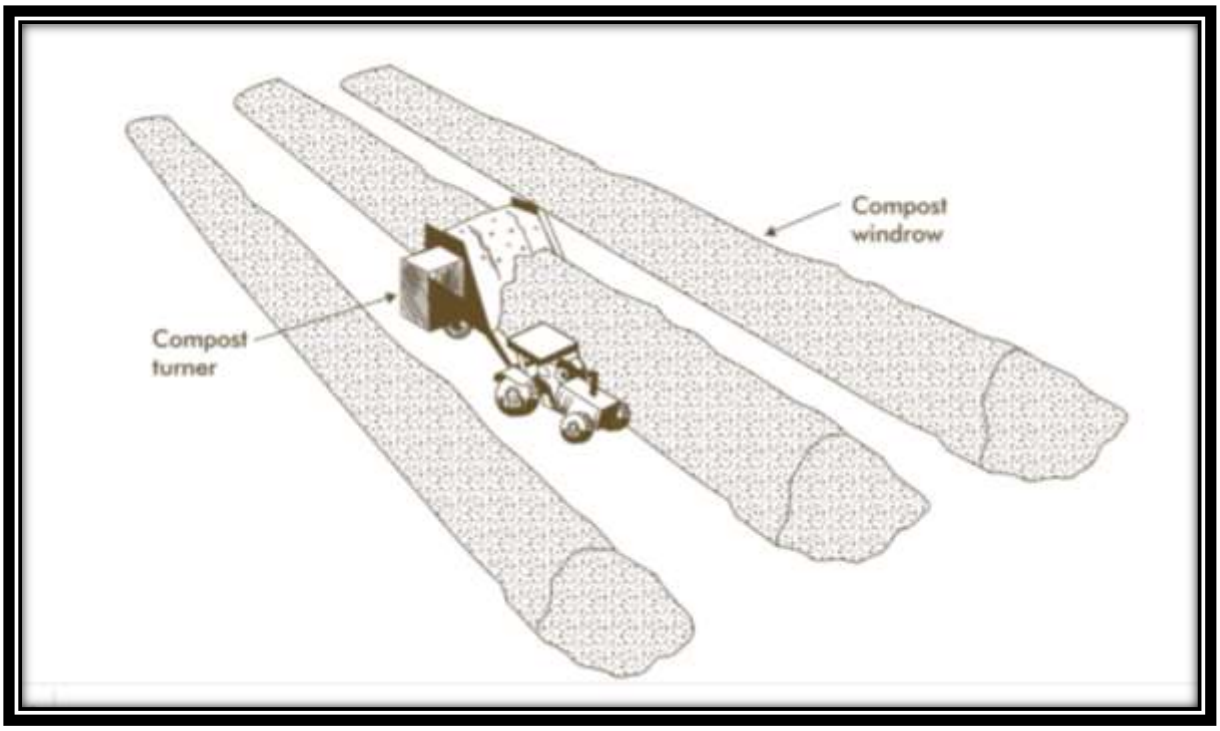


Figure 11: Windrow turning with a pull-type turner.

Windrow composting can produce excellent compost using a variety of diverse materials. Wastes such as manure solids and paunch manure (offal), if in a secure compost area to eliminate scavengers, can be composted with bulking agents such as sawdust, straw and recycled paper products. Windrow composting efficiency and product quality are dependent primarily upon two major factors:

1. The initial compost mix.

2. Management practices." (Alberta Agriculture, Food and Rural Development, 2005)

Layout and capacity

Appropriate separation or buffer distances between the composting operation and nearby water resources (surface and groundwater) and neighbouring homes can help to minimize the impact of any odour associated with raw materials, protect the water resources from possible contamination, and also meet the regulations.

Water will be directed away from the composting facility with a berm and no water from outside of the facility will enter the site. All stormwater and leachate will be directed via a stormwater canals towards the sedimentation ponds.

Based on all facilities at full capacity (worst case scenario), calculations are as follows:

i) Expected Volume of Manure (~ 10 000 livestock) = **16m^3/day**

ii) Volume of 1 manure stockpile (45m long x 5m wide x 2m high) = **150m^3**

iii) Days to fill 1 manure stockpile (ie: [ii] / ([i]) = **9.4 days**

iv) Total volume of manure (based on 15 stockpiles within composting area) = **2200m^3**

v) Days to fill 15 manure piles (ie: [iv] / [i]) = **138 days (4.6 months)**

vi) Cyclic sheep handling process (ie : Feeding, Raising, Fattening) = **107 days (3.6 months)**

Based on the above information, it can be anticipated that as the 15th manure stockpile is at maximum capacity (after 138 days), the sheep carcasses within the 1st manure stockpile would be approaching full decomposition. The cyclic handling period of livestock would also be reached (at 107 days) and therefore a manure composting area of 100m x 50m is sufficient. See Figure 12 below.

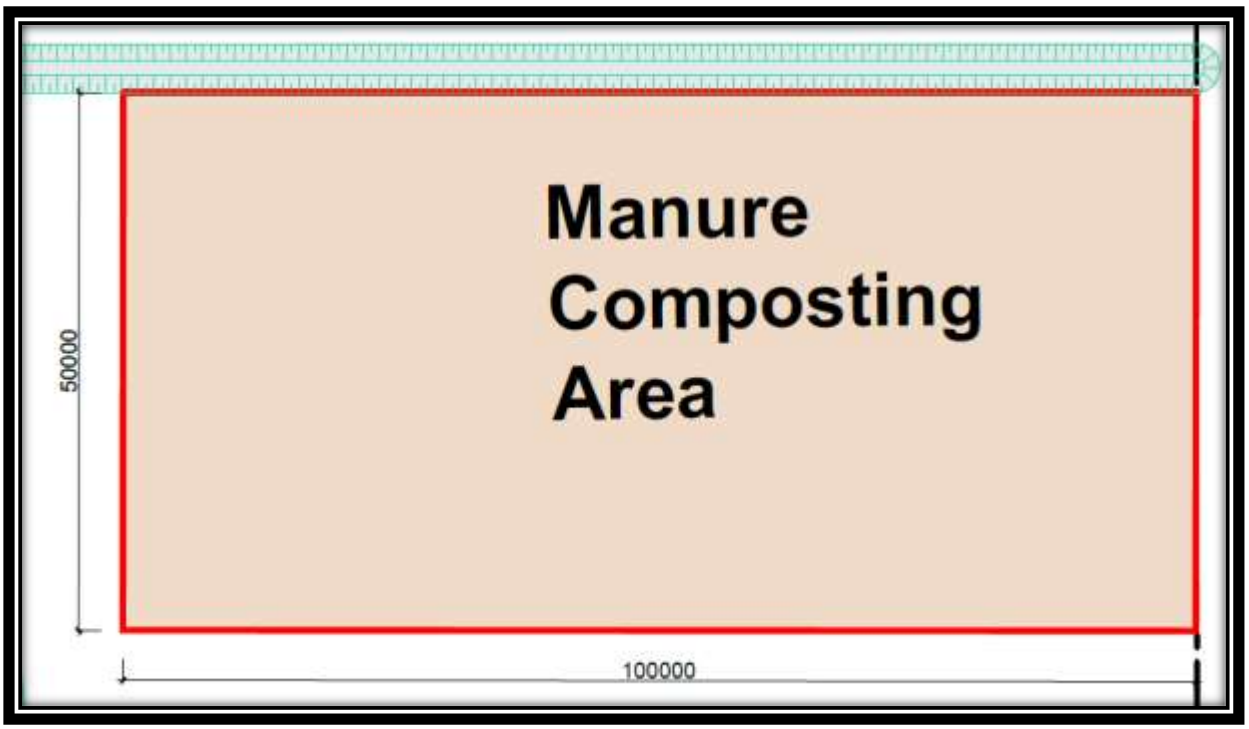


Figure 12: Manure composting area.

6. DESCRIPTION OF THE PROPERTY

The site is located on the outskirts of Middelburg along the N10 in the direction of Cradock. The site is approximately 42.8266 ha in extent and is located on Portion 15, of Portion 1 of the Farm Bultfontyn, Middelburg, Eastern Cape Province. See Figure 3 for a copy of the locality map. The site is located approximately 4,2 kilometers south east of the City Centre of Middelburg, 1,7 kilometers south of Midros and 2,5 kilometers south east of Kwanonzame. An Airfield is located 1,5 kilometers south of the site. The site falls within an area that is under the jurisdiction of the Inxuba Yethemba Local Municipality and the Chris Hani District Municipality.

Nearest town or districts:	Middelburg		
Contact person:	Mr Xolela Msweli		
Postal address:	PO Box 24, Cradock		
Postal code:	5880	Cell:	N/A
Telephone:	048 801 5043	Fax:	048 881 1421
E-mail:	xolela@iym.co.za		
Property description/physical address:	Portion 15 of Portion 1 of the Farm Bultfontyn		
Size of the Facility	0,5 hectares (100m X 50m)		

Current land-use where the site is situated:

Industrial		Recreation	
Agriculture		Commercial	
Residential		Mining & quarrying	
Forestry		Wilderness areas	
Wetlands		Nature area	
Open spaces			

Other current land-use…Apart from the Golf Club that is located on a small portion of the site, the site is currently vacant.

Current land-use zoning:	Agricultural

Surveyor-general 21-digit

C	0	4	8	0	0	0	0	0	0	0	0	0	1	2	8	0	0	0	1	5

Site Co-ordinates

The co-ordinates should be in degrees, minutes and seconds using the Hartebeeshoek94 WGS84 co-ordinate system.

Latitude (S):			**Longitude (E):**		
31°	31'	54.69"	25°	02'	05.38"

Proximity of the facility to the nearest residential area: 2,366 km. Please see figure below.

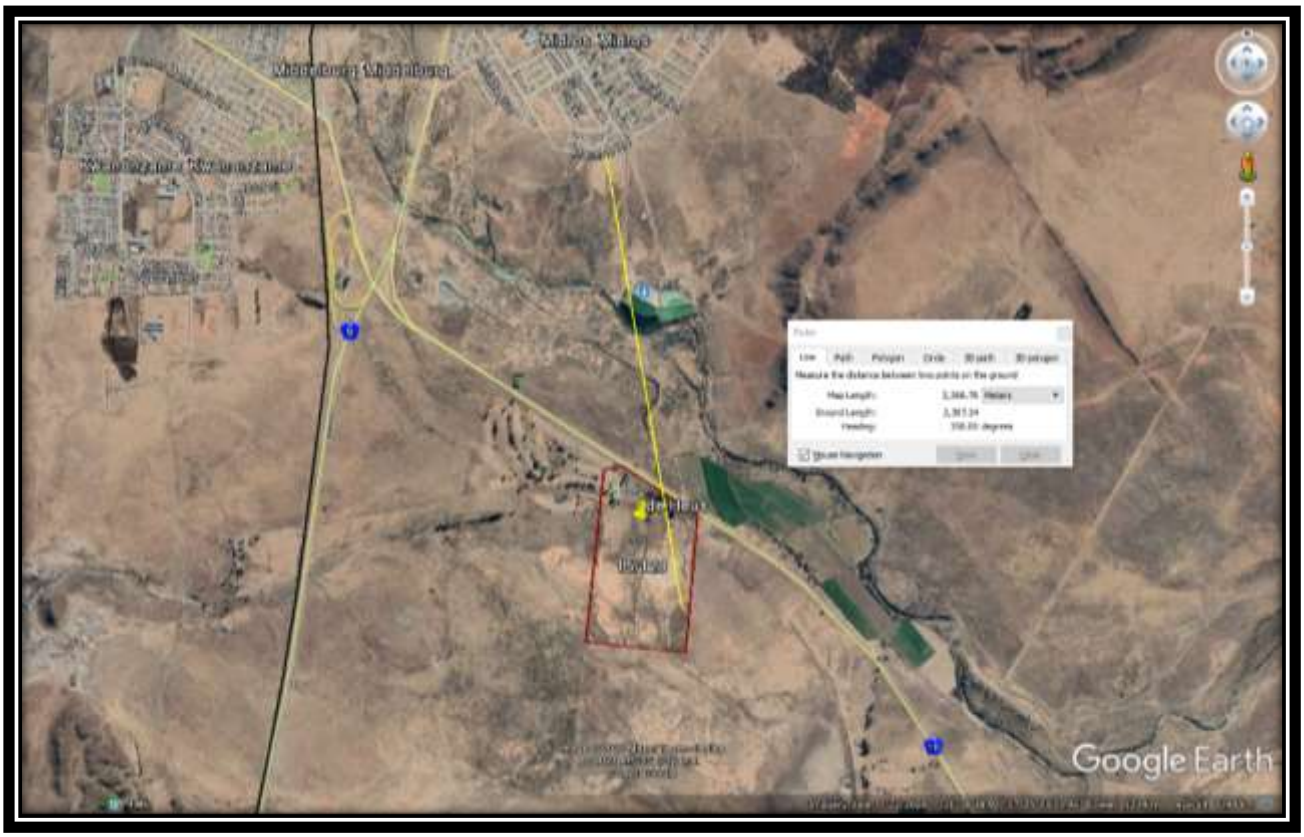


Figure 13: The site.

Figure 14: Locality Map.

The Middelburg Golf Course is located adjacent and west of the site. See Photograph 1.The remains of a Cricket Oval/field is located close to the Golf Club house. The Cricket Oval/field is demarcated by a soil berm. The Cricket oval was constructed between February 2016 and October 2018 (According to the Google Earth Images) and was never used. See Photograph 2.

Photograph 1: Entrance to the site. Golf course on the right and site on the left. Clubhouse in the background.

Photograph 2: The circle that you can see on Google is in fact an attempt to have established a cricket ground.

The site used to form part of the Golf course as it used to be an 18 hole course and has since been reduced to a 9 hole course. Old structures (Old Golf tees (Photograph 3) and old greens (Photograph 4)) associated with this activity can be seen at various locations on the site.

Photograph 3: Remnants of an old golf tee box.

Photograph 4: Remnants of Old "oil green" that was part of the golf course.

The blue line on the Layout plan is a furrow that was used (Prior to 1990) to divert water that overflowed from a reservoir that was build in the Klein Brak River towards a farm dam that is situated south west of the proposed development. Since the dam wall of the reservoir was broken down in the early 1990's there has been no water in the furrow and this structure has become redundant. The servitude that was registered for this furrow has also since been cancelled. See Photograph 5.

Photograph 5: The canal on site that used to cannel water from the Klein Brak River towards a dam located towards the south of the site.

Photograph 6: View towards the north. N10 in the background.

Photograph 7: View towards the north east.

Photograph 8: View towards the east.

Photograph 9: View towards the south east.

Photograph 10: View towards the south.

Photograph 11: View towards the south west.

Photograph 12: View towards the west.

Photograph 13: View towards the North West.

Large bare areas (See Photograph 14) are present where signs of sheet erosion are visible. Signs of excavations (See Photograph 15 and 16) or scraping of extensive areas are noticeable despite a "good rainfall season". A number of pioneer and alien plant species that are conspicuous may also be reflection of possible "harsh soil conditions" and/or disturbances of the past. The Topographical map of the area identifies these barren areas as Eroded Areas. See Figure 15.

Photograph 14: Excavations on site.

Photograph 15: Barren areas on site.

Photograph 16: Barren areas on site

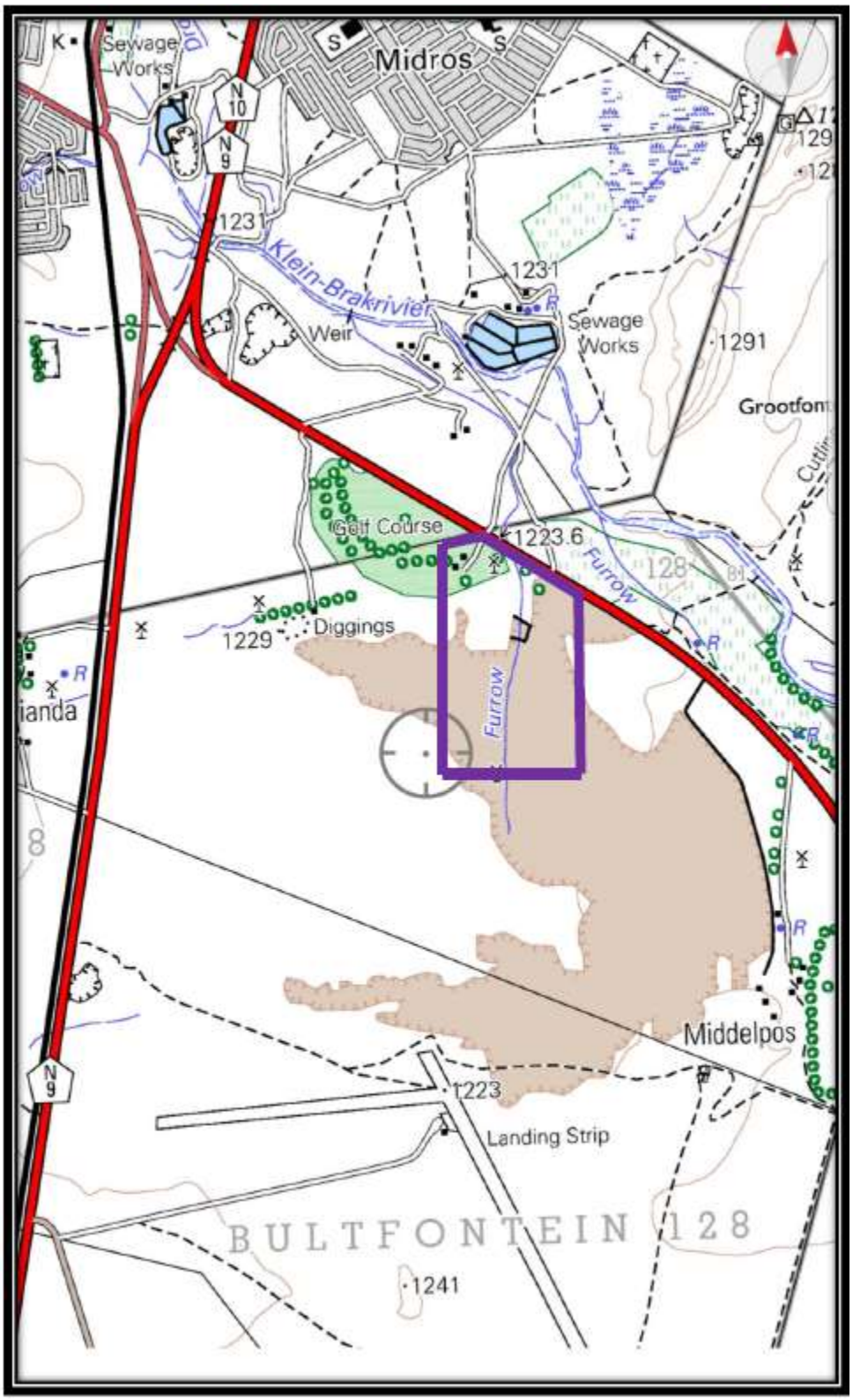


Figure 15(a). 1:50 000 Topographical map (3125CA Middelburg) of the area (purple outline).

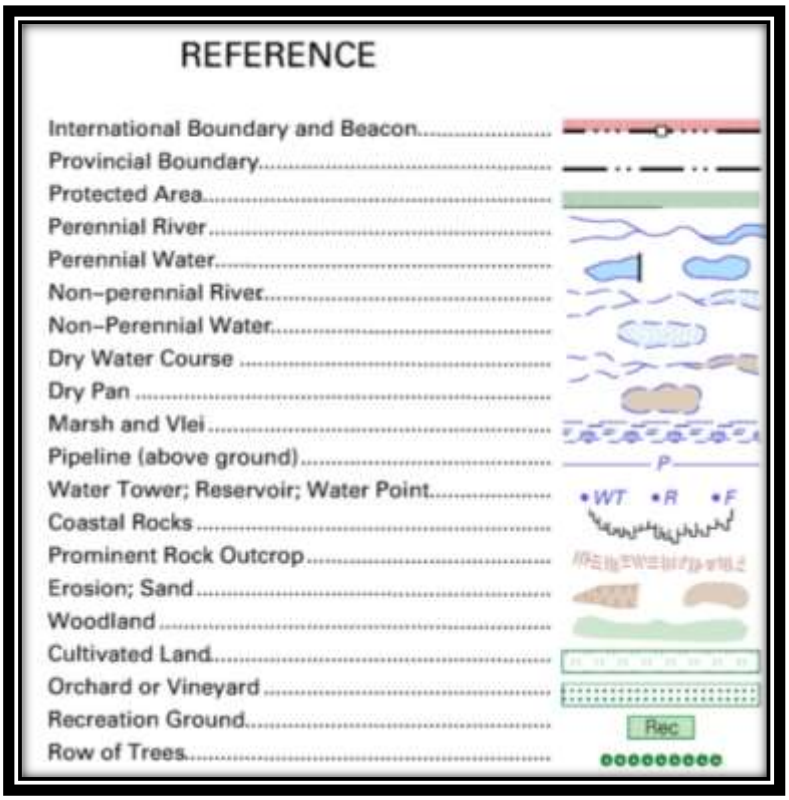


Figure 15(b): Reference for 1:50 000 Topographical map (3125CA Middelburg)

7. DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

7.1 GEOLOGY AND SOIL

Referral to the geological map (1992 sheet 3124 Middelburg; 1:250 000 series) indicates that the entire area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Permian Balfour Formation of the Adelaide Subgroup of the Beaufort Group, which comprises mainly mudrock and sandstone (Figure 16), and in turn are overlain by Quaternary calcrete and alluvial sediments.

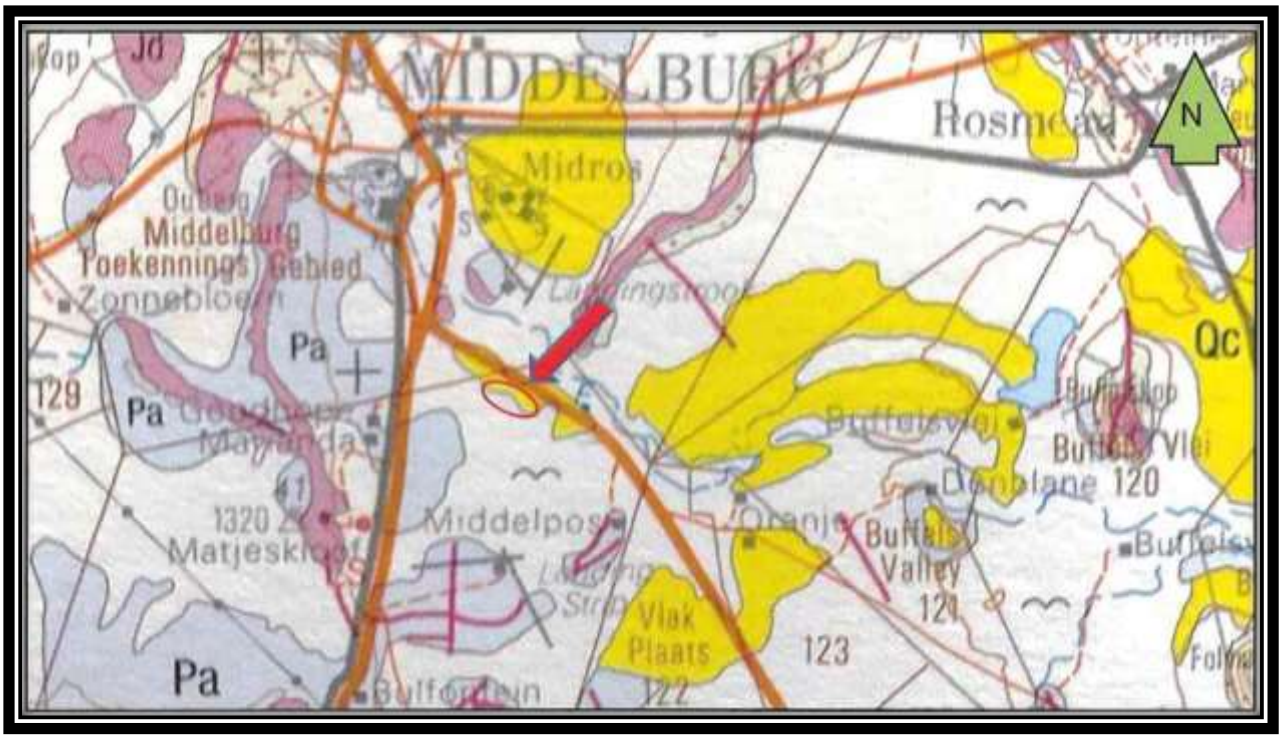


Figure 16: Extract from the 1:25 000 scale geological map 3124 Middelburg

According to the 1:250 000 scale geological map 3124 Middelburg, the site is underlain by calcrete (symbol ***Qc*** in dark yellow), and alluvium and colluvium (symbol ~ in light yellow). Other geological formations around the site but not shown to directly underly the site include ***Jd*** in purple (intrusive dolerite formations), and ***Pa*** in light blue (red, purple and grey mudstone with subordinate sandstone).

According to the geo-technical study that was conducted by Southern Geotechnical Engineering, the site is underlain by a relatively uniform soil profile. All test pits were stopped within transported soils (pedogenic, colluvlum and alluvium). None of the test pits encountered residual soils or bedrock formations. The following soil layers were identified within the test pit excavations:

TOPSOIL WITH PLANT ROOTS:
Encountered at all 12 test pits as a thinnish surface layer.
Layer thickness:Min. 0.1m;Average 0.33m; Max. 0.4m.
Typically described as: *Dry to slightly moist, pale orange brown, loose to medium dense, cracked, slightly voided, clayey SAND containing fine plant and grass roots.*

COLLUVIUM:
Encountered at 6 of the 12 test pits as a relatively thick, near surface soil layer.
Layer thickness: Min. 1.5m; Average 2.3m; Max.2.6m.
Typically described as: *Dry to slightly moist1 pale light orange to pinkish brown slightly blotched off white, loose, voided, fine, slightly silty fine sand with occasional soft calcareous nodules and gravels.*

PEDOGENIC CCALCRETE):
Encountered at 4 of the 12 test pits as a relatively thick, near surface soil layer.
Layer thickness: Min. 1.0m; Average 2.2m; Max. More than 2.5m.
Typically described as: *Dry to slightly moist, pale light orange to reddish brown blotched off white, medium dense to dense with depth, soft, calcareous gravels and small nodules in a fine sandy matrix.*

LACUSTRINE DEPOSITS:
Coinciding with the *'pad* areas.
Encountered at 3 of the 12 test pits from surface (DH 05, DH 11 and DH 12).
Layer thickness extends from surface to maximum depth reach of **TLB** and deeper.
Typically described as: *Dry to slightly moist, pale light orange brown, slightly blotched off white, 'firm to 'stiff, silty/sandy clay with some soft calcareous nodules and gravels;*

ALLUVIUM:
Encountered at 2 of the 12 test pits at depth (bases of Test Pits DH 06 and DH 09), underlying colluvium and pedogenic soils. At Test pit DH 02 alluvium was encountered as two thin 'lenses' of granular material.
Min. depth to 1.1m (thin 'lens'); Max. depth to 4.0m.
Typically encountered as either loosely packed rounded pebbles and cobbles in a coarse, clean sandy matrix (DH02 and DH06), or a clean sand **(DH** 09).

7.1.2 TOPOGRAPHY

The topography of the study area is flat with no rocky outcrops, ridges or hills. The highest elevation on site is found in the north-west at 1 231 meters above sea lea level and the lowest elevation is located along the eastern boundary at 1 225 meters above sea level. Remnants of a partially completed cricket pitch is situated towards the north-west while an old furrow runs through the center of the site, from north to south. The remainder of the study area is almost devoid of structural development, apart from a few old golf tees, golf greens, broken up concrete slabs, partially backfilled excavations and disturbed surfaces associated with old golf fairways.

A detailed site survey have been carried out to establish levels. The Engineering report and the Layout plan will address issues regarding drainage of the site.

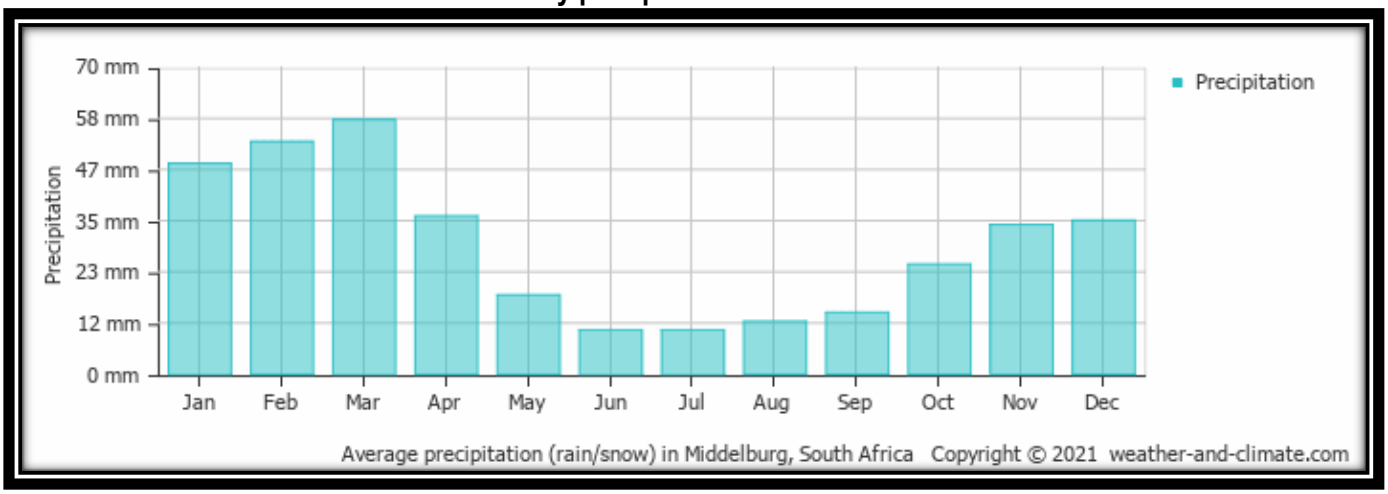
7.1.3 CLIMATE

The prevailing climate in Middelburg is known as a local steppe climate. There is not much rainfall in Middelburg all year long. The Köppen-Geiger climate classification is BSk. The average annual temperature is 15.9 °C. About 461 mm of precipitation falls annually. In the discussion of this variable, certain aspects of rainfall, humidity, temperature and monthly Hours of sunshine that can influence the project will be highlighted.

7.1.3.1. Rainfall

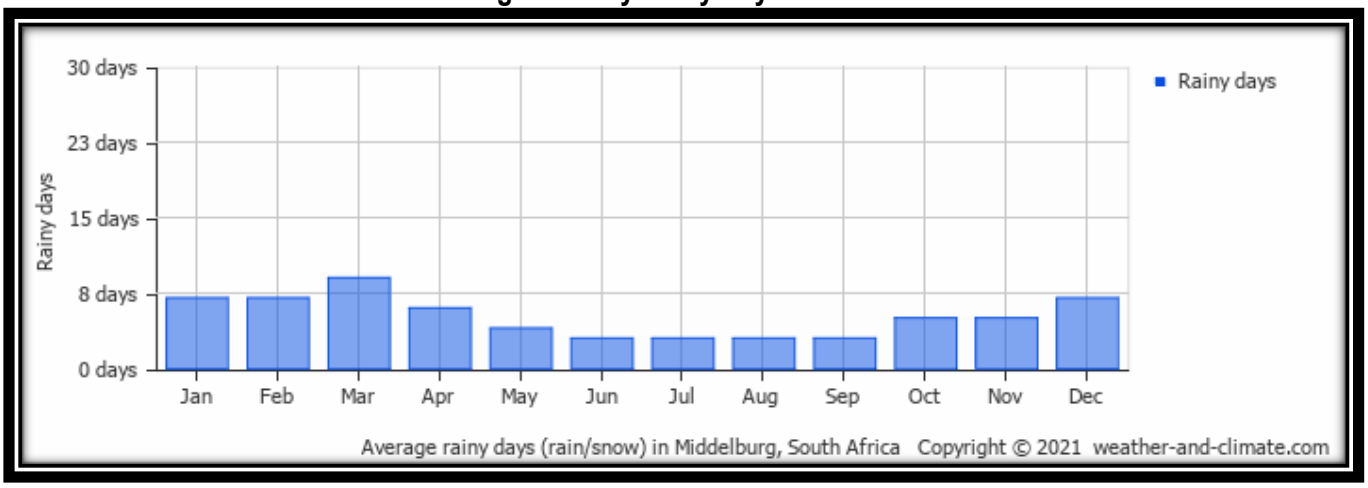
Middelburg has dry periods in May, June, July, August, September and October. On average, March is the wettest month while, on average, July is the driest month. The average amount of annual precipitation is: 353.0 mm.

Monthly precipitation



Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

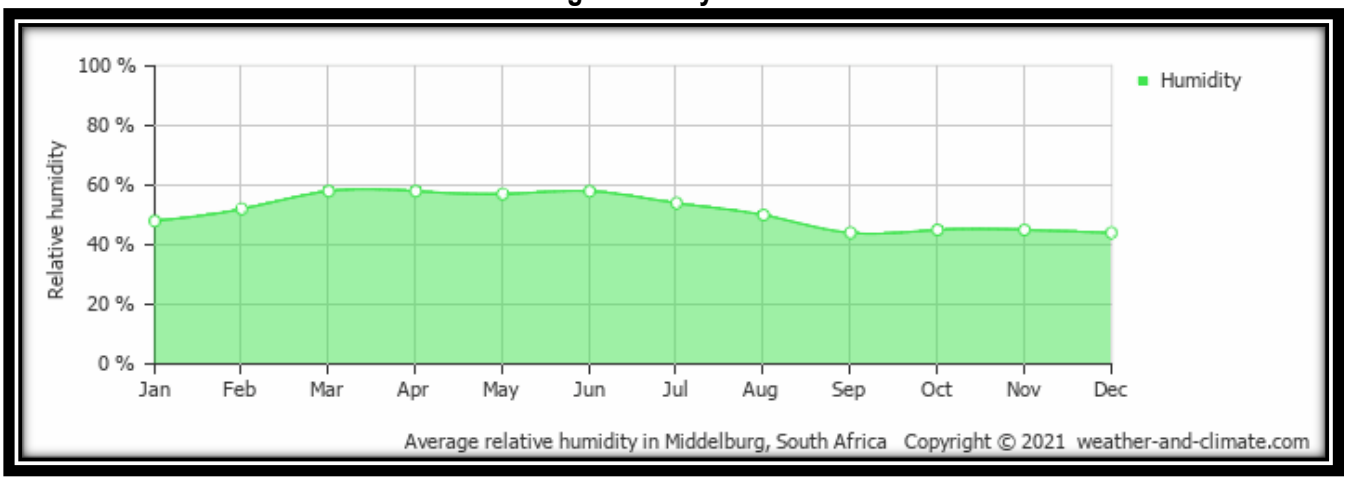
Average Monthly Rainy Days



Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

On average, March is the rainiest and August has the least rainy days. The average annual amount of rainy days is: 62.0 days;
On average, April is the most humid and September is the least humid month. The average annual percentage of humidity is: 51.0%.

Average humidity

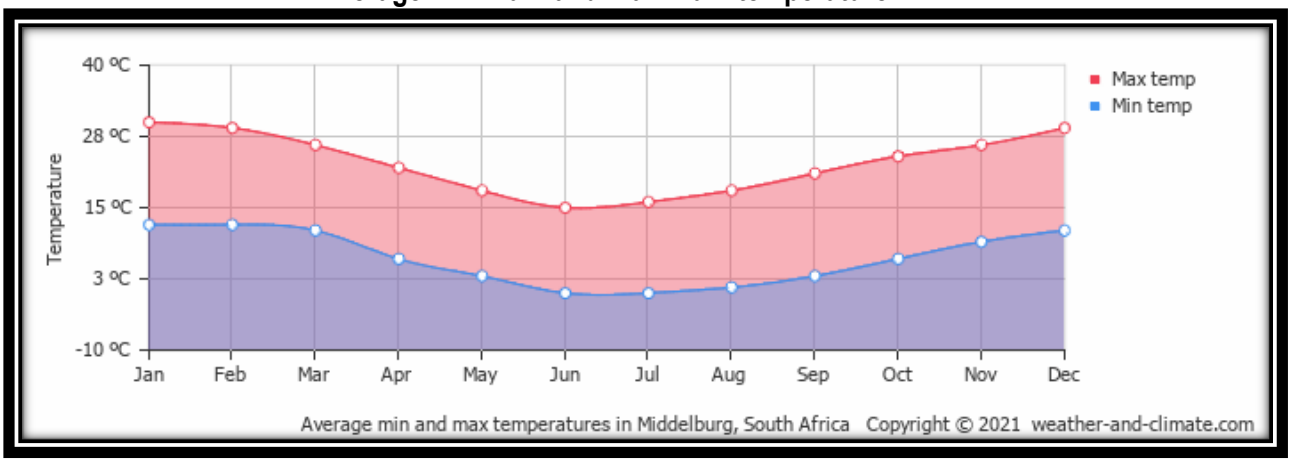


Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

7.1.3.2. Temperature

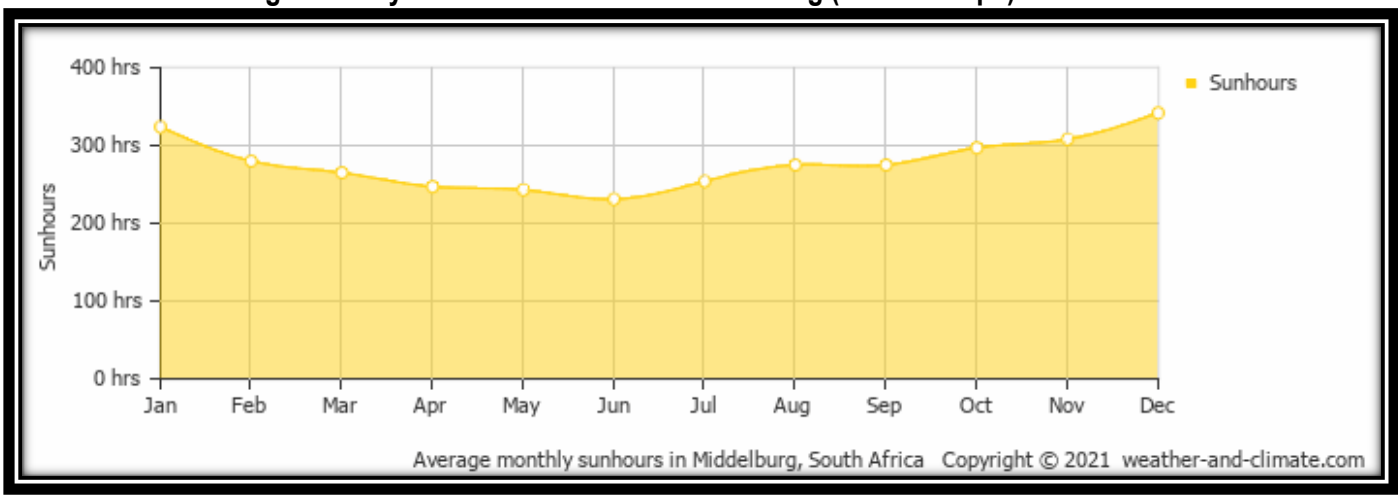
The warmest months are January, February and December. On average, the warmest month is January and the coolest month is June. The average annual maximum temperature is: 23.0° Celsius and the average annual minimum temperature is: 6.0° Celsius.

Average minimum and maximum temperature



Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

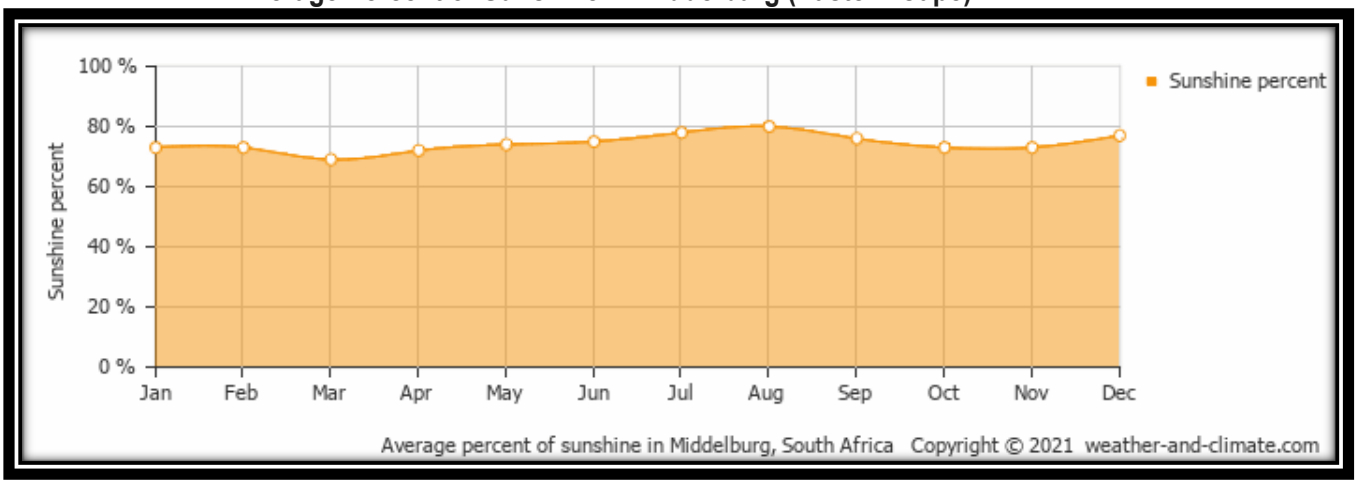
Average Monthly Hours of Sunshine in Middelburg (Eastern Cape)



Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

- On average, December is the most sunny.
- On average, June has the lowest amount of sunshine

Average Percent of Sunshine In Middelburg (Eastern Cape)



Source: 2010-2021 World Weather & Climate Information (https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,middelburg,South-Africa.)
(Date visited: 12/07/2021)

- On average, August is the most sunny.
- On average, March has the lowest amount of sunshine.

Climate Change

According to: WIREs Climate Change 2014, 5605-620. Doi:10.1002/wcc.295: "Climate change is a key concern within South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65∘C over the past five decades and extreme rainfall events have increased in frequency. These changes are likely to continue. Climate change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity. Considering South Africa's high levels of poverty and inequality, these impacts pose critical

challenges for national development. In relation to water, impact studies for the water resources sector have begun to look beyond changes in streamflow to changes in the timing of flows and the partitioning of streamflow into base flows and stormflows, reservoir yields, and extreme hydrological events. Spatially the eastern seaboard and central interior of the country are likely to experience increases in water runoff. Higher frequencies of flooding and drought events are projected for the future. Complexities of the hydrological cycle, influences of land use and management and the linkages to society, health, and the economy indicate far higher levels of complexity in the water resources sector than in other sectors. What has emerged is that land uses that currently have significant impacts on catchment water resources will place proportionally greater demands on the catchment's water resources if the climate were to become drier. The influence of climate change on water quality is an emerging research field in South Africa, with assessments limited to water temperature and non-point source nitrogen and phosphorus movement. A critical interaction that has not been explored is between changes in water quality and quantity and the combined impacts, such changes might have impact on various types of water use, e.g., irrigation, domestic consumption, or aquatic ecosystems support".

Water availability and demand has been calculated by the consulting Civil Engineers, to enable a sustainable development.

"Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. In December 2015, 196 Parties to the U.N. Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement, a legally binding framework for an internationally coordinated effort to address climate change. It aims to hold the rise in global average temperature by 2100 to well below 2°C above pre-industrial levels. Researchers are assessing how much mitigation will be needed by various sectors worldwide to meet the global target, including how much mitigation is feasible.

Because livestock emissions are estimated to represent 14.5% of anthropogenic GHG emissions globally, it is generally acknowledged that the livestock sector plays an important role in climate change. How much of a role the sector can play in attaining the global target of the Paris Agreement is unknown for now, especially in view of projections that worldwide livestock production will increase by about 70% between 2010 and 2050 to meet growing demand, especially in developing countries.

Research has identified a range of Green House Gasses mitigation options for the livestock sector. A number of approaches are believed to be promising, but no single option has "hit the sweet spot" of reducing emissions dramatically while not harming animals or dampening production of farms and ranches. Adoption of more efficient technologies and practices is key to reducing emissions. Possible technologies and practices include the use of better quality feed and feed balancing to lower enteric and manure emissions. Manure management practices can assist in recovery and recycling of nutrients and energy. Technologies such as feeding additives, vaccines that reduce the microorganisms that produce methane, and genetic selection methods are believed to have potential to reduce emissions but require further development. Some believe that reducing the livestock sector's contribution to climate change, while also ensuring that nutritional security and health needs are supported, is an urgent global research and investment priority." (Source: EveryCRSReport.com, University of North Texas Libraries Government Documents Department Raw Metadata: JSON).

7.1.4 SURFACE DRAINAGE, WETLANDS AND RIPARIAN ZONES

The area lies within the drainage basin of the Klein-Brakrivier that is located approximately 350m north of the site. Site is part of the Fish to Tsitsikamma Water Management Area (WMA 15). The site is not part of a Freshwater Ecosystem Priority Area (FEPA) and also not part of a wetland cluster (Nel *et al.*,

2011a, 2011b). Wetlands such as floodplain wetlands, channelled valley-bottom wetlands, unchannelled valley-bottom wetlands, depressions, seeps and wetland flats appear to be absent at the site. No wetlands are found at the site and plate flow is the dominant drainage pattern.

There is a furrow that was used (Prior to 1990) to divert water that overflowed from a reservoir that was build in the Klein Brak River towards a farm dam that is situated south west of the proposed development. Since the dam wall of the reservoir was broken down in the early 1990's there has been no water in the furrow and this structure has become redundant. The servitude that was registered for this furrow has also since been cancelled.

Large bare areas are present where signs of sheet erosion are visible. Signs of excavations or scraping of extensive areas are noticeable, despite substantial rainfall of the summer season. A number of pioneer and alien plant species that are conspicuous may also be reflection of possible "harsh soil conditions" and/or disturbances of the past. The 1:50 000 Topographical map of the area indicates that these areas are "eroded areas.

Photograph 17: Soil sample at a furrow at the site. The furrows at the site appear to be dysfunctional at present.

Photo: R.F. Terblanche.

Photograph 18 Soil at bare area where erosion and poor recovery of vegetation are visible, at the site.
Photo: R.F. Terblanche

7.1.5 GROUND WATER

No groundwater was encountered during the geo-technical investigation and as such the depth to the permanent ground water level is unknown. However, it is considered unlikely that any groundwater will be encountered to a minimum depth of 3.0m to 4.0m below current ground levels. Test pit excavation DH 09 also did not encounter groundwater in the upper 4.0m of the soil profile.

7.1.6 FAUNA AND FLORA HABITAT

Site is part of the Nama-Karoo Biome which is represented by the Eastern Upper Karoo vegetation type (Mucina & Rutherford 2006).

To serve as local context for the landscape and vegetation at the site an outline of the Eastern Upper Karoo (NKu 4) from Mucina and Rutherford (2006) follows.

NKu 4 Eastern Upper Karoo
Distribution: Eastern Upper Karoo is present in parts of the Northern Cape Province, Eastern Cape Province and Western Cape Province. Eastern Upper Karoo is located between the towns of Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyr and Cradock in the east and the Great Escarpment and the Sneeuberge-Coetzeesberge mountain chain in the south. Altitude varies mostly between 1000 – 1700 m (Mucina & Rutherford, 2006).
Vegetation and landscape features: Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllus shrubs, with “white” grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast (Mucina & Rutherford, 2006).

Geology and soils: Mudstones and sandstones of the Beaufort Group (including both Adelaide and Tarkastad Subgroups) supporting duplex soils with prismacutanic and/or pedocutanic diagnostic horizons dominant (Da land type) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types). In places, less prominent Jurassic dolerites (Karoo Dolerite Suite) are also found (Mucina & Rutherford, 2006).
Climate: Rainfall takes place mainly in autumn and summer, peaking in March. Mean Annual Precipitation (MAP) ranges from about 180 mm in the west to 430 mm in the east. Incidence of frost is relatively high, but ranging widely from <30 days (in the lower-altitude Cradock area) to >80 days of frost per year (bordering the Upper Karoo Hardeveld on the Compassberg and mountains immediately to the west) (Mucina & Rutherford, 2006).
Important taxa. Tall shrubs: *Lycium cinereum*, *Lycium horridum*, *Lycium oxycarpum*. Low shrubs: *Chrysocoma ciliata*, *Eriocephalus ericoides* subsp. *ericoides*, *Eriocephalus spinescens*, *Pentzia globosa*, *Pentzia incana*, *Phymaspermum parvifolium*, *Salsola calluna*, *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *Helichrysum lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilus*, *Selago geniculata*, *Selago saxatilis*. Succulent shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*. Geophytic herbs: *Moraea pallida*, *Moraea polystachya*, *Syringodea bifucata*, *Syringodea concolor*. Succulent herbs: *Psicaulon coriarium*, *Tridentea jucunda*, *Tridentia virescens*. Graminoids: *Aristida congesta*, *Aristida diffusa*, *Cynodon incompletus*, *Eragrostis bergiana*, *Eragrostis bicolor*, *Eragrostis lehmanniana*, *Eragrostis obtusa*, *Sporobolus fimbriatus*, *Stipagrostis ciliata*, *Tragus koelerioides*, *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *Enneapogon scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heterpogon contortus*, *Sporobolus ludwigii*, *Sporobolus tenellus*, *Stipagrostis obtusa*, *Themeda triandra* and *Tragus berteronianus*.

Note: Though some plant species of the above listed vegetation types are present at the site, not necessarily all of the plant species listed above are present at the site.

Large parts of vegetation at the site have been transformed or modified. Remaining vegetation is mainly karroid with few individual trees. Exotic trees or alien invasive trees occur at the golf course section with its associated infrastructure as well as at some other parts of the site. The alien invasive succulent *Cylindropuntia imbricata* occurs at some parts of the site.
Fairly large covers of the alien invasive herb *Atriplex lindleyi* are conspicuous at areas where the soil have been exposed in the past. Tall shrubs include the indigenous *Lycium cinereum*, *Lycium horridum* and *Hertia pallens* as well as the exotic *Atriplex nummularia*. Low shrubs include *Salsola tuberculata*, *Salsola calluna, Eriocephalus ericoides* subsp. *ericoides*, *Pentzia incana, Chrysocoma ciliata*, *Aptosimum spinescens, Aptosimum procumbens*, *Ruschia intricata*, *Osteospermum leptolobum*, *Pteronia glauca* and *Rosenia humilus*. Conspicuous indigenous grass species at the site are *Eragrostis lehmanniana*, *Aristida congesta*, *Eragrostis obtusa*, *Tragus berteronianus*, *Enneapogon desvauxii* and *Stipagrostis uniplumis*. Few indigenous trees are found at the site which include *Searsia lancea* and *Vachellia karroo*.
Alien invasive tree species at the site include *Schinus molle*, *Eucalyptus camaldulensis*, *Agave americana* and *Ligustrum lucidum*.

Some of the alien invasive weed species at hirtherto bare ground or ecologically disturbed areas at the site are *Salsola kali*, *Argemone ochroleuca*, *Chenopodium album*, *Alternanthera pungens*, *Datura ferox* and *Senecio inaequidens.*

Old furrows which do not appear to have a significant function currently are present at the site.

Large bare areas are present where signs of sheet erosion are visible. Signs of excavations or scraping of extensive areas are noticeable despite a “good rainy season”. A number of pioneer and alien plant species that are conspicuous may also be reflection of possible “harsh soil conditions” and/or disturbances of the past.
Rocky ridges and wetlands appear to be absent at the site.

Photograph 19. Tall shrubs in the picture are the exotic *Salsola nummularia*.

Photo: R.F. Terblanche

Photograph 20: The succulent shrub in the picture is the alien invasive *Cylindropuntia imbricata*.

Photo: R.F. Terblanche

Photograph 21: Vegetation and exposed soil adjacent to the old furrow at the site.

Photo: R.F. Terblanche

Photograph 22 Foliage of the alien invasive tree species *Schinus molle* at the site.

Photo: R.F. Terblanche

Photograph 23 The exotic shrub *Salsola nummularia* at the site.

Photo: R.F. Terblanche

Photograph 24 Alien invasive weed *Atriplex lindleyi* at the site.

Photo: R.F. Terblanche

Photograph 25: Foliage and flowers of the indigenous shrub *Lycium cinereum*, at the site.

Photo: R.F. Terblanche

Photograph 26 The indigenous shrub *Eriocephalus ericoides* at the site.

Photo: R.F. Terblanche.

Photograph 27 The indigenous shrub *Hertia pallens* at the site.

Photo: R.F. Terblanche

Site specific indications of sensitivity from the SANBI EIA Screening Tool for relative plant species theme sensitivity indicates a low sensitivity for the entire site.

The indications of sensitivity from the SANBI EIA Screening Tool for relative animal species theme sensitivity indicates a very high sensitivity for the entire site. This very high sensitivity indication is owing to the distribution range of the bird species *Neotis ludwigii* (Ludwig's Bustard). Ludwig's Bustard is a large bird and a nomad and partial migrant. Though Ludwig's Bustard roams over large areas and a visit by this large bird to the site cannot be totally excluded, the site does not appear to be a habitat of particular importance to this bird species. The local animal theme sensitivity of the specific site is probably low.
Indications of sensitivity from the SANBI EIA Screening Tool for relative terrestrial biodiversity indicates a low sensitivity for the entire site.

A low sensitivity from the SANBI EIA Screening Tool for relative aquatic biodiversity is indicated.
The findings of the habitat survey at the site also suggest that a low sensitivity for the biodiversity themes at the site is likely.
No Threatened or Near Threatened plant or animal species appear to be resident at the site. No other plant or animal species of particular conservation concern appear to be present at the site.
The scope for the site to be part of a corridor of particular conservation importance is small.

The vegetation type at the site is Eastern Upper Karoo (NKu 4) which is not listed as threatened according to the National List of Threatened Ecosystems (2011).
Ecological sensitivity at most of the is currently low and at some parts, medium. See Figure 17. Following the mitigations which will be upheld and planned footprint for development all the impact risks listed above are moderate or low.

Establisment of exotic weeds should be monitored and exotic weeds at the site should be eradicated. A declared invader such as the mesquite tree (*Prosopis* species), should not be planted or allowed to spread from adjacent areas to the proposed footprint.

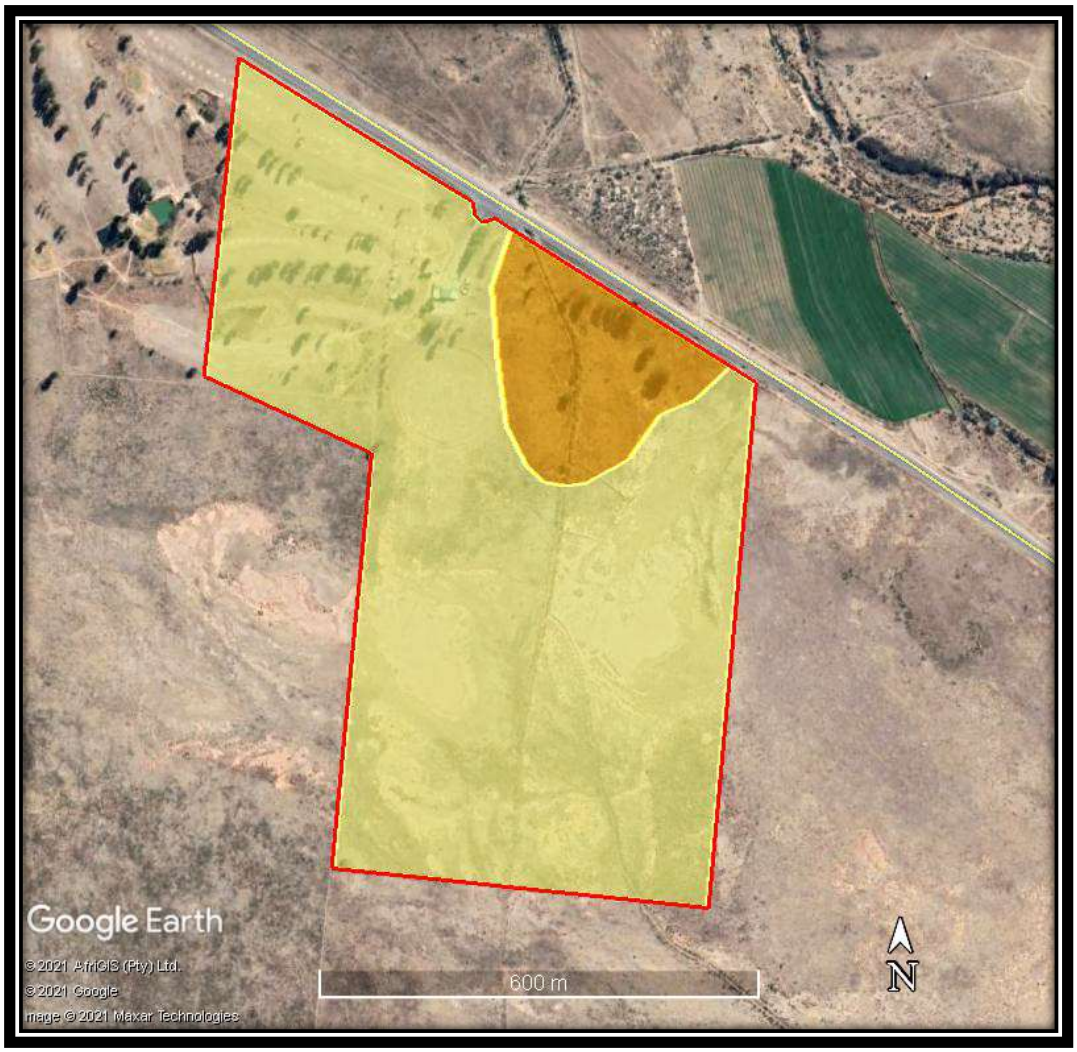


Figure 17: Indications of ecological sensitivity at the site.

Red outline	Boundaries of the site
Light yellow outline and shading	Low Sensitivity
Orange outline and shading	Medium-low Sensitivity

7.2. SOCIO ECONOMIC FACTORS

7.2.1. SOCIAL AMENITIES

The National Development 2030 mentions that South Africa can eliminate poverty and reduce inequality by 2030 and this will require change, hard work, leadership and unity. Its goal is to improve the life chances of all South Africans, but particularly those young people who presently live in poverty. The

plan asks for a major change in how government in general go about their lives. In the past, we expected government to do things for us. What South Africa needs is for all of us to be active citizens and to work together – government, **business**, communities – so that people have what they need to live the lives they would like.

The White Paper on Local Government1 (1998) introduces the concept of "developmental local government" which is defined as: "Local government committed to working with citizens and groups within the community to find sustainable ways to meet their social, economic and material needs, and improve the quality of their lives." However, the same document makes it clear that:

"Local Government is not directly responsible for creating jobs. Rather, it is responsible for taking active steps to ensure that the overall economic and social conditions of the locality are conducive to the creation of employment opportunities."

The Chris Hani District Municipality developed and adopted a District Development Agenda that focuses on the development of all its Six Local Municipalities through the identification of competitive advantages of its local municipalities. This was later translated into an **Agro Industrial Plan** that has been used as a springboard to the proposed Special Economic Zone.

The Chris Hani Regional Development Strategy provides focused areas around which resources can be leveraged and mobilised in order to contribute to the broad overall objective of ensuring that all people in the district are able to benefit from the economy. The Competitive Advantage therefore for the district points to the broadly defined **agricultural sector** as the one with the most potential to contribute to job creation, promoting of livelihoods opportunities and contributing to sustained social and economic growth and development.

Whilst crop production and agro-processing sector remain important areas of intervention, the present cost of transport to high volume markets will most likely render local production uncompetitive until substantial economies of scale and consistent quality can be achieved.

Value chain integration implies looking at all the components of a particular sector and subsector and identifying what can be done or put in place to add value to what already exists, and in doing so, promote job creation and provide more livelihood opportunities.

While the districts' agricultural potential is obvious, primary agricultural projects have had a minimal impact on unemployment. This situation necessitates strategies to increase value-added production by exploiting opportunities that exist along the various crop and livestock value chains. (Chris Hani District Municipality 2021-2022 Draft IDP)

Agriculture is one of the main economic sectors within the area. Agricultural activities can be sub-divided into two groups – crop farming and livestock farming. The Applicant has identified gaps in the value chain for both of these economic sectors being Lucerne (Crop farming) and sheep (Livestock farming). It is the intension of the applicant to add value to both of these identified agricultural sectors and in doing so, create jobs and infrastructure. The increased employment in the area during both the construction and operational phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the proposed development will be created due to economic spin-offs that will result.

<u>Feed Mill</u>

Feed mixing, pill making, packaging and ancillary works including grain and feed storage will form part of this operation. Lucerne that is produced extensively in the area and will be used to produce feed, thus adding value to primary products that are produced in the region. Maize that is also produced in the region will also be incorporated into the production process and a limited amount of this produce will also be value added. At full production the Feed Mill will produce 9 000 tons of feed per month and will generate 100 employment opportunities.

Agricultural recreational area.
This part of the proposed development will be for Animal display and demonstrations, auctions and ancillary activities and will be Open to the public, thus providing a platform for the people of the region to sell and display their animals and to come together as a community.

Solar Farm
Greenhouse gases (GHG), including CO2 emissions are associated with the conventional provision of energy services and are a major cause of climate change. Globally, coal is the second largest primary energy source used worldwide (preceded by oil), and the first source for power generation. In terms of electricity generation or supply, South Africa is highly dependent on coal-fired power plants and therefore energy supply is carbon dioxide-intensive.

Renewable energy sources play a role in providing energy services in a sustainable manner, and in particular in mitigating climate change. Sustainable energy can be defined as energy that provides affordable, accessible and reliable energy services that meet economic, social and environmental needs within the overall developmental context of society, while recognising equitable distribution in meeting those needs. Sustainable energy is an element of sustainable development that is defined as development that meets the present needs and goals of the population without compromising the ability of future generations to meet theirs. On the overall sustainable development is underpinned by economic development (growth efficiency), social development (culture, heritage, poverty, and empowerment) and environmental development (pollution and natural resources).

The government of South Africa considers the use of renewable energy as a contribution to sustainable development. Sustainable development also implies the provision of electricity and other modern fuels to the commercial and industrial sectors to promote their economic competitiveness and future prosperity. (Department of Environmental Affairs (2015). EIA Guideline for Renewable Energy Projects. Department of Environmental Affairs, Pretoria, South Africa)

With the current situation of unreliable electricity provision in the Country, the Applicant has opted for the option of providing his own Electricity, thus ensuring a steady flow of electricity for his operations. In providing off-grid, renewable Electricity, the Applicant is also decreasing his Ecological footprint as he will not be using Electricity that has been generated from unrenewable energy sources.

Sheep Feedlot
The Sheep Feedlot will be designed for 10 880 head of sheep. Currently, only 24 sheep can be raised on the entire development site, as the area is very dry. The intensification of the Agricultural potential of the site is a huge advantage as the production capacity of the site will be raised from 24 to 10 880 head of sheep. This operation will also result in an additional 10 employment opportunities that will be generated.

Treatment Facilities

In order to treat the manure and the carcasses that will originate from the Sheep Feedlot the construction of three Sedimentation ponds, two Evaporation ponds and a Manure Composting area is proposed. The need for these activities lies in the fact that in order to ensure that the proposed development does not cause any harm to the Environment, potential pollution has to be curbed. The purpose of the sedimentation system is to remove settleable solid material from the feedlot runoff and prevent it from entering the evaporation ponds. The Evaporation pond is sized based on calculation of the annual water balance (Annual Rainfall versus Evaporation Statistics) and is designed to contain the runoff/ effluent from the feedlot site.

The manure composting area will have a concrete base and will be able to accommodate the composting activities. The composting facility will generate additional income as the compost will be sold, thus ensuring that a potential source of pollution has been processed to a usable product.

Consistent with national priorities, environmental authorities must support *"increased economic growth and promote social inclusion",* whilst ensuring that such growth is *"ecologically sustainable".* In the National Spatial Development Perspective (NSDP) it is highlighted that, to achieve the goal of stimulating sustainable economic activities and to create long-term employment opportunities, it is required that spending on economic infrastructure is focused in priority areas with potential for economic development, with development to serve the broader societies' needs equitably

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

7.2.2. AIR QUALITY

Animal Feeding Operations can affect air quality through emissions of gases (ammonia and hydrogen sulphide), particulate matter (PM), volatile organic compounds (VOC), hazardous air pollutants, microorganisms, and odour. Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. The generation rates of odour, manure, gases, particulates, and other constituents vary with weather, time, animal species, type of housing, manure handling system, feed type, and management system (storage, handling, and stabilization).

The extent and toxicity of emissions is not necessarily a concise indicator of contributions to ground-level air pollution concentrations or of risks to health and the environment. Such contributions are also a function of the height of emission, temporal variations in the release of pollutants, and the proximity of the source to the people or the environment affected by exposure to the pollutant (such as, for instance, children, or the elderly, or people who are ill, or others who may be particularly sensitive receptors to a specific pollutant above a certain concentration). If an industry is operating close to a school or hospital or centre for the elderly, the potential exposure (in combination with the other contributing factors) is high.

Currently there is little documentation on the composition of sheep manure under dryland conditions. However, the differences between feedlot cattle and sheep manure characteristics are well documented. On a kilo for kilo basis, sheep produce two thirds as much manure; it is drier; has half the concentration of nitrogen, a similar concentration of phosphate and almost twice as much potassium. (Pennsylvania State University 2003). Sheep manure also has half the biochemical demand for oxygen of cattle and a BOD:COD ratio of 7.8% as opposed to 17.4% for cattle (Taiganides 1977).

Sheep manure is difficult to dilute or mix with water, as solids tend to float. Consequently, with the exception of manure from early-weaned lambs on a liquid diet, sheep manure is best handled in solid form (Pennsylvania State University 2003). The comparative dryness of sheep manure is a potential benefit. With good manure management, moisture levels could be kept below 33% where there is no oviposition from any flies or any fly development (Taiganides 1977).

Given the high volumes of pollutants emitted from fuel-burning within the industrial and power-generation sectors, their contribution to ambient concentrations and public health risks is often lower than might be expected. This is because these sources are generally characterized by constant releases, relatively high above ground level, and further away from residential settlements than are household fuel-burning and vehicle emissions.

Ranking the significance of different sources of pollution on the basis of the total emissions for which each source is responsible would, for example, place industrial emissions above household fuel-burning. If the aim is to reduce impacts on human health, however, then household fuel-burning would need to be targeted as a top priority (Scorgie et al., 2004d).

Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.

Approaches adopted or considered for future implementation have included: regulation (for example, the use of Atmospheric Emission Licences for Listed Activities); market instruments (such as atmospheric user-charges and pollution taxes); the potential for voluntary agreements, education and awareness raising; and emissions trading. International experience shows that adopting a mix of instruments and interventions is more effective than using a single instrument to improve air quality across various types of source. Although direct regulation remains important in controlling industrial sources, there is evidence that specifying emission limits is more effective than specifying the use of particular technologies, so as to give companies flexibility in selecting the method of achieving success that suits them best. This approach is advocated as being more cost-effective and more likely to stimulate technological advances in pollution control methods and production processes.

For large point sources (that is, sources of pollution that are concentrated on one site, but that have large, constant volumes of many types of pollution) that are few in number, instruments such as emissions trading have been advocated as an effective way to manage pollutant emissions and reduce the costs of compliance.

Implementing an efficient social protection system to alleviate poverty is central to maintaining conditions that facilitate not only economic growth but also environmental sustainability. Many South African households – including those with access to electricity – use coal, wood, and paraffin, due to the relative cost-effectiveness of such fuels for heating (that is, space heating) and cooking purposes.
Greenhouse gases (GHG), including CO2 emissions are associated with the conventional provision of energy services and are a major cause of climate change. Globally, coal is the second largest primary energy source used worldwide (preceded by oil), and the first source for power generation. In terms of electricity generation or supply, South Africa is highly dependent on coal-fired power plants and therefore energy supply is carbon dioxide-intensive.

Renewable energy sources play a role in providing energy services in a sustainable manner, and in particular in mitigating climate change. Sustainable energy can be defined as energy that provides affordable, accessible and reliable energy services that meet economic, social and environmental needs within the overall developmental context of society, while recognising equitable distribution in meeting those needs. Sustainable energy is an element of sustainable development that is defined as development that meets the present needs and goals of the population without compromising the ability of future generations to meet theirs. On the overall sustainable development is underpinned by economic development (growth efficiency), social development (culture, heritage, poverty, and empowerment) and environmental development (pollution and natural resources).

The government of South Africa considers the use of renewable energy as a contribution to sustainable development. Sustainable development also implies the provision of electricity and other modern fuels to the commercial and industrial sectors to promote their economic competitiveness and future prosperity. (Department of Environmental Affairs (2015). EIA Guideline for Renewable Energy Projects. Department of Environmental Affairs, Pretoria, South Africa).

Air pollution as a result of steam generation will be a given. The proposed generation of steam falls below the threshold as described in the Air Quality Act (Act 39 of 2004) and no further action will be required for this variable. In addition to the above, it should be noted that the project will however create a certain amount of dust during the construction phase. If proper dust suppression measures are implemented this variable will have very little impact (low in intensity and significance during the construction phase).

7.2.3. NOISE

Increased noise pollution as a result of the operational activities of the feed mill and the sheep feedlot will occur. The proposed development is located more than 2 kilometres away from the nearest residential development. In addition the ambient noise created by the N10 that is located adjacent to site has already disturbed the “rural” character of the area. It is also a fact that a certain amount of noise will be generated during the construction phase of the project. Noise levels should however rarely exceed the allowable limits.

7.2.4. ARCHAEOLOGY AND CULTURAL SITES

Background research indicates that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. A number of archaeological & recent historical sites and features were identified and recorded in the study area during the assessment. The most extensive and significant of these are a number of open-air Stone Age sites with scatters of stone tools and associated material. Some recent historical features recorded include the remnants of an aqueduct (indicated on the 1957 map of Portion 15 of the farm) and possibly associated features and a Cricket field (oval). See Figure 18.

Figure 18: The distribution of sites in the assessment area. The blue line indicates the water furrow; the green polygon is the Cricket Oval; Site 2 is the cement & brick foundation remains associated with the golf course. The sheet erosion areas in the black polygons show the extent of the areas where the Stone Age open-air scatters were found (Google Earth 2021).

The 1st site is the remains of the old Cricket Oval/field (This is infact a new cricket ground that was never completed) close to the Golf Club. The site is demarcated by a soil berm. The site is not deemed as historically significant.

The 2nd site recorded is this water furrow. The Phase 1 assessment is seen as sufficient enough documentation. The site used to form part of the Golf course as it used to be an 18 hole course and has since been reduced to a 9 hole course. The structures referred to as site 3 are in all probability old structures associated with this activity (Old tee boxes?). They are nearly completely demolished and the Phase 1 assessment is seen as sufficient enough documentation.

The most significant sites and finds in the area are the open-air scatters of Stone Age material. These sites are characterized by fairly dense scatters of MSA & LSA flakes, cores, flake tools such as blades, scrapers and more formal tools such as points. A scatter of ostrich egg shell fragments was also recorded in one area. These open-air scatters are located in two large sheet erosion areas. The size and density of these Stone Age scatters make these sites highly significant from an Archaeological perspective. It is therefore recommended that Phase 2 Archaeological Mitigation measures be implemented before the development commences and the sites are destroyed.

The following is recommended:

1. Detailed mapping of the Stone Age scatters of material

2. Surface sampling of representative material from these scatters in order to determine their age and typology. This material will then have to be curated by a recognized institution such as the McGregor Museum in Kimberley
3. A permit from SAHRA will be required from SAHRA to conduct this Phase 2 work

7.2.5 PALAEONTOLOGY

The entire study area is underlain by mudrocks of the Permian Balfour Formation of the Adelaide Subgroup of the Beaufort Group of the Karoo Supergroup and more superficially by Quaternary calacrete and alluvial deposits. The rocks of the Beaufort Group are renowned for their wealth of fossil tetrapods, and there is a slight, but unlikely, possibility that the overlying alluvial deposits could contain fossils.

The sedimentary rocks of the Permian Beaufort Group, which are not exposed in the study area, are renowned for their wealth of fossil tetrapods, particularly therapsids, and also plants of the *Glossopteris* flora. These rocks of the Karoo Supergroup are completely covered by unconsolidated Quaternary sediments. The Quaternary deposits could host much younger fossils but this is extremely unlikely.

Collections of fossils from the Beaufort Group are present in the collections of the Evolutionary Studies Institute (ESI), at the University of the Witwatersrand, the Council for Geoscience in Pretoria, National Museum in Bloemfontein, Ditsong Museum in Pretoria, and Iziko Museum in Cape Town.

As the Permian Beaufort Group are overlain by Quaternary calcrete and alluvial deposits and are not exposed in the study area it is highly unlikely that palaeontological heritage will be affected by the proposed development. The overlying Quaternary sediments are not consolidated and it is very unlikely that any fossils will be present.

This desktop study has indicated that no fossils are exposed, and if deep excavations are undertaken as a result of development it could expose fossil vertebrates, and plants in the rocks of the Beaufort Group and could create an opportunity for further study. It is thus recommended that, if in the unlikely event that fossils are exposed in the Permian Beaufort Group or Quaternary sediments, during the proposed development a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented.

7.2.6 CIVIL AVIATION

The site is rated as a “High” sensitivity site for the civil aviation theme. This is mainly due to its close proximity to the Middelburg (Cape) Aerodrome (FAMC) at location Ref. Point: S31.547259 ,E25.029453. In accordance with the Government Gazette No. 43110 a specialist assessment was performed in order to ensure the level of impact on civil aviation installations. After an assessment performed by a radio frequency and radar specialist the site was rated as a “Low” sensitivity site for the civil aviation theme. Therefore according to the Government Gazette No. 43110 no further assessment requirements are identified.
Initial Screeningtool result: “High” Sensitivity site related to the impact on civil aviation installations.

The site marked in light blue in the figures below is 1.5km due north of Middelburg (Cape) Aerodrome (FAMC). The runways of the Middelburg (Cape) Aerodrome (FAMC) is indicated in green in the figures below. Indicated in red with inside the development area is the location of the solar plant.

Figure 19: Proposed development site in respect to the Middelburg (Cape) Aerodrome (FAMC)

The highest planned structure on the development site will fall well below the obstacle identification surfaces area and not cause any obstacle complications for the Middelburg (Cape) Aerodrome (FAMC). The proposed development site is 1.5km due north of Middelburg (Cape) Aerodrome (FAMC) and falls within the Inner Horizontal Surface with n limitation on the height of the maximum structure on the development site to be below 40meters in height. See Figure 19 below.

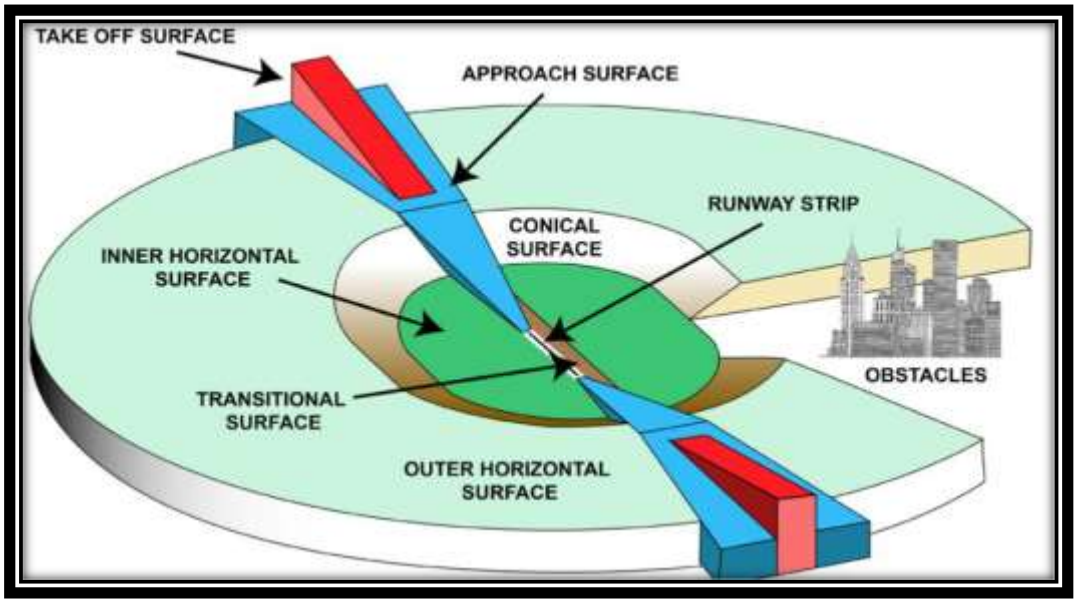


Figure 20: Obstacle identification surfaces

Radio frequency propagation prediction modelling was performed in order to assess the degree of interference from the proposed development site on any type of electromagnetic radio waves transmitting devices that could be deployed at the Middelburg (Cape) Aerodrome (FAMC). The Middelburg (Cape) Aerodrome (FAMC) runways are indicated by the green lines in the images below and the proposed development site is indicated in light blue.

The Middelburg (Cape) Aerodrome (FAMC) currently do not have a radar system. For possible future radar installations the proposed development site will have a very low influence on an airport radar. This is due to the height of the development area in regards to the runway level. The area is very flat and the development is more or less on the same level as the runway. This low level together with angle of the radar antenna and the distance from the runway will result in very low interference on the radar. The interference will be so low together with clutter map adjustments that the interference from the proposed development site is negligible.

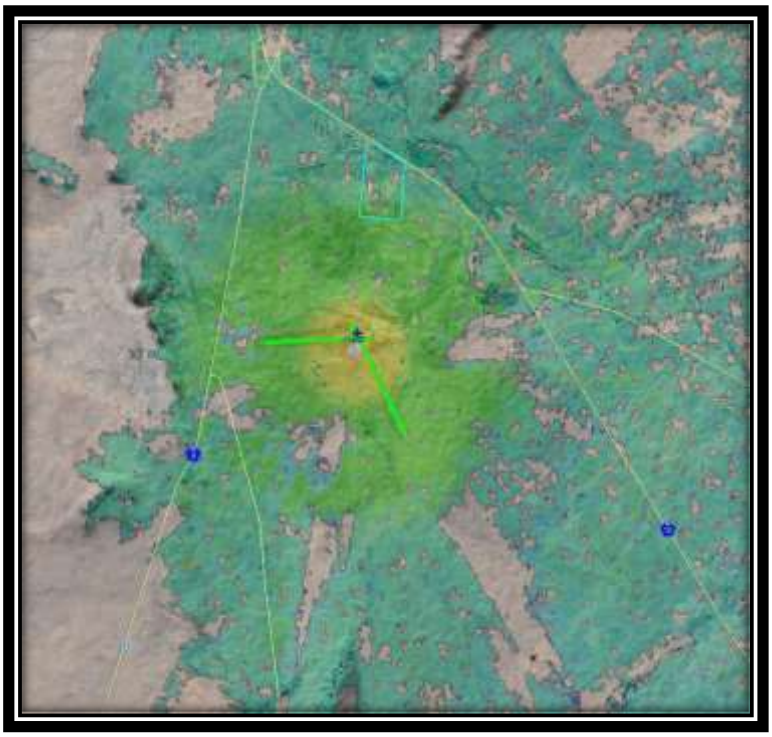


Figure 21: RF propagation from FAMC – Plot 2

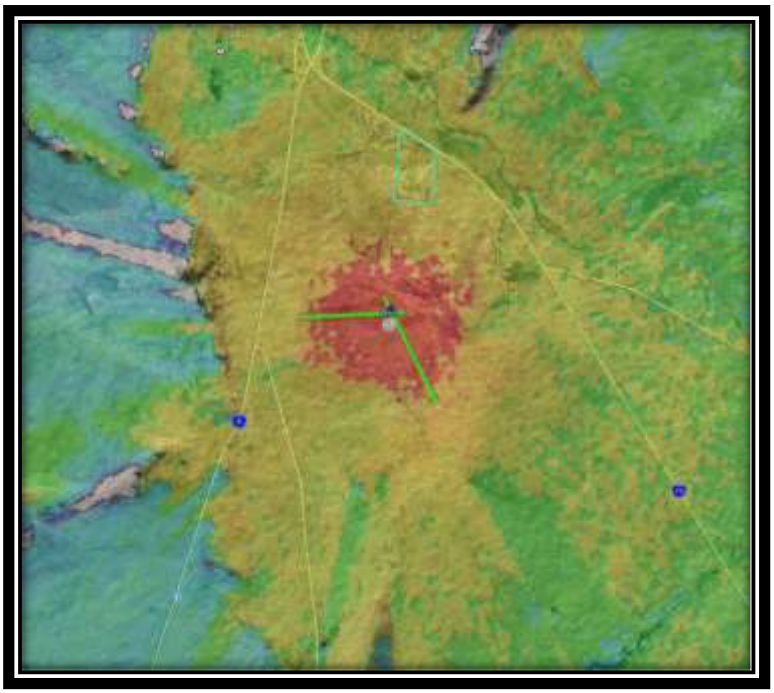


Figure 22: RF propagation from FAMC – Plot 1

The proposed development site do not fall in the takeoff and approach flight path of the RF signal lobes as used by precision landing systems for the Middelburg (Cape) Aerodrome (FAMC). Although there are no precision landing systems currently deployed, it can be seen in the image below that should there be precision landing systems deployed in the future the RF signal focus area of the precision landing systems fall well outside the proposed development.

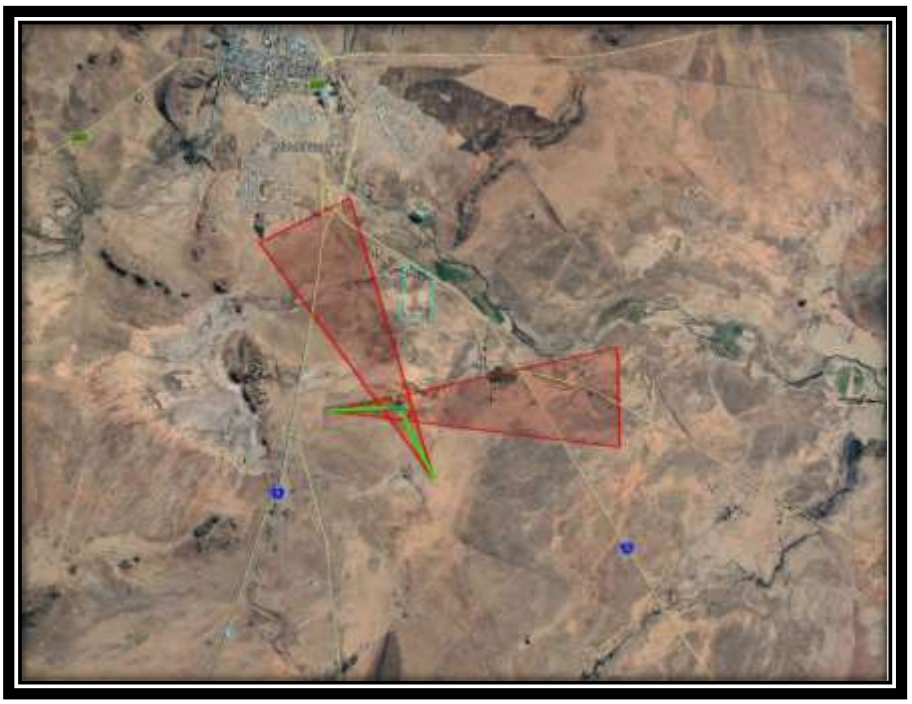


Figure 23: RF propagation from FAMC for advance landing systems

Glint and Glare

A Glint and glare analysis was performed on the influence of the planned solar plant. The reason for this is that the PV glare can be hazardous for pilots, motorists, and other observers.

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration

Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.

After the assessment, the Development has been rated as a “Low” sensitivity site for the civil aviation theme because of the following main reasons.

1. The highest planned structure on the development site will fall within the obstacle identification surfaces area and not cause any obstacle problems for the Middelburg (Cape) Aerodrome (FAMC).

2. The site also will cause low radar interference. Radar is a detection system that uses radio waves to determine the range, angle, or velocity of objects. A radar system consists of a transmitter producing electromagnetic radio waves. These electromagnetic radio waves reflect off the object and return to the receiver, giving information about the object's location and speed. Because the Development site is not in line with the approach and departure flight paths and the maximum height of the buildings is low relative to the radar the interference from the proposed development site will be negligible.

3. The proposed development site do not fall in the takeoff and approach flight path of the RF signal lobes as used by precision landing systems for the Middelburg (Cape) Aerodrome (FAMC).

4. A Glint and glare analysis show no "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles. PV glare can be hazardous for pilots, motorists, and other observers. There is also no glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.

5. The site will also have negligible interfere with any ground to air communication, any airport radio direction finding equipment as well as any radio transmitting beacons

7.2.6 AGRICULTURAL POTENTIAL

The sensitivity of a site is determined by the screening tool of the Department of Environment. According to the screening tool, the site has a medium sensitivity. More detailed analyses, however, found that this assessment is incorrect and for the following reasons:

1) Middelburg is in the Karroo Region that has an arid climate, it has a low and erratic rainfall and high summer temperatures. Crop production is not practiced unless it is under irrigation.
2) There is no irrigated cropping on the site and no water license as far as we are aware.

3) The soils are mostly moderately deep and deep Clovelly soils that are arable but with no irrigation water available, has low arable potential.

The development proposed will remain agriculture but will intensify the agricultural activities. Instead of degraded barren land, it will be converted to include a feed mill, agricultural recreation area, solar farm and sheep feedlot. The conclusion is that the land has a low agricultural sensitivity.

Figure 24: Surrounding land uses (Bing map) indicating that irrigated land is the only cultivated land

Figure 25 is the Land Cover map of DALRRD that clearly indicates that the only cropping that takes place is under irrigation. The implication is: no water, no commercial cropping.

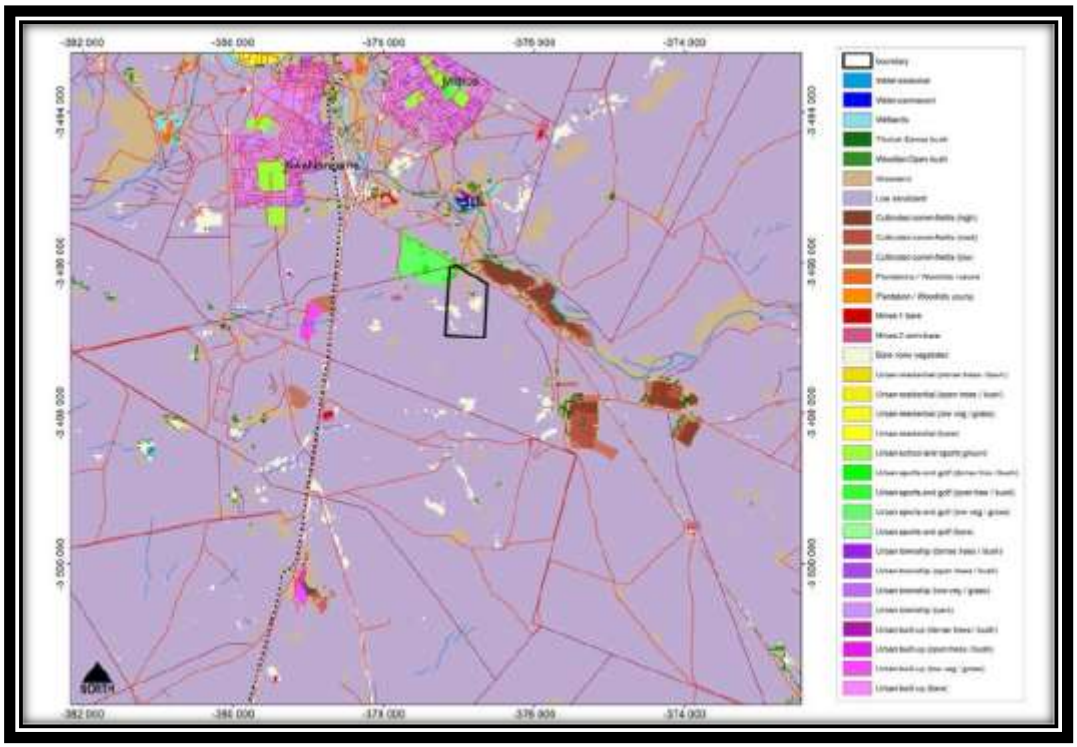


Figure 25: Land cover map (DALRRD)

The Agricultural Specialist concluded*: "It is our professional view that no high potential land will be lost and that the development proposed will only benefit farming as a land use and as an industry*.

7.2.7 AESTHETICS AND VISUAL

Visual Intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

High visual intrusion – results in a noticeable change or is discordant with the surroundings;

Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;

Low visual intrusion – minimal change or blends in well with the surroundings.

The proposed development will change the scenic resources of the local area from an undeveloped area to a developed area. The visual intrusion is considered to be moderate as the proposed development will partially fit into the surroundings, but will be clearly noticeable.

The proposed development will require additional lighting on and in buildings and possibly along roads. This will change the night landscape from unlit to lit. The solar farm's panels is expected to be orientated north and as such will be visible from the N10 The reflectiveness from the panels may result in glare at certain times of day. Passing traffic travelling in a west-north-westerly direction is likely not to be impacted on, however motorists travelling in an east-south-easterly direction may experience some glare at certain times of day. However considering the solar farm will be setback from the road and that the feedmill will partially obscure the solar farm it is unlikely to lead to significant visual impact.

8. ENVIRONMENTAL MANAGEMENT OBJECTIVES AND TARGETS

The following table is a summary of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process.

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
DOCUMENTATION AND TRAINING		
The Integrated Environmental Impact Assessment and an application to establish an organic waste composting facility must be submitted to DEDEAT. The environmental management programme must form part of the application to be approved by DEDEAT.	Submit an application to DEDEAT and plan to have a copy of the signed registration document on site. Approval of the design plans, waste types to be composted and operational processes to be used must be obtained from DEDEAT before commencing with any composting activity	A signed copy of the EA and registration document is available in the site office. Commencement of the activity only started once design plans, waste types to be composted and operational processes have been approved by DEDEAT.
An environmental management programme must clearly describe the processes and measures to be put in place to protect both people and the environment	To ensure that the processes and measures to be put in place will protect both people and the environment.	Availability of EMPr.
The necessary documentation must be available in the site office	Ensure that all concerned is aware of the EMPr and related environmental aspects	Availability of documents Trained and informed workforce.
REQUIREMENTS FOR THE DESIGN AND CONSTRUCTION OF THE ORGANIC WASTE COMPOSTING FACILITY		
The organic waste composting facility must not be constructed in an environmentally sensitive area such as a floodplain, water resource, wetland and any other conservation or protected area, and it must conform to zoning requirements as determined by the relevant local authority. An organic waste composting facility must be designed and constructed in such a manner that the finished compost which has been fully treated is not contaminated with the run-off from untreated or partially treated compost, waste or raw materials. The design of an organic waste compositing facility must include diverting stormwater from rainfall events, away from the working or storage area.	Conduct an assessment of the sensitivity of the site and design the locality of the organic waste composting facility to be located in an area that will not cause any harm to the environment. Liaise with the Local Municipality to ensure that the zoning of the site is appropriate.	The organic waste composting facility is not constructed in an environmentally sensitive area such as a floodplain, water resource, wetland and any other conservation or protected area, and it conforms to zoning requirements as determined by the local authority
The organic waste composting facility must be constructed in an area that is accessible to emergency response personnel and equipment. The approach road to the organic waste composting facility must have a hard surface for heavy vehicles, offloading compostable material, to prevent muddy areas during the wet seasons	To ensure easy access in the event of an emergency and to have a hard surface for heavy vehicles, offloading compostable material, to prevent muddy areas during the wet seasons.	Easy access available.
Containment barriers must be risk based, and the type of waste to be processed and the immediate receiving environment must be considered to quantify the type of containment barriers to put in place in consultation with the provincial authority. The containment barriers must be practical and be able to withstand the heavy machinery associated with the composting activities where applicable	To ensure that the organic waste composting facility does not cause any harm to the environment by designing and constructing appropriate containment structures.	No harm done to the receiving environment as a result of the development. Containment barriers designed for this facility includes the concrete base of the facility and the designed stormwater system that will discharge into the Sedimentation and Evaporation ponds.
A leachate collection system must be designed, and it must prevent both ground and surface water pollution, soil pollution and odour problems.	To ensure that the organic waste composting facility does not cause both ground and surface water pollution, soil pollution and odour problems.	No harm done to the receiving environment as a result of the development. Containment barriers designed for this facility includes the

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
		concrete base of the facility and the designed stormwater system that will discharge into the Sedimentation and Evaporation ponds.
The construction and operational times, as well as noise levels must comply with relevant applicable legislation, including municipal by-laws in order to minimise the impact of noise on the surrounding properties.	To ensure that the organic waste composting facility does not have any negative impact of noise on the surrounding properties	No negative impact of noise on the surrounding properties.
An area under construction must be demarcated to prevent unauthorised access during the construction phase	To ensure the safety of people and animals.	No incidents or accidents.
REQUIREMENTS FOR SECURITY AND ACCESS CONTROL		
The site must be fenced off and secured in a manner that will prevent unauthorised entry to the areas of the organic waste composting facility used for receiving, storing and processing of organics, process residuals and contaminated materials.	To ensure the prevention of unauthorised entry.	Incoming raw materials must be inspected before entering the facility and the composting system. Upon inspection, non-conforming waste must be diverted to a relevant licensed waste management facility.
SITE ACCESS & TRAFFIC MANAGEMENT		
Access roads may increase the construction footprints	Construction vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.	Minimizing eradication of vegetation.
VEGETATION CLEARING		
Vegetation will be cleared from within the footprint of the working area, before earthmoving and construction activities commence.	Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.
TOPSOIL & SUBSOIL MANAGEMENT		
Topsoil (where present) will be removed from any area where physical disturbance of the surface will occur.	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site	The topsoil must be adequately protected from being blown away or eroded by storm water. Removed subsoil should be stockpiled separately from topsoil. Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site
EXCAVATIONS & EARTHWORKS		
It will be necessary to employ heavy machinery (excavators, back-actors, bulldozers, dump trucks etc.) for the earthmoving required	Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as	Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum.

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
	there is always the potential to inflict damage to sensitive areas.	Excavations and earth-moving may only take place within the demarcated working area
DANGEROUS AND TOXIC MATERIALS (CHEMICALS)		
Safe storage of chemicals See also below for further aspects on this subject Availability of safety kits to prevent oils/toxic materials spreading in the environment Proper storage must be provided for chemicals , paint and construction materials needed	Clean environment Safe storage of materials	No spills of chemicals Proper storage provided
STORAGE OF OIL AND FUEL		
Safe handling of fuel and oil and prevention of spills.	Clean environment	No spills of oil or fuel No leakages of oil
USE OF OIL AND CHEMICALS		
Drip trays must be provided for vehicles in storage yard Wash bay and oil trap to be provided	No spills of oil Cleaning area for vehicles	No oil spills from vehicles No oil or fuel into environment due to cleaning of vehicles or equipment
STORAGE OF CEMENT		
Safe handling of cement	Clean environment	No spills of cement
STORAGE OF EQUIPMENT AND MATERIALS		
Safe and proper storage of equipment and material	Safe and proper storage of equipment and material	Neat, clean and ordered storage of material
CONCRETE		
The contractors must provide information on proposed handling of concrete.	Minimise the possibility of concrete residue entering into the surrounding environment	No evidence of contaminated soil on the construction site
TOILETS AND ABLUTION FACILITIES		
Clean sanitary environment	Clean and sanitary environment	Toilets for workers in accordance with the instructions in the EMP
WASTE MANAGEMENT		
A clean and waste free environment	Clean environment with waste handled in accordance with the EMP	No waste in the environment
WORKSHOP EQUIPMENT, MAINTENANCE AND STORAGE OF MATERIAL		
Clean and safe work area	Clean and safe work area	Safe and clean work and storage area
FIRES		
No burning of waste and or fires originating from the construction area	No burning of waste and or fires originating from the construction area	No fire incidents
OTHER ENVIRONMENTAL ASPECTS		
Stockpiles All stockpiled material must be easily accessible without any environmental damage to adjacent grasslands/farmlands. All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised. The stockpiles may only be placed within the demarcated areas - the location of which must be approved by the ER or ECO. Stockpiled material at batching plant must be contained to prevent the spread of gravel in the area.	Properly constructed and well maintained stockpiles	No erosion or spread of material from stockpiles Gravel stockpiles must be properly managed

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
Erosion, sedimentation and storm water No erosion and or sedimentation	• Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint	No erosion or sedimentation. The organic waste composting facility must be designed and operated in such a manner that surface water and other waste streams are prevented from mixing with organic waste received, processed and stored at the premises, including the final product. All water that has entered the processing and storage areas must be handled and treated as leachate
Vegetation The contractor must avoid vegetated areas that will not be cleared.	Minimise impacts on vegetation	Limit impact on vegetation Weeds must be prevented from proliferating at the premises
Waste management Any illegal dumping of waste must not be tolerated. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site.	Sustainable management of waste; to keep the site neat and tidy. This will control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. It will also minimise the potential to pollute soils, water resources and natural habitats	Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site Sufficient containers available on site The design of the organic waste composting facility must include infrastructure to securely store all organics, contaminated products, waste and process residues that cannot be beneficially processed at the facility, until they can be lawfully disposed of at the facility or transferred to another facility. Proof of waste recycled and all safe disposal certificates including waste manifests must be kept on site at all times
Dust Dust production must be controlled by regular watering of roads and works area, should the need arise.	Reduce dust fall out	No visible signs of dust
SAFETY	Children's access to construction site controlled, Access to construction camp controlled	No children on construction site Safety fence and controlled access available

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
	Safety aspects considered	Safety signs with necessary information displayed
REQUIREMENTS DURING OPERATIONAL PHASE		
Minimisation of airborne emissions		
Operational measures must be put in place to immediately blend a carbon source or cover with mature compost any highly biodegradable organics such as food waste, organic sludge and putrescible waste to minimise offensive odour emissions that may be generated by potentially odorous waste	To ensure that the organic composting facility does not cause offensive odour emissions	No offensive odour emissions
Un-surfaced roads, un-grassed or un-paved areas, which give rise to dust, must be regularly watered or other effective dust control measures implemented, to restrict dust to levels which do not pose a threat to human health or the environment. Speed reducing measures such as speed humps and speed limit signage must be introduced	To restrict dust to levels which do not pose a threat to human health or the environment.	Dust levels which do not pose a threat to human health or the environment.
Organics that are being processed must always be kept reasonably moist (at least 25% (m/m) moisture content) to minimise the emissions of airborne pathogens	To ensure that the organic composting facility does not cause the emissions of airborne pathogens	Minimal emissions of airborne pathogens
Emissions of methane in aerobic processes must be controlled by keeping the organics being processed adequately aerated.	To ensure that the Emissions of methane in aerobic processes are controlled	Minimal emissions of methane
The schedule of turning of the compost should depend on the composting method being employed at the facility and must conform to the environmental management programme. The oxygen concentration can be measured with an oxygen probe. However, temperature provides an adequate indication of the process conditions.	The minimum desirable oxygen concentration in the composting material is 5%. Greater than 10% is ideal to avoid anaerobic conditions and high odour potential.	Rapid aerobic decomposition can only occur in the presence of sufficient oxygen. Aeration occurs naturally when air warmed by the compost rises through the material, drawing in fresh air from the surroundings at the base of the windrow. Initial mixing of materials usually introduces enough air to start composting. Porosity and moisture content affect air movement through the composting material. Regular mixing of the material, referred to as turning, enhances aeration in the composting material. Good aeration during composting will encourage complete decomposition of carbon (C) to carbon dioxide (CO_2) rather than releasing carbon as methane (CH_4).
Employees at composting and related organic-processing operations must be protected against high levels of exposure to airborne particulate matter by ensuring that design features and operational measures are strictly followed and monitored, and appropriate personal protective equipment is worn by employees	To ensure that all workers are protected against airborne particulate matter.	Protective clothing worn.
Management of waste generated at the organic waste composting facility		
Any liquid and solid waste generated at the organic waste composting facility, including contaminated products and process residuals not suitable for beneficial processing at the organic waste composting facility, must be stored in such a manner as to prevent water and soil pollution and amenity impacts, in accordance with the requirements specified in the Norms and Standards for Storage of Waste published in terms of Government Notice No.926 in Government *Gazette No.* 37088, on 29 November 2013	To prevent water and soil pollution and amenity impacts, in accordance with the requirements specified in the Norms and Standards for Storage of Waste published in terms of Government Notice No.926 in Government *Gazette No.*	No water and soil pollution and amenity impacts. The Organic waste composting facilities is registered with a Waste Information System in terms of the National Waste Information System

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
	37088, on 29 November 2013	Regulations, 2012 published under Government Notice No. R. 625 in Government *Gazette* No.35583 on 13 August 2012
	Waste generated at the composting facility must be sorted at source into various categories (recyclables and non-recyclables} and a documented procedure must be implemented to prevent any mixing of hazardous and general waste	
	Leachate generated at a composting facility and excess water generated through receiving wet waste must be used on site to increase the moisture content of compost heaps to facilitate decomposition	
	Excess water generated from rainfall, must be used on site to control dust and the dust must not exceed the maximum allowable limits stipulated in the National Dust Control Regulations of Government Notice R.827 of Government Gazette 36974 of 01 November 2013;	
	The liquid waste containers must be of sufficient strength and structural integrity to ensure that they are unlikely to burst or leak in their ordinary use.	
	Waste that is spilled or carried by wind during operation, handling or storage must be contained	
	Hazardous waste must be stored in covered containers that are only opened when waste is added or emptied and the waste must not be kept at levels that trigger other listed activities	
	Organic waste composting facilities must register with a Waste Information System in terms of the National Waste Information System Regulations, 2012 published under Government Notice No. R. 625 in Government *Gazette* No.35583 on 13 August 2012	
Stockpiling of incoming and processed organics		
	The quantities (tonnage or kilograms) of incoming and process waste must at all times not exceed the design requirements for the receiving storage and processing areas	

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
	The mass (tons or metric tons) of all incoming compostable organic waste must be weighed or estimated by determining the density of the waste and multiplying it by the volume of waste received, and the records thereof must be safely kept at the facility or company office for a period of 5 years	
	Operational measures must be put in place to ensure that the storage times for organics are controlled to minimise emissions of offensive odours.	
	Design and operational measures must prevent contamination of final products	
	Other waste streams that have accumulated on site, such as packaging or mixed waste streams must not be stored on site for more than 2 weeks	
Fire and methane gas management		
A fire management plan or strategy must be in place	Sufficient fire-fighting equipment that is kept in good working conditions and appropriate personal protective equipment for fire safety must be available at the facility at all times	A fire management plan or strategy must be in place
	There must be clear signage indicating where the fire-fighting equipment is in relation to compost heaps and the equipment must be within a 10 m distance.	
	Identified sources of fires that may result at the facility and appropriate operational procedures to be undertaken to bring the fire under control	
	A firebreak with a predetermined width as per the relevant legislation, Local Authority by-laws or Fire Protection Agency or barrier constructed around the perimeter of the site to avoid the spread of fires	
	Clear signs in at least two prevalent languages spoken within the area must be in place and should inform the public that flammable substances are not permitted on the site.	
	The design and operation of aerobic composting must	

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
	ensure that the generation of methane is minimised. The design and operational procedures for the organic waste composting facility must ensure that heap heights are limited and heaps are monitored for excessive high temperatures to prevent spontaneous combustion.	

9. ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

9.1 ASSESSMENT CRITERIA

Impacts were rated using the following methodology:

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Duration (time scale)	Short term	Up to 5 years
	Medium term	6 – 15 years
	Long term	More than 15 years
Extent (area)	Local	Confined to study area and its immediate surroundings
	Regional	Region (cadastral, catchment, topographic)
	National	Nationally (The country)
	International	Neighboring countries and the rest of the world.
Magnitude (Intensity)	Low	Site-specific and wider natural and/or social functions and processes are negligibly altered. ((A low intensity impact will not affect the natural, cultural, or social functions of the environment).
	Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way. (Medium scale impact will alter the different functions slightly).
	High	Site-specific and wider natural and/or social functions and processes are severely altered. (A High intensity impact will influence these functions to such an extent that it will temporarily or permanently cease to exist).
Probability	Improbable	Possibility of occurrence is very low. (Such an impact will have a very slight possibility to materialise, because of design or experience).
	Possible	There is a possibility that the impact will occur
	Probable	It is most likely that the impact will occur
	Definite	The impact will definitely occur
Significance	Insignificant	Impact is negligible and will not have an influence on the decision regarding the proposed activity (No mitigation is necessary)
	Very Low	Impact is very small and should not have any meaningful influence on the decision

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
		regarding the proposed activity (No mitigation is necessary)
	Low	The impact may not have a meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Medium	The impact should influence the decision regarding the proposed activity (The project can only be carried through if certain mitigatory steps are taken)
	High	The impact will influence the decision regarding the proposed activity
	Very High	The proposed activity should only be approved under special circumstances
Reversibility	Low	There is little chance of correcting the adverse impact
	Medium	There is a moderate chance of correcting the adverse impact
	High	There is a high chance in correcting the adverse impact
Risk	Low	Assessing a risk involves an analysis of the consequences and likelihood of a hazard being realized. In decision-making, low-consequence / low-probability risks (green) are typically perceived as acceptable and therefore only require monitoring.
	Medium	Other risks (amber) may require structured risk assessment to better understand the features that contribute most to the risk. These features may be candidates for management
	High	High-consequence / high-probability risks (red) are perceived as unacceptable and a strategy is required to manage the risk.

Attributes associated with the alternatives were assessed and is outlined below:

Geographical attributes

The Geographical attributes of an area relates to the characteristics of a particular region, area or place. It influences the determination of site alternatives as it relates to the location of a site in relation to relevant features in the area.

Physical attributes

Physical attributes of an area relates to the processes and patterns in the natural environment. For the purpose of this assessment, the following processes and patterns have been investigated. Geology, soil, topography and landforms, climate and meteorology, surface water and ground water.

Biological attributes

Biological attributes for the purpose of this study includes the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area. The two main branches assessed will be:
Phytogeography is the branch of biogeography that studies the distribution of plants.
Zoogeography is the branch that studies distribution of animals.

Social attributes

Social attributes is closely related to social theory in general and sociology in particular, dealing with the relation of social phenomena and its spatial components.

Economic attributes

Economic attributes includes the location, distribution and spatial organization of economic activities and also takes into account social, cultural, and institutional factors in the spatial economy of the development.

Heritage attributes

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural attributes

Cultural attributes relates to the specific characteristics such as language, religion, ethnic and racial identity, and cultural history & traditions of people. These attributes influences family life, education, economic and political structures, and, of course, business practices.

It should be noted that the above mentioned attributes do not occur in isolation and it is not uncommon for an identified impact to overlap with two or more of these attributes. Also note, not all risks require comprehensive and detailed assessment. Solid problem formulation should allow decision-makers to evaluate the extent of subsequent analysis required. The level of effort put into assessing each risk should be proportionate to its significance and priority in relation to other risks, as well as its complexity, by reference to the likely impacts. Consideration should be given to stakeholders' perceptions of the nature of the risk.

9.2 ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

The following **Environmental Impact Management Outcomes** has been identified:

1. A full copy of the signed EA from DEDEAT in terms of NEMA and NEM:WA, granting approval for the development must be available on site
2. A full copy of the signed Registration from DEDEAT in terms of NEM.WA, granting approval for the organic composting facility must be available on site
3. A copy of the EMPr as well as any amendments thereof must be available on site
4. A suitably qualified ECO must be appointed.
5. Impacts on the environment must be minimised during site establishment and the development footprint must be kept to the approved development area.
6. Vegetation clearing may not commence until such time as the development footprint has been clearly defined.
7. No clearance of vegetation outside of the development footprint may occur.
8. At the end of the construction phase the site and its surrounding area must be free from any pollution that originated as a result of the construction activities.
9. No disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.
10. No disturbance of topsoil & subsoil outside of the development footprint may occur.
11. At the end of the construction phase the site and its surrounding area must be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.
12. At the end of the construction phase the site and its surrounding area must be free from any sewage that originated as a result of the construction activities.
13. At the end of the construction phase the site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the construction activities.
14. Dust prevention measures must be applied to minimise the generation of dust.
15. Noise prevention measures must be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.
16. Absolutely no burning of waste is permitted.
17. Fires will only be allowed in facilities especially constructed for this purpose.

18. No hunting of animals will be allowed.
19. No intentional destruction of any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance may occur.
20. Maintain the containment barriers to ensure that neither the Sedimentation Ponds and Evaporation Ponds nor the organic waste composting facility causes any harm to the environment.
21. The site must be fenced off and secured in a manner that will prevent unauthorised entry to the areas of the Sedimentation Ponds, Evaporation Ponds and organic waste composting facility.
22. Proper ablution and decontamination facilities, for management and staff, must be provided onsite.
23. Organic waste composting facilities must register with a Waste Information System in terms of the National Waste Information System Regulations, 2012 published under Government Notice No. R. 625 in Government Gazette No.35583 on 13 August 2012.
24. The mass (tons or metric tons) of all incoming compostable organic waste must be weighed or estimated by determining the density of the waste and multiplying it by the volume of waste received, and the records thereof must be safely kept at the facility or company office for a period of 5 years.
25. All forms of dust pollution and airborne emissions must be managed in terms of the National Environmental Management: Air quality Act, 2004 (Act No 39 of 2004)).
26. Operational measures must be put in place to immediately blend a carbon source or cover with mature compost any highly biodegradable organics such as food waste, organic sludge and putrescible waste to minimise offensive odour emissions that may be generated by potentially odorous waste.
27. Organics that are being processed must always be kept reasonably moist (at least 25% (m/m) moisture content) to minimise the emissions of airborne pathogens.
28. Emissions of methane in aerobic processes must be controlled by keeping the organics being processed adequately aerated.
29. Facility management must put measures in place to control high concentrations of airborne particulate matter during pre-treatment (shredding and mixing} of dry organics.
30. Employees at Sedimentation Ponds, Evaporation Ponds, composting and related organic-processing operations must be protected against high levels of exposure to airborne particulate matter by ensuring that design features and operational measures are strictly followed and monitored, and appropriate personal protective equipment is worn by employees.

All Contractors and sub-contractors must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.

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NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE	A complete copy of the signed EA from DEDEAT in terms of NEMA and NEM:WA, granting approval for the development **must** be available on site	Obtain the Environmental Authorization and plan to have a copy of the signed EA on site.	Ensure that a signed copy of the EA is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A copy of the EMPr as well as any amendments thereof **must** be available on site	Ensure that a site specific EMPr is compiled and approved and plan to have a copy of the approved document on site	Ensure that a copy of the approved EMPr is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A suitably qualified ECO **must** be appointed.	Prior to the start of construction activities, an ECO must be appointed to	Ensure that the ECO document is available on site and that everyone on site is informed and	No action required	The Applicant and the ECO

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		ensure that an Environmental Control document is compiled. This document must explain the roles and responsibilities of everyone involved and must also contain an Environmental awareness training manual.	trained regarding their Environmental obligations in terms of the EA and EMPr. Records of training sessions must be kept on site.		
			ECO's report must be an item on monthly site meeting agenda	No action required	The project manager.
		The ECO must ensure that the contractor provides method statements for the various	The method statements must be available in the site office	No action required	The Applicant and the contractor must ensure that the method statements are developed and

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		environmental aspects.			approved by the ECO
SITE ESTABLISHMENT	Impacts on the environment **must** be minimised during site establishment and the development footprint must be kept to the approved development area.	A Land surveyor must peg the parameters of the development footprint.	Construction vehicles, machinery and workers must be restricted to only operate within the approved development footprint. The development footprint must be clearly demarcated and the extent of this area must be communicated to all contractors and sub-contractors. Existing access roads must be utilised to access the site camp(s) and working/ construction areas Appropriate traffic management strategies must be implemented to ensure the safety of construction vehicles and other road-users. If needed, signage to warn other road users of the presence of construction vehicles should be erected at appropriate locations, where the	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			signage will be clearly visible to potentially affected road users.		
VEGETATION CLEARING	Vegetation clearing **may not commence** until such time as the development footprint has been clearly defined. No clearance of vegetation outside of the development footprint **may** occur.	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.
STORM AND WASTE WATER MANAGEMENT	At the end of the construction phase the site and its surrounding area **must** be free from any pollution that	The developer must compile a storm water management plan.	All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility.	No action required	The developer must ensure that a storm water management plan is developed.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	originated as a result of the construction activities.		Natural storm water runoff not contaminated by construction activities can be discharged directly into the environment.		The ECO must monitor compliance.
			No wastewater may run freely into any naturally vegetated areas. Run-off containing high sediment loads must not be released into drainage channels		
			Approval must be obtained from DW&S for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998.		
			Surface water or storm water must not be allowed to concentrate, or to flow down cut or fill sloped routes without erosion protection measures being in place		
			Ensure that storm water channels do not discharge straight down contours. These must be aligned at such an angle to the contours that they have the least possible gradient		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed		
			Land clearing must be restricted to the demarcated working area, and no disturbance of topsoil & subsoil outside of the demarcated working area will be allowed.		
TOPSOIL & SUBSOIL	**No** disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.	A Land surveyor must peg the parameters of the development footprint.	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are
			The topsoil must be adequately protected from being blown away or eroded by storm water. The topsoil storage area must be located on a level area outside of any surface drainage/		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			storm-water channels, and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.		trained in this regard. The Contractor will be responsible for the removal and correct stockpiling of the topsoil and subsoil. The ECO will monitor compliance.
			Removed subsoil should be stockpiled separately from topsoil. Handling of topsoil should be minimized as much as possible, and the location of the topsoil berm should be chosen carefully to avoid needing to relocate the topsoil berm at a later date. Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify. The topsoil berm may be a few meters wide but should ideally not be more than 0.5m high to allow sufficient light and air penetration.		
			Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped.		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped. The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.		
	No disturbance of topsoil & subsoil outside of the development footprint **may** occur.				
DANGEROUS AND TOXIC MATERIALS	At the end of the construction phase the site and its surrounding area **must** be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.	**CHEMICALS**			All hazardous substances must be stored in suitable containers as defined in the Method Statement;
		The Contractor must provide method statements for the storage and handling of chemicals on site.	Containers must be clearly marked to indicate contents, quantities and safety requirements	No Action required	
			All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers		
			Bunded areas to be suitably lined with a SABS approved liner		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis		
			All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);		
			All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet		
			Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available		
			The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			The ECO will monitor compliance.		
		FUEL AND OIL			The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers
		The Contractor must provide method statements for the storage and handling of fuel and oil on site.	Fuel storage tanks must be located in a portion of the construction camp where they do not pose a high risk in terms of water pollution (i.e. they must be located away from water courses)	No Action required	
			The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers.		
			The floor of the bund must be sloped, draining to an oil separator		
			Provision must be made for refuelling at the storage area by protecting the soil with an		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained		
			All empty externally dirty drums must be stored on a drip tray or within a bunded area		
			Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly)		
			Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			The responsible operator must have the required training to make use of the spill kit in emergency situations		
			In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008.		
			During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil.		
			Leaking equipment must be repaired immediately or be removed from site to facilitate repair		
			Construction area must be monitored for oil and fuel spills		
			Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.		
		CONCRETE AND CEMENT			The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils rocky outcrops, streams and natural vegetation

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		The contractors must provide and maintain a **method statement** for "cement and concrete batching". The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plants	Cleaning of cement mixing and handling equipment must be done using proper cleaning trays	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility		
			Any spillage that may occur must be investigated and immediate remedial action must be taken		
			The visible remains either of concrete, solid, or from washings, must be physically removed immediately or disposed of as waste to a registered landfill site		
			Cement batching areas must be located in an area where residues are contained and that the location does not fall within storm water channels		
			The contractor is responsible for providing all sanitary arrangements for his		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			and the sub-contractors team. A minimum of one chemical toilet must be provided per 30 persons and should include male and female toilets.		
TOILETS AND ABLUTION FACILITIES	At the end of the construction phase the site and its surrounding area **must** be free from any sewage that originated as a result of the construction activities.	The contractor must provide method statement for the operation and maintenance of toilets and ablution facilities	Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper to all toilets at all times. Toilet paper dispensers must be provided in all toilets The contractor must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor must ensure that no spillage occurs when the toilets are cleaned or emptied. The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			circumstances		
			Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times		
			Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows: • **Hazardous waste**: including (but not limited to) old oil, paint, etc. • **General waste**: including (but not limited to) paper, plastic, glass and construction rubble		
WASTE MANAGEMENT	At the end of the construction phase the site and its surrounding area **must** be free from any hazardous or general waste pollution	The contractors must provide and maintain a method statement for "solid waste management". The method statement	Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request.	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	that originated as a result of the construction activities.	must provide information on the proposed licensed facility to be utilised and details must be kept of record keeping for auditing purposes	Bins must be clearly marked for ease of management		training of staff in this regard. The ECO will monitor compliance.
			All refuse bins must have a lid secured so that animals cannot gain access		
			Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's waste generated on the site		
			Subcontractor(s) contracts must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO		
			All solid and chemical wastes that are generated must be removed and disposed of at		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			a licensed waste disposal site. The contractor is to provide proof of such to the ECO		
			Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site		
			A suitably positioned and clearly demarcated waste collection site must be identified and provided The waste collection site must be maintained in a clean and orderly manner. A covered container (Like a skip, with a cover), must be used to contain refuse from campsite bins, rubble and other construction material		
			All forms of dust pollution must be managed in terms of the National Environmental Management: Air quality Act, 2004 (Act No 39 of 2004)). Acceptable dust fall rates for residential areas are:		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			Dust fall rate (D) (mg/m^2/day, 30 days average: D<600 **Permitted frequency of exceeding dust fall rate:** Two within a year, not sequential months A standard test method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739. The latest version of this method shall be used.		
DUST	Dust prevention measures **must** be applied to minimise the generation of dust.	The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the	Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be revegetated or stabilised as soon as is practically possible. Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		proposed source of water to be utilised.	The construction camp must be watered during dry and windy conditions to control dust fallout.		The ECO will monitor compliance.
			Dust production must be controlled by regular watering of roads and work area, should the need arise		
			During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level		
			Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind		
			Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas		
NOISE	Noise prevention measures **must** be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.	The contractors must provide and maintain a method statement for noise.	Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise Management. It is proposed that normal working hours are between 08h00 and 17h00 (Mondays to Saturdays). No work will be allowed on Sundays or outside of the abovementioned hours.	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable,		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			provide transport to and from the site on a daily basis for construction workers.		
			All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained.		
FIRES	Absolutely **no** burning of waste is permitted.	The contractors must provide and maintain a method statement for "fires", clearly indicating where and for what, fires will be utilised plus details on the fuel to be utilised	Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor's camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose.	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
	Fires will **only** be allowed in facilities especially constructed for this purpose.		Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.		
			The contractor must designate a smoking area for the labour force so as to prevent unanticipated incidents of veldt fires.		
			No wood is to be collected, chopped or felled for fires from private or public property as well		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			as from no-go or sensitive areas within the site and any surrounding natural vegetation Absolutely no burning of waste is permitted.		
FAUNA	**No** hunting of animals will be allowed.	Plan to ensure that all activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)	Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc. All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal.		
HERITAGE	**No** intentional destruction of any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance may occur.	Conduct a Phase 1 HIA for the development to identify any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance. If the farmstead and related structures are to be demolished to make way for the proposed	Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance. Should any archaeological artefacts be exposed during site activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified immediately. Proper fencing in of the grave sites to protect it against any accidental or direct impact by any future development. The site should also be cleaned and properly marked as a cemetery. All work must cease immediately, if any human remains are uncovered. Such material, if exposed, must be reported to the South African	Maintain the fencing of the grave sites.	The developer and applicant. Study to be conducted by a suitable qualified specialist. Findings to be monitored by the ECO.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		development, a detailed Phase 2 Heritage study must be undertaken here by a suitable specialized architectural historian	Police Services, so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences		
			In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), construction personnel must be alert and must inform the local heritage agency within 48 hours should they come across any signs of heritage resources.		
CRIME, SAFETY AND SECURITY	All Contractors and sub-contractors **must** abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.	Plan to appoint a health and safety officer for the construction site.	The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.	No actions required	Health and safety officer.
		Compile an Emergency	The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		Response Action Plan (ERAP) prior to the commencement of the project	numbers and names are posted at relevant locations throughout the construction site.		
			Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc		
			All unattended open excavations must be adequately fenced or demarcated.		
			Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.		
			Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS. The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			Workers must be instructed not to trespass onto adjacent land. Trespassers will be prosecuted.		
			The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations.		

Please note: This Section of the EMPr should be read in conjunction with Paragraph 5 of the EMPr.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE	A complete copy of the signed EA/waste licence from DEDEAT in terms of NEMA and NEM:WA, granting approval for the development **must** be available on site	Obtain the Environmental Authorization and plan to have a copy of the signed EA/waste licence from DEDEAT in terms of NEMA and NEM:WA on site.	Ensure that a signed copy of the EA/waste licence from DEDEAT in terms of NEMA and NEM:WA is available in the site office A complaints register must be kept on site during the construction phase as well as details regarding the manner in which the complaints are being addressed. An incident register must be kept at the facility at all times	Ensure that a signed copy of the EA/waste licence from DEDEAT in terms of NEMA and NEM:WA is available in the site office. All compost intended for use as fertilisers must be registered with the national department responsible for agriculture and must meet all the necessary requirements in terms of the Regulations Regarding Fertilisers, published in Government Notice No. R.732 in Government *Gazette* No. 35666 on 10 September 2012 issued in terms of the Fertilizers, Farms Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947), including any amendment. A complaints register must be kept on site during the operational phases as well as details regarding the manner in which the complaints are being addressed.	The Applicant, assisted by the EAP to be monitored by the ECO

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
				An incident register must be kept at the facility at all times. A person responsible for managing the lagoons and composting facility must, during the safety, health and environment induction of all new employees, train such employees on waste management in order to identify, prevent, minimise or manage actions or behaviors that are likely to cause adverse impacts on air, water, land, fauna and flora as a result of construction, operation and decommissioning of the facility. Members of staff at lagoons and organic waste composting facility must be trained to manage all types of waste in accordance with the provisions of these Norms and Standards and any other relevant legislative requirements applicable to composting facilities. All incidents which fall within the ambit of section 30 of the National Environmental Management Act, 1998 (Act No.	

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
				107 of 1998) must be dealt with in accordance with that section and must be	
	An environmental management programme compiled by the facility owner or environmental consultant must clearly describe the operation of the facility and measures to be put in place to protect both people and the environment	Compile an environmental management programme that clearly describes the operational processes and measures to be put in place to protect both people and the environment	Ensure that the facility is constructed as designed in the EMPr.	Ensure that the facility is operated as described in the EMPr.	The Applicant, assisted by the EAP to be monitored by the ECO
	Construction and development of the waste storage facility must be carried out under the supervision of a registered professional engineer and must be in accordance with the approved civil engineering designs. The plan must only be amended and approved by a registered professional engineer.	Submit the design plans, waste types to be composted and operational processes to be used to DEDEAT for approval.	No construction activities related to the facility may start before design plans, waste types to be composted and operational processes have been approved by DEDEAT	Ensure that the waste types to be handeled and operational processes complies with the approval from DEDEAT.	The Applicant, assisted by the EAP to be monitored by the ECO
	A copy of the EMPr as well as any amendments thereof **must** be available on site	Ensure that a site specific EMPr is compiled and approved and plan to have a copy of the approved document on site	Ensure that a copy of the approved EMPr is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	A suitably qualified ECO **must** be appointed.	Prior to the start of construction activities, an ECO must be appointed to ensure that an Environmental Control document is compiled. This document must explain the roles and responsibilities of everyone involved and must also contain an Environmental awareness training manual.	Ensure that the ECO document is available on site and that everyone on site is informed and trained regarding their Environmental obligations in terms of the EA and EMPr. Records of training sessions must be kept on site.	No action required	The Applicant and the ECO
			ECO's report must be an item on monthly site meeting agenda	No action required	The project manager.
		The ECO must ensure that the contractor provides method statements for the various environmental aspects.	The method statements must be available in the site office	No action required	The Applicant and the contractor must ensure that the method statements are developed and approved by the ECO
REQUIREMENTS FOR THE DESIGN AND CONSTRUCTION OF THE ORGANIC WASTE COMPOSTING FACILITY	The facility must not be constructed in an environmentally sensitive area such as a floodplain, water resource, wetland and any other conservation or protected area, and it must conform to zoning requirements as determined by the relevant local authority	Conduct an assessment of the sensitivity of the site and design the locality of the facility to be located in an area that will not cause any harm to the environment. Liaise with the Local Municipality to ensure that the zoning of the site is appropriate.	Ensure that the facility is constructed in the area that has been allocated for this purpose.	Ensure that the facility is operated on the site that has been allocated for this purpose. All infrastructure required for the facility operations must be maintained to ensure that it functions effectively and in accordance with the operational requirements and design parameters	The Applicant, assisted by the EAP to be monitored by the ECO

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		A Land surveyor must peg the parameters of the development footprint.			
	The facility must be constructed in an area that is accessible to emergency response personnel and equipment. The approach road to the facility must have a hard surface for heavy vehicles, offloading compostable material, to prevent muddy areas during the wet seasons	Design the access to the facility to be easily accessible to emergency response personnel and equipment and to have a hard surface for heavy vehicles, offloading compostable material, to prevent muddy areas during the wet seasons	Construct the access to the facility to be easily accessible to emergency response personnel and equipment and to have a hard surface for heavy vehicles, offloading compostable material, to prevent muddy areas during the wet seasons.	Maintain the access	The Applicant, assisted by the Civil Engineer.
	Containment barriers must be risk based, and the type of waste to be processed and the immediate receiving environment must be considered to quantify the type of containment barriers to put in place in consultation with the provincial authority. The containment barriers must be practical and be able to withstand the heavy machinery associated with the composting activities where applicable.	Design containment barriers to ensure that the facility does not cause any harm to the environment. Containment barriers designed for this facility includes the concrete base of the facility and the designed stormwater system that will discharge into the Sedimentation and Evaporation ponds.	Construct the containment barriers as designed to ensure that the facility does not cause any harm to the environment.	Maintain the containment barriers to ensure that the facility does not cause any harm to the environment	The Applicant, assisted by the Civil Engineer.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	A leachate collection system must be designed, and it must prevent both ground and surface water pollution, soil pollution and odour problems. The facility must be designed and constructed in such a manner that the finished compost which has been fully treated is not contaminated with the run-off from untreated or partially treated compost, waste or raw materials. The design of an organic waste compositing facility must include diverting stormwater from rainfall events, away from the working or storage area.				
	The construction and operational times, as well as noise levels must comply with relevant applicable legislation, including municipal by-laws in order to minimise the impact of noise on the surrounding properties. Noise prevention measures **must** be applied to	Plan to ensure that construction and operational times will only occur during normal working hours. The contractors must provide and maintain a method statement for noise.	All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained. Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the EMPr are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise Management.	All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained. Develop a Code of Conduct for the operation phase in terms of behaviour of staff. Operating hours as determined by the EMPr are adhered to during the operational phase. Where not defined, it must be ensured that	The Contractor and the operator of the facility will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	minimise the generation of unnecessary noise pollution as a result of construction activities on site.		It is proposed that normal working hours are between 08h00 and 17h00 (Mondays to Saturdays). No work will be allowed on Sundays or outside of the abovementioned hours. Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.	development activities must still meet the impact management outcome related to noise Management. It is proposed that normal working hours are between 08h00 and 17h00. Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.	
	An area under construction must be demarcated to prevent unauthorised access during the construction phase	A Land surveyor must peg the parameters of the development footprint.	The development footprint must be clearly demarcated and the extent of this area must be communicated to all contractors and sub-contractors	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
REQUIREMENTS FOR SECURITY AND ACCESS CONTROL	The site must be fenced off and secured in a manner that will prevent unauthorised entry to the facility used for receiving, storing and processing of organics, process residuals and contaminated materials and the Sedimentation and Evaporation ponds	Plan for the site to be fenced off and secured in a manner that will prevent unauthorised entry to the facility used for receiving, storing and processing of organics, process residuals and contaminated materials and the Sedimentation and Evaporation ponds.	Construct the fence and access control to be fenced off and secured in a manner that will prevent unauthorised entry to the areas of the organic waste composting facility used for receiving, storing and processing of organics, process residuals and contaminated materials and the Sedimentation and Evaporation ponds.	Maintain the fence and access control to be fenced off and secured in a manner that will prevent unauthorised entry to the areas of the organic waste composting facility used for receiving, storing and processing of organics, process residuals and contaminated materials and the Sedimentation and Evaporation ponds. Incoming raw materials must be inspected before entering the facility and the composting system. Upon inspection, non-conforming waste must be diverted to a relevant licensed waste management facility.	The Applicant and operator of the facility assisted by the Civil Engineer
SITE ESTABLISHMENT	Impacts on the environment **must** be minimised during site establishment and the development footprint must be kept to the approved development area.	A Land surveyor must peg the parameters of the development footprint.	Construction vehicles, machinery and workers must be restricted to only operate within the approved development footprint. The development footprint must be clearly demarcated and the extent of this area must be communicated to all contractors and sub-contractors. Existing access roads must be utilised to access the site camp(s) and working/ construction areas	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			Appropriate traffic management strategies must be implemented to ensure the safety of construction vehicles and other road-users. If needed, signage to warn other road users of the presence of construction vehicles should be erected at appropriate locations, where the signage will be clearly visible to potentially affected road users.		
VEGETATION CLEARING	Vegetation clearing **may not commence** until such time as the development footprint has been clearly defined. No clearance of vegetation outside of the development footprint **may** occur.	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.	Infestation by alien invasive species could replace indigenous vegetation or potential areas where indigenous vegetation could recover. It is in particular declared alien invasive species such as *Melia* azedarach (Syringa) or alien invasive Australian *Acacia* species (Australian Wattles) that should not be allowed to establish. Once established combatting these alien invasive plant species may become very expensive in the long term. If the development is approved an opportunity presents itself to cultivate indigenous plant species which would benefit urban nature conservation	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.
STORM AND WASTE WATER MANAGEMENT	At the end of the construction phase the site and its surrounding area **must** be free from any pollution that originated as a	The developer must compile a storm water management plan.	Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager	Maintain the containment barriers (Concrete surfaces and storm water structures.) to ensure that the organic waste composting facility does not	The developer must ensure that a storm water management plan is developed.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	result of the construction activities. The organic waste composting facility must be designed and operated in such a manner that surface water and other waste streams are prevented from mixing with organic waste received, processed and stored at the premises, including the final product		All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility. No wastewater may run freely into any naturally vegetated areas. Run-off containing high sediment loads must not be released into drainage channels Approval must be obtained from DW&S for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998. Surface water or storm water must not be allowed to concentrate, or to flow down cut or fill sloped routes without erosion protection measures being in place Ensure that storm water channels do not discharge straight down contours. These must be aligned at such an angle to the contours that they have the least possible gradient To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.	cause any harm to the environment. The organic waste composting facility must be operated in such a manner that surface water and other waste streams are prevented from mixing with organic waste received, processed and stored at the premises, including the final product. All water that has entered the processing and storage areas must be handled and treated as leachate.	The ECO must monitor compliance.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
TOPSOIL & SUBSOIL	**No** disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no disturbance of topsoil & subsoil outside of the demarcated working area will be allowed.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The Contractor will be responsible for the removal and correct stockpiling of the topsoil and subsoil. The ECO will monitor compliance.
			Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas.		
			The topsoil must be adequately protected from being blown away or eroded by storm water. The topsoil storage area must be located on a level area outside of any surface drainage/ storm-water channels, and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.		
			Removed subsoil should be stockpiled separately from topsoil. Handling of topsoil should be minimized as much as possible, and the location of the topsoil berm should be chosen carefully to avoid needing to relocate the topsoil berm at a later date. Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify. The topsoil berm may be a few meters wide but should ideally not be more than 0.5m high to allow sufficient light and air penetration.		
	No disturbance of topsoil & subsoil outside of the		Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped.		

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	development footprint **may** occur.				
DANGEROUS AND TOXIC MATERIALS	At the end of the construction phase the site and its surrounding area **must** be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.	**CHEMICALS**			The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
		The Contractor must provide method statements for the storage and handling of chemicals on site.	All hazardous substances must be stored in suitable containers as defined in the Method Statement;	A Safety Data Sheet for each of the chemical products utilised at the facility must be kept on site and in easily accessible location to employees	
			Containers must be clearly marked to indicate contents, quantities and safety requirements		
			All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers		
			Bunded areas to be suitably lined with a SABS approved liner		
			An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis		
			All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);		
			All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet		
			Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available		
		FUEL AND OIL			

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		The Contractor must provide method statements for the storage and handling of fuel and oil on site.	The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			Fuel storage tanks must be located in a portion of the construction camp where they do not pose a high risk in terms of water pollution (i.e. they must be located away from water courses)		
			The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers		
			The floor of the bund must be sloped, draining to an oil separator		
			Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained		
			All empty externally dirty drums must be stored on a drip tray or within a bunded area		
			Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a		

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			recommended product that is environmentally friendly)		
			Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used		
			The responsible operator must have the required training to make use of the spill kit in emergency situations		
			In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008.		
			During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil.		
			Leaking equipment must be repaired immediately or be removed from site to facilitate repair		
			Construction area must be monitored for oil and fuel spills		
			Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.		
		CONCRETE AND CEMENT			

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
		The contractors must provide and maintain a **method statement** for "cement and concrete batching". The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plants	The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils rocky outcrops, streams and natural vegetation	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			Cleaning of cement mixing and handling equipment must be done using proper cleaning trays		
			All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility		
			Any spillage that may occur must be investigated and immediate remedial action must be taken		
			The visible remains either of concrete, solid, or from washings, must be physically removed immediately or disposed of as waste to a registered landfill site		
			Cement batching areas must be located in an area where residues are contained and that the location does not fall within storm water channels		
TOILETS AND ABLUTION FACILITIES	At the end of the construction phase the site and its surrounding area **must** be free from any sewage that originated as a result of the construction activities.	The contractor must provide method statement for the operation and maintenance of toilets and ablution facilities	The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 30 persons and should include male and female toilets.	Proper ablution and decontamination facilities, for management and staff, must be provided onsite	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet		

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ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			paper to all toilets at all times. Toilet paper dispensers must be provided in all toilets		
			The contractor must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor must ensure that no spillage occurs when the toilets are cleaned or emptied.		
			The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances		
			Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times		
WASTE MANAGEMENT	At the end of the construction phase the site and its surrounding area **must** be free from any hazardous or general waste pollution that originated as a result of the construction activities. Any liquid and solid waste generated at the organic waste composting facility, including contaminated products and process residuals not suitable for beneficial processing at the organic waste composting	The contractors must provide and maintain a method statement for "solid waste management". The method statement must provide information on the proposed licensed facility to be utilised and details must be kept of record keeping for auditing purposes Organic waste composting facilities must register with a Waste Information System in	Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows: • **Hazardous waste**: including (but not limited to) old oil, paint, etc. • **General waste**: including (but not limited to) paper, plastic, glass and construction rubble Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request.	Waste generated at the composting facility must be sorted at source into various categories (recyclables and non-recyclables} and a documented procedure must be implemented to prevent any mixing of hazardous and general waste. Liquid waste must be stored in leak resistant containers which must be inspected weekly for early detection of leaks. Leachate generated at a composting facility and excess water generated through receiving wet waste must be	The Contractor will be responsible for providing method statements for the construction phase. The operator of the organic waste composting facility will be responsible for compliance during the operational phase. They will also be responsible for training of staff in this regard.

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ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	facility, must be stored in such a manner as to prevent water and soil pollution and amenity impacts, in accordance with the requirements specified in the Norms and Standards for Storage of Waste published in terms of Government Notice No.926 in Government Gazette No. 37088, on 29 November 2013	terms of the National Waste Information System Regulations, 2012 published under Government Notice No. R. 625 in Government *Gazette* No.35583 on 13 August 2012	Bins must be clearly marked for ease of management All refuse bins must have a lid secured so that animals cannot gain access Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's waste generated on the site Subcontractor(s) contracts must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the ECO Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site	used on site to increase the moisture content of compost heaps to facilitate decomposition Excess water generated from rainfall, must be used on site to control dust and the dust must not exceed the maximum allowable limits stipulated in the National Dust Control Regulations of Government Notice R.827 of Government Gazette 36974 of 01 November 2013; The liquid waste containers must be of sufficient strength and structural integrity to ensure that they are unlikely to burst or leak in their ordinary use Waste that is spilled or carried by wind during operation, handling or storage must be contained Hazardous waste must be stored in covered containers that are only opened when waste is added or emptied and the waste must not be kept at levels that trigger other listed activities	The ECO will monitor compliance.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
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		Pre-construction phase	Construction phase	Operational phase	
			A suitably positioned and clearly demarcated waste collection site must be identified and provided The waste collection site must be maintained in a clean and orderly manner. A covered container (Like a skip, with a cover), must be used to contain refuse from campsite bins, rubble and other construction material	Organic waste composting facilities must register with a Waste Information System in terms of the National Waste Information System Regulations, 2012 published under Government Notice No. R. 625 in Government *Gazette* No.35583 on 13 August 2012	
				The quantities (tonnage or kilograms) of incoming and process waste must at all times not exceed the design requirements for the receiving storage and processing areas	
				The mass (tons or metric tons) of all incoming compostable organic waste must be weighed or estimated by determining the density of the waste and multiplying it by the volume of waste received, and the records thereof must be safely kept at the facility or company office for a period of 5 years.	
				Operational measures must be put in place to ensure that the storage times for organics are	

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
				controlled to minimise emissions of offensive odors. Design and operational measures must prevent contamination of final products Other waste streams that have accumulated on site, such as packaging or mixed waste streams must not be stored on site for more than 2 weeks. The design of the organic waste composting facility must include infrastructure to securely store all organics, contaminated products, waste and process residues that cannot be beneficially processed at the facility, until they can be lawfully disposed of at the facility or transferred to another facility. Proof of waste recycled and all safe disposal certificates including waste manifests must be kept on site at all times.	
DUST/ MINIMISATION OF AIRBORNE EMISSIONS	Dust prevention measures **must** be applied to minimise the generation of dust.	The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the	Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be revegetated or stabilised as soon as is practically possible.	All forms of dust pollution and airborne emissions must be managed in terms of the National Environmental Management: Air quality Act, 2004 (Act No 39 of 2004)).	The Contractor will be responsible for providing method statements for the construction phase. The operator of the

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	Minimisation of airborne emissions.	proposed source of water to be utilised.	Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present. The construction camp must be watered during dry and windy conditions to control dust fallout. Dust production must be controlled by regular watering of roads and work area, should the need arise During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas	Operational measures must be put in place to immediately blend a carbon source or cover with mature compost any highly biodegradable organics such as food waste, organic sludge and putrescible waste to minimise offensive odour emissions that may be generated by potentially odorous waste	composting facility will be responsible to adhere to the requirements as is set out in this section for the operational phase. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
	Acceptable dust fall rates are: **Dust fall rate (D) (mg/m²/day, 30 days average:** D<600 **Permitted frequency of exceeding dust fall rate:** Two within a year, not sequential months			Un-surfaced roads, un-grassed or un-paved areas, which give rise to dust, must be regularly watered or other effective dust control measures implemented, to restrict dust to levels which do not pose a threat to human health or the environment. Speed reducing measures such as speed humps and speed limit signage must be introduced	
	A standard test method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739. The latest version of this method shall be used.			Organics that are being processed must always be kept reasonably moist (at least 25% (m/m) moisture content) to minimise the emissions of airborne pathogens.	
				Emissions of methane in aerobic processes must be controlled by keeping the organics being processed adequately aerated	

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
				The schedule of turning of the compost should depend on the composting method being employed at the facility and must conform to the environmental management programme. The oxygen concentration can be measured with an oxygen probe. However, temperature provides an adequate indication of the process conditions. The minimum desirable oxygen concentration in the composting material is 5%. Greater than 10% is ideal to avoid anaerobic conditions and high odour potential.	
				Facility management must put measures in place to control high concentrations of airborne particulate matter during pre-treatment (shredding and mixing} of dry organics.	
				Employees at composting and related organic-processing operations must be protected against high levels of exposure to airborne particulate matter by ensuring that design features and operational measures are strictly followed and monitored,	

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
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		Pre-construction phase	**Construction phase**	**Operational phase**	
				and appropriate personal protective equipment is worn by employees.	
NOISE	Noise prevention measures **must** be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.	The contractors must provide and maintain a method statement for noise.	All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained. Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise Management. It is proposed that normal working hours are between 08h00 and 17h00 (Mondays to Saturdays). No work will be allowed on Sundays or outside of the abovementioned hours. Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.	See section in this regard above.	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
FIRES AND METHANE GAS MANAGEMENT	Absolutely **no** burning of waste is permitted. Fires will **only** be allowed in facilities especially constructed for this purpose.	The contractors must provide and maintain a method statement for "fires", clearly indicating where and for what, fires	Absolutely no burning of waste is permitted. Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor's camps. Wood, charcoal or anthracite are the only fuels permitted to	Sufficient fire-fighting equipment that is kept in good working conditions and appropriate personal protective equipment for fire safety must	The Contractor will be responsible for providing method statements. He will also be responsible for

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
	A fire management plan or strategy must be in place.	will be utilised plus details on the fuel to be utilised	be used for fires. The contractor must provide sufficient wood (fuel) for this purpose. Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air. The contractor must designate a smoking area for the labour force so as to prevent unanticipated incidents of veldt fires. No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation	be available at the facility at all times. Organic waste composting facility staff members must be trained in fire-fighting techniques. Emergency response measures must be put in place to deal with any eventuality of fires resulting from the working surfaces or at any other area within the facility There must be clear signage indicating where the fire-fighting equipment is in relation to compost heaps and the equipment must be within a 10 m distance Identified sources of fires that may result at the facility and appropriate operational procedures to be undertaken to bring the fire under control. A firebreak with a predetermined width as per the relevant legislation, Local Authority by-laws or Fire Protection Agency or barrier constructed around the perimeter of the site to avoid the spread of fires	training of staff in this regard. The ECO will monitor compliance.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
				Clear signs in at least two prevalent languages spoken within the area must be in place and should inform the public that flammable substances are not permitted on the site.	
				The design and operation of aerobic composting must ensure that the generation of methane is minimised.	
				The design and operational procedures for the organic waste composting facility must ensure that heap heights are limited and heaps are monitored for excessive high temperatures to prevent spontaneous combustion	
FAUNA AND FLORA	**No** hunting of animals will be allowed.	Plan to ensure that all activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)	All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem	Weeds must be prevented from proliferating at the premises. The organic waste composting facility operator must put in place measures to control pests	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
			animal e.g. a large snake, a specialist must be called in to safely relocate the animal.		The ECO will monitor compliance.
			Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc.		
HERITAGE	**No** intentional destruction of any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance may occur.	Conduct a Phase 1 HIA for the development to identify any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance, as well as a Paleontological desktop study to determine the likelihood of fossils to be found on site.	In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), construction personnel must be alert and must inform the local heritage agency within 48 hours should they come across any signs of heritage resources.	No action required.	The developer and applicant. Study to be conducted by a suitable qualified specialist. Findings to be monitored by the ECO.
			Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance.		
			Should any archaeological artefacts / fossils be exposed during site activities, work on the area where the artefacts / fossils were found must cease immediately and the ECO must be notified immediately.		
			All work must cease immediately, if any human remains are uncovered. Such material, if exposed, must be reported to the South African Police Services, so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences		

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ENVIRONMENTAL ASPECT	**ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME**	**ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS**			**RESPONSIBLE PERSON**
		Pre-construction phase	**Construction phase**	**Operational phase**	
CRIME, SAFETY AND SECURITY	All Contractors and sub-contractors **must** abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.	Plan to appoint a health and safety officer for the construction site.	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations	No actions required	Health and safety officer.
		Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the project	The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.		
			The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.		
			Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc		
			All unattended open excavations must be adequately fenced or demarcated.		
			Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.		
			Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS. The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area		
			Workers must be instructed not to trespass onto adjacent land. Trespassers will be prosecuted.		

11. ENVIRONMENTAL AWARENESS PLAN

11.1 INTRODUCTION

Training is essential for ensuring that the EMP provisions are implemented efficiently and effectively. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The Construction Contractor should make allowance for all construction workers, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing work on site. During this training, the ECO will explain the EMP and the conditions contained therein. Attention will be given to the construction process and how the EMP fits into this process.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimized and environmental compliance maximized.

Environmental awareness training and education should be ongoing throughout the construction phase, and should be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMP), or as new workers come to site. Translators should be utilized where needed.

Environmental awareness could be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site.
- Refresher courses as and when required.
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.

Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

11.2 ORGANISATIONAL STRUCTURE

This section describes the roles and responsibilities of the key stakeholders involved in the development, implementation and review of the EMP.

11.2.1 PROJECT PROPONENT

The Project Proponent will be the ***De Heus (PTY) Ltd.*** Ultimately, they will be responsible for the development and implementation of the EMP and for ensuring that the conditions in the eventual Environmental Authorization (EA) are satisfied. Although construction activities will be contracted out, the

liability associated with non-compliance still rests with the Project Proponent. The Project Proponent (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMP and meeting EA conditions.

The Project Proponent must inform the Contractor of the EA and EMP obligations, as well as **Method Statements** to be prepared and environmental training to be undertaken by the Contractor in terms of these obligations.

The Project Proponent must identify a **Project Manager (PM)** who has overall responsibility for managing the Project, Contractors and for ensuring that the environmental management requirements are met. During the construction phase, the Project Manager will be the Proponent's construction manager; during the operations phase this role will be fulfilled by the **operations manager**.

All decisions regarding environmental procedures and protocol must be approved by the Project Manager, who also has the authority to stop any construction activity in contravention of the EMP or EA.

An **Environmental Control Officer (ECO) must** be employed by the Project Proponent for the duration of the project. The ECO should have appropriate training and experience in the implementation of environmental management specifications. The ECO provides feedback to the Project Manager regarding all environmental matters. Contractors are answerable to the ECO (or Project Manager, depending on contractual arrangements) for non-compliance with the requirements stated in the EMP or EA.

11.2.2 ENVIRONMENTAL CONTROL OFFICER (ECO)

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals (including pre-construction set-up and final rehabilitation), in order to ensure that the provisions of this EMP is adhered to and that sound environmental management is ensuing on site.

The ECO must inspect all areas of the site that may be affected by construction-related activities, including the working area, site camp, stockpile areas and access roads. After each ECO inspection the ECO must compile an ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Applicant, the ER, Construction Contractor(s) and the Competent Authority. The ECO inspection reports should include both photographic and written records.

The ECO will have the following responsibilities:

- Maintenance, update and review of the EMP.
- Liaison between the Project Proponent, Contractors, authorities and other lead stakeholders on all environmental concerns.
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective.
- Monitoring the performance of the Contractor (and Sub-contractors) and ensuring compliance with the EMP and associated Method Statements.

- Validating the regular site inspection reports, which are to be prepared by the Contractor's Environmental Officer (EO).
- Checking the EO's *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken.
- Checking the EO's *public complaints register* in which all complaints are recorded, as well as action taken.
- Issuing of site instructions to the Contractor for corrective actions required.
- Assisting in the resolution of conflicts.
- Communication of all modifications to the EMP to the relevant stakeholders.
- Conducting regular audits to ensure that the system for implementing the EMP is operating effectively.

11.2.3 CONTRACTOR

The Contractor should appoint a **Contractor's Representative**, who is responsible for the on-site implementation of the EMP and EA. The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. The Contractor's Representative ensures that all Sub-contractors working under the Contractor abide by the requirements of the EMP.

The Contractor is answerable to the Project Manager (PM) for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria.

The Contractor will be required to provide the following **Method Statements,** setting out in detail how the management actions contained in an EMP and EA will be implemented in order to ensure that the environmental management objectives are achieved. The Method Statements must be reviewed and approved by the Project Proponent.

> Stockpiles

> Excavation stabilisation

> Oil and chemicals

> Cement

> Storage of fuel and oils

> Use of dangerous and toxic materials

> Toilets and ablution facilities

> Waste Management

> Dust

> Workshop equipment, maintenance and storage

> Noise

> Fires

> Erosion and sedimentation

> Flora and Fauna (Including no-go areas)

> Crime, safety and security

> Hydrology

The Contractor may appoint an **Environmental Officer (EO)**, or officers, if more than one is required. Their primary role is to coordinate the environmental management activities of the Contractor on site. The EO may be required to perform the following roles:

- Support the ECO in the monitoring and execution of the Contractors or Sub-contractors' Method Statements by maintaining a permanent presence on site.
- Inspect the site as required to ensure adherence to the management actions of the EMP, EA and the Method Statements.
- Complete Site Inspection Forms on a regular basis (eg. daily or weekly).
- Provide inputs to the regular (eg. monthly) environment report to be prepared by the ECO.
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMP and EA.
- Maintain a *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken, for submission to the Project Proponent.
- Maintain a *public complaints register* in which all complaints are recorded, as well as action taken, for submission to the Project Proponent.

11.3 CHECKLISTS

The table below provide the main mitigation measures and/or management interventions to minimise or reduce the negative impacts and enhance positive impacts identified by the specialists associated with the proposed development.

The intent is for the document to be a live, dynamic document that should be maintained and updated throughout the project lifecycle, *inter alia*, by including the necessary Environmental Authorisation from the approving Authority as an attachment.

The table below provide the main mitigation measures and/or management interventions appropriate to the project. The tables present the objectives to be achieved and the management actions that need to be implemented in order to reduce the negative impacts and enhance the positive impacts per management activity. The associated monitoring and implementation frequencies and the responsible person(s) are indicated.

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
1. Construction and operational activities planning	The construction/operational activities must conform to the conditions of authorisation contained in the signed Registration from DEDEAT in terms of NEM.WA and mitigation measures contained within this EMPr	Proponent	Continuous
2. Appointment of the ECO	The Proponent must appoint an independent Environmental Control Officer (ECO) who must monitor the Contractor's compliance with the EMPr and who must complete ECO checklist reports (audits) on a regular basis (at least once a month).	Proponent	Once-off
	The Proponent must provide the ECO with a copy of the EMPr.	ECO	Once-off
	The ECO must form part of the project management team and should attend the monthly project progress meetings.	ECO	Continuous
	The Contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor	Once-off
3. EMPr	This EMPr must be made binding to the main Contractor and to individual Contractors, and must be included in the tender documentation for the construction contract.	Proponent	Once-off
4. Licences/ permits and permissions	The Proponent must ensure that all pertinent licences/permits, certificates and permissions required for the project have been obtained prior to any activities commencing on site and ensure that they are strictly enforced/adhered to. These documents must be made available on site at all times, and the Contractor must be made aware of their content.	Contractor, Proponent, ECO	Prior to commencement of work
	The Contractor must maintain a database of all pertinent permits and permissions required for the contract.	Contractor, Proponent, ECO	Continuous
5. Method Statements	The Contractor must submit written Method Statements to the PM and ECO for the activities identified during consultation.	Contractor, PM, ECO	As required
	Method Statements must be submitted at least five working days prior to the proposed commencement of work on an activity to allow the PM (and/or ECO) time to study and approve the method statement.	Contractor, PM, ECO	As required
	The Contractor may not commence work on that activity until such time as the Method Statement has been approved in writing.	Contractor, PM, ECO	Continuous
	The Contractor must carry out the activities in accordance with the approved Method Statement.	Contractor, PM, ECO	Continuous

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Under certain circumstances, the PM may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the PM, and appropriate records retained.	Contractor, PM, ECO	Continuous
	Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his/her obligations or responsibilities in terms of the EMPr specifications.	Contractor, Proponent	Continuous
6. Environmental incidents	The Contractor must take timeous corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves. The Contractor must adhere to any time limits for such corrective actions that may be stipulated by the ECO in consultation with the PM.	ECO, Contractor	Continuous
7. Labour	Local labour must be used wherever possible to stimulate the local economy.	Contractor	Once-off
	The Contractor should use labour intensive construction measures where appropriate, practical and financially feasible.	Contractor	Once-off
	The workforce should be trained to benefit individuals beyond the completion of the project.	Contractor	Once-off
	The Contractor should use local suppliers where possible.	Contractor	Once-off
	The PM must ensure that all staff working on the project must be in possession of a South African Identity Document or a relevant work permit. A register must be kept on site of all staff working on site.	PM	Continuous
	Equal opportunities for employment should be created to ensure that all sectors of society (especially women) have equal access to such opportunities.	Contractor	Continuous
8. Training of staff	The Contractor must ensure that all construction staff receive environmental awareness training concerning, amongst others, the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts, protection of any animals encountered on site, no-go areas, the use of toilets and basic sanitation, and basic health and safety on site.	Contractor, ECO	Once-off
	It is the Contractor's responsibility to provide the site foreman with environmental training (including explaining the content of the EMPr and any Conditions of Approval) and is to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.	Contractor, ECO	Once-off
	Training must be provided to the staff members in the use of the appropriate fire-fighting equipment.	Contractor, Health and Safety Officer	Once-off
	The Contractor must ensure that all staff operating machinery/construction vehicles are adequately trained to carry out the designated tasks.	Contractor, Health and Safety Officer	Once-off
9. Worker health and safety	A Health and Safety Plan must be developed and implemented by the Contractor for the construction period to ensure worker safety. Should any injury be obtained as a result of work the Contractor must ensure the necessary medical attention is received. The necessary Health and Safety file and incident register must be kept on site at all times.	Contractor, Health and Safety Officer	Continuous

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
10. Site access & traffic management	Vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.	Contractor ECO	Continuous
11. Vegetation clearing	Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.	Proponent Contractor ECO	Once-off
12. Topsoil & subsoil management	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site. The topsoil must be adequately protected from being blown away or eroded by storm water. Removed subsoil should be stockpiled separately from topsoil. Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site	Contractor ECO	Continuous
13. Excavations & earthworks	Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as there is always the potential to inflict damage to sensitive areas. Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum. Machinery must enter and exit the site via the indicated access roads, and may not enter/ exit the river channel at any other location. Excavations and earth-moving may only take place within the demarcated working area	Contractor ECO	Continuous
14. Groundwater contamination	Ensure vehicles are serviced and refuelled in bunded areas	Contractor	Continuous
	Ensure vehicles are checked weekly for faults and serviced timeously if faulty	Contractor	As required
	Should any leaks occur ensure contaminated soil is dug up to 1 cm below the level of visible contamination and disposed of as hazardous waste	Contractor	As required
	Drip trays should be placed under all vehicles remaining stationary for more than 24 hours	Contractor	Continuous
15. Noise	Limit construction activities to normal working hours	Contractor	Continuous
	Coincide any excessively noisy activities to minimise duration of inconvenience	Contractor	As required
	Ensure noise standards are complied with and that construction staff are provided with personal protective equipment when undertaking noisy operations	Contractor	Continuous
16. Safety	No children on construction site. Safety fence and controlled access should be enforced Safety signs with necessary information displayed	Proponent Contractor ECO	Continuous
17. Stockpiles	Soil stockpiles must not be situated within 50m of any water course.	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	Contractor, ECO	Monthly
	Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding.	Contractor, ECO	Monthly
	Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal method. Proof from an applicable waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur must be provided to the ECO upon request.	Contractor, ECO	Monthly
	Stockpiles must not exceed 2m in height unless otherwise permitted by the PM and / or ECO.	Contractor, ECO	Monthly
18. Erosion control	Wind screening and stormwater control must be undertaken where required by the ECO to prevent soil loss from the site.	Contractor, ECO	Twice monthly
	The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion, if required by the ECO.	Contractor, ECO	Twice monthly
	Other erosion control measures that can be implemented are as follows: • Brush packing with cleared vegetation; • Mulch or chip packing; • Planting of vegetation; and • Hydro-seeding / hand sowing.	Contractor, ECO	
	Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.	Contractor, ECO	Twice monthly
	All erosion control mechanisms need to be regularly maintained.	Contractor, ECO	Twice monthly
	Re-vegetation of disturbed surfaces must occur as soon as possible after construction activities are completed.	Contractor, ECO	Twice monthly
	No impediment to the natural water flow o site other than approved erosion control or rehabilitation works is permitted.	Contractor, ECO	Twice monthly
	Stockpiles not used in three (3) months after stripping should be seeded to prevent dust and erosion, as advised by the ECO	Contractor, ECO	Twice monthly
19. Hazardous materials	Use and or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled.	Contractor, ECO	Monthly
	Any hazardous substances must be stored at least 50m from any of the watercourses on site in a bunded area.	Contractor, ECO	Monthly
	The Contractor must ensure that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. Such materials may also be temporarily stored on drip-trays.	Contractor, ECO	Monthly
	Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material. Such bunded areas must be regularly emptied of accumulated rainwater. Wastewater from such emptying, if contaminated, must be disposed at an appropriately licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	In the event of a spill, the Contractor must take prompt action to clear polluted areas and prevent spreading of the pollutants.	Contractor, ECO	As required

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	The Contractor will be liable to arrange for professional service providers to clear affected areas, if required.		
	Proper facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater. These pollution prevention measures for storage must include a bunded containment area with a wall high enough to contain at least 110% of any stored volume. This containment area must be sited at least 50m away from any drainage line, in a site approved by the ECO.	Contractor, ECO	Monthly
	Cement storage and batching must only take place in a bunded area, and any runoff		
	Any spillage, which may occur, must be investigated and immediate action must be taken. This must be reported to the ECO and to the relevant authorities if so required by the ECO.	Contractor, ECO	As required
20. Cement and concrete batching	Concrete must not be mixed on the ground, but in a bunded area with any runoff captured for disposal as hazardous wastewater.	Contractor, ECO	Continuous
	The batching area is to be located in an area of low environmental sensitivity, as approved by the ECO.	Contractor, ECO	Once-off
	Cement bags must only be stored in a covered, bunded area and not directly on the ground. Used cement bags must be disposed of as hazardous waste.	Contractor, ECO	Weekly
21. Hydrology and stormwater	Silt fences must be used where required by the ECO to remove any suspended silt from stormwater before it enters the stormwater system.	Contractor, ECO	Monthly
	Temporary cut-off drains and berms must be used where necessary to capture stormwater and promote infiltration.	Contractor, ECO	Monthly
	Stormwater and surface water must be diverted away from excavation trenches, and care must be taken to avoid surface stormwater from the site running into the seasonal pan on the site.	Contractor, ECO	Monthly
	No rubble, litter or sand may be deposited into any freshwater systems or water courses.	Contractor, ECO	Monthly
22. General materials handling, use and storage	Choice of location for storage areas must take into account prevailing winds, distances to the seasonal watercourses (50m minimum), general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	Contractor, ECO, Health and Safety Officer	Once-off
	Storage areas must be designated, demarcated and fenced. Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by unauthorised persons. Fire prevention facilities must be present at all storage facilities.	Contractor, ECO	Monthly
	Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible, the available MSDSs should include information on ecological impacts and measures to minimise negative environmental impacts during accidental spills.	Contractor, ECO, Health and Safety Officer	Once-off, as required
	Clear signage must be placed at all storage areas containing hazardous substances / materials.	Contractor, ECO, Health and Safety Officer	Once-off
	The Contractor must be responsible for the training and education of all personnel on site who will be handling the hazardous material about its proper use, handling and disposal. The Contractor must ensure that information on the management of spill and accidental ingestion is kept on site. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.	Contractor, Health and Safety Officer	Once-off

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	The provisions of the Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practice must be adhered to. This applies to solvents and other chemicals possibly used in the construction time.	Contractor, Health and Safety Officer	Continuous
	The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.	Contractor, Health and Safety Officer	Continuous
	All excess cement and concrete mixes must be contained on the construction site prior to disposal off site.	Contractor, ECO	Monthly
	Hazardous substances must be stored at least 50m away from any water bodies on site to avoid pollution.	Contractor, ECO	Monthly
23. Fuel storage	Topsoil and subsoil to be protected from contamination.	Contractor, ECO	Monthly
	Fuel and material storage must be away from stockpiles on site in appropriate containers in a bunded area.	Contractor, ECO	Twice monthly
	Chemicals must be mixed on an impermeable surface and provisions must be made to contain spillages or overflows into the soil.	Contractor, ECO	Monthly
	Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Drip trays may be used for temporary storage of such materials.	Contractor, ECO	Monthly
	Contaminated soil must be contained and disposed of off-site at an approved hazardous waste disposal site.	Contractor, ECO	Monthly
24. Transportation	Material must be appropriately secured to ensure safe passage between destinations during transportation. Loads must have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor must be responsible for any clean-up resulting from the failure by his employees or suppliers to property secure transported materials.	Contractor, ECO, Health and Safety Officer	Monthly
25. General waste management	Litter generated by the construction crew must be separated on site into general waste and recyclables and collected in covered rubbish bins. General waste is to be removed to a licenced landfill site on a weekly basis and recyclables must be taken to a recycling centre monthly.	Contractor, ECO	Weekly/ Monthly
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires shall be allowed on site, unless in designated areas approved by the PM and by the ECO or by the Health and Safety Officer.	Contractor, ECO, PM, Health and Safety Officer	Monthly
	The Contractor must supply waste bins/skips throughout the site at locations where construction personnel are working. The bins must be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof to deter animals that may be attracted to the waste. The Contractor must ensure that all personnel immediately deposit all waste in the waste bins for removal by the Contractor. Bins must be emptied on a weekly basis and the waste removed to the construction camp where it must be properly contained in scavenger, water and windproof containers until disposed of. The bins must not be used for any purposes other than waste collection.	Contractor, ECO	Monthly
	Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders waste generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project.	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled.	Contractor, ECO	Monthly
26. Hazardous waste management	The waste, resulting from the use of hazardous materials, must be disposed of at a registered hazardous waste disposal site by a certified waste disposal Contractor as approved by the ECO. A disposal certificate must be obtained from the disposal Contractor.	Contractor, ECO	As required
	Staff must be trained in the identification of hazardous waste.	Contractor, ECO	As required
	Temporary storage and disposal of hazardous waste is regulated by legislation which must be complied with, i.e. the Occupational Health and Safety Act.	Contractor, ECO	Monthly
27. Noise	The Contractor must aim to adhere to the relevant noise regulations and limit noise to within standard working hours.	Contractor, ECO	Monthly
	Construction site camp and other noisy facilities must be located well away from noise sensitive neighbours.	Contractor, ECO	Once-off
	Truck traffic must be routed away from noise sensitive areas, where possible.	Contractor, ECO	As required
	All noise and sounds generated must adhere to SABS 0103 specifications for maximum allowable noise levels for residential areas. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies.	Contractor, ECO	Monthly
	Noisy operations must be combined so that they occur where possible at the same time.	Contractor, ECO	Monthly
	Construction activities must be contained to reasonable working hours. Night-time activities near noise sensitive receptors must not be allowed.	Contractor, ECO	Monthly
	With regard to unavoidable noisy construction activities, the Contractor must liaise with local residents to inform them of such events.	Contractor	As required
	As construction workers operate in a noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). Where necessary, ear protection gear must be worn.	Contractor, ECO, Health and Safety Officer	Monthly
	Noise suppression measures must be applied to all construction equipment where required. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.	Contractor, ECO, Health and Safety Officer	Monthly
28. Worker health and safety	Safety measures, work procedures and first aid must be implemented on site.	Contractor, , Health and Safety Officer	Monthly
	A Health and Safety Plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up to ensure worker safety.	Contractor, Health and Safety Officer	Once-off
	Workers must be thoroughly trained in using potentially dangerous equipment.	Contractor, Health and Safety Officer	As required
	Contractors must ensure that all equipment is maintained in a safe operating condition.	Contractor	Monthly
	A safety officer must be appointed.	Contractor	Once-off
	A record of health and safety incidents must be kept on site.	Contractor, , Health and Safety Officer	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Any health and safety incidents must be reported to the project manager immediately.	Contractor, , Health and Safety Officer	As required
	First aid facilities must be available on site at all times. All incidents requiring first aid occurring on site must be recorded in the incidents book on site.	Contractor, , Health and Safety Officer	Monthly
	A record must be kept of medication administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Contractor.	Contractor, , Health and Safety Officer	Monthly
	Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Contractor, ECO, Health and Safety Officer	Monthly
29. Personal Protective Equipment	Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc.	Contractor, ECO, Health and Safety Officer	Monthly
	No person is to enter the portion of the site where construction activities are being undertaken without the necessary PPE.	Contractor, ECO, Health and Safety Officer	Monthly
	SABS Standards and specifications governing dangerous processes such as welding must be strictly applied, with a view to proper protection of the public and workers.	Contractor, ECO, Health and Safety Officer	As required
30. Fauna and Flora	Implement the eradication programme for invasive species in terms of the Conservation of Agricultural Resources Act (Act No. 43 of 1983).	Contractor, ECO	Monthly
	Institute the rehabilitation of areas as soon as construction activity allows it.	Contractor, ECO	As required
	No disturbance, capture or injury of any fauna will be permitted. Should any fauna be found on site it must be removed from site by the ECO or a suitably qualified person.	Contractor, ECO	Continuous

12. MONITORING, AUDITING AND REPORTING

The Applicant ***De Heus (PTY) Ltd*** is responsible for ensuring that all environmental management measures prescribed in this EMPr, as well as any other conditions specified by the relevant authorities, are implemented and adhered to during all phases of the proposed development. The Applicant may delegate the responsibilities for implementing the requirements to other persons/entities, however the Applicant remains responsible for ensuring that the delegated responsibilities are carried out.

It is the responsibility of the project team or their delegate to ensure that regular monitoring of environmental issues addressed in this management plan is undertaken. The applicant is responsible for the monitoring of the infrastructure.

(1) The site must be inspected by the facility operators or employees on a daily basis to ensure early detections and addressing of environmental pollution and weekly reports consolidating the daily inspections' findings should be kept on site.

(2) Compost heap temperature that is high enough to destroy pathogens for the applicable composting method must be maintained and monitored for a time period required for such composting method.

(3) The national, provincial and local authorities must be given access to audit or inspect the facility at any time and at such frequency as the authority may decide.

(4) The audit or inspection reports drafted by the environmental authority must be made available to the facility operator within sixty (60) days of the audit or inspection.

(5) The composting facility manager must, during the audit or inspection, make any records or documentation available to the audit or inspection team as may be required.

(6) Safe disposal certificates for hazardous waste removed from facility must be kept on record for a minimum period of five (5) years.

(7) A record of any finding of non-compliance by the environmental authority and how such non-compliances were addressed must be kept in a file and produced upon request by any relevant competent authority.

(8) Internal audits detailing environmental performance of the facility must be conducted every twelve (12) months by the composting facility and official reports thereof must be prepared. Each of the internal audit findings must be made available to the external auditor referred to in sub-paragraph below and to the environmental authority upon request. Audit reports must be in the format specified by the provincial authority.

(9) The composting facility must ensure that external audits of the facility are conducted every twenty four (24) months by an independent auditor and the auditor must prepare an official audit report documenting the audit findings.

(10) The external audit report must be submitted to the provincial authority upon request and must include, but not limited to the following:

(a) An indication of compliance of the facility with these Norms and Standards and the composting facility's environmental management programme as approved by the provincial authority;

(b) An indication of compliance with any specific requirements issued by the relevant authority either at national, provincial or local sphere of government;

(c) An indication of any major environmental incidents or non-compliance that occurred and details of the manner the incidents or non-compliance were addressed;

(d) An indication of the presence of records of safe disposal certificates for all hazardous and general waste removed from the facility; and

(e) An indication if hazardous waste is separated from general waste and that such waste is removed by a registered waste handling company for either recycling or disposal at licensed disposal facility.