

DRAFT ENVIRONMENTAL MANAGEMENT PLAN

**Proposed cultivation of 135 ha virgin soil for the
establishment of 14 Seed Potato Farming Pivots and
associated water pipelines on the Remaining Extent of
the Farm Reliance No. 347 near Griekwastad, Northern
Cape Province**

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DEFINITIONS AND TERMINOLOGY

Alternatives	Different mechanisms for achieving the general purpose and need of the proposed activity or development. Alternatives may be in terms of location, activity, processes, timing, or “do nothing” (i.e. “no-go” option).
Assessment	The evaluation, judgement, organising, rating, interpreting and communicating information which is relevant.
Biota	The animal and plant life of a particular region, habitat or ecosystem.
Construction activity	Any action taken by the Contractor, his subcontractors, suppliers or personnel in undertaking the construction work, otherwise referred to as “Works”
Construction area(s)	All areas used by the Contractor in order to carry out the required construction activities. This includes all offices, accommodation facilities, testing facilities / laboratories, batching areas, storage & stockpiling areas, workshops, spoiling areas, access roads, traffic accommodation (e.g. bypasses), etc.
Applicant/Employer	The person applying for Environmental Authorisation or carrying out the activity. The person or legal entity that has made application to the competent authority for environmental authorizations and who will have the overall responsibility to adhere to the relevant legislation and comply with the environmental authorization.
Ecosystem	A biological community of interacting organisms (plants and animals) and their physical environment.
Endangered species	A species of plant or animal which has been categorised by the International Union for Conservation of Nature (IUCN) Red Data List as likely to become extinct.
Endemic	A plant or animal species that is native or restricted to a certain area or range.
Environment	The surroundings within which humans exist and that are made up of – <ul style="list-style-type: none">• land, water and atmosphere;• micro-organisms, plant and animal life;• any part or combination of the above and the interrelationships among and between them;

	<ul style="list-style-type: none"> • the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Authorisation	The permission required from the competent authority for an activity as listed according to the NEMA regulations.
Environmental Impact	Any change to the environment, whether desirable or undesirable, that would result directly or indirectly from any construction activity.
Environmental Management	Ensuring that environmental concerns are included in all stages of development in order to ensure that the proposed activity or development is done in a sustainable manner and does not exceed the carrying capacity of the surrounding local environment.
Hazardous material / substances	Any waste that contains organic or inorganic elements or compounds, that may, owing to its inherent physical, chemical or toxicological characteristics, have a detrimental impact on health and the environment.
Indigenous	A “native” species of plant or animal that occurs naturally in a particular place or region, and was not artificially or intentionally introduced.
Invasive Alien Plants	All undesirable vegetation, defined as but not limited to, all declared category 1 and category 2 plants in terms of the National Environmental Management: Biodiversity Act 2014 (Act 10 of 2004), as amended.
Local Authority	Otherwise referred to as the “Council” – the local municipal authority that operates or is responsible in said area.
Rehabilitation	Returning an area impacted by activities/works to its original or better condition prior to the impacts from the activities/works having occurred.
Significant impact	An impact that may, but its magnitude, duration, intensity, or probability, have a notable effect on one or more aspects of the environment.

ABREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DEA	Department of Environmental Affairs
DW&S	Department of Water & Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP/EMPr	Environmental Management Programme
ER	Employer's Representative
ESA	Ecological Support Area
SAHRA	South African Heritage Association
I&AP	Interested and Affected Party
IAP	Invasive Alien Plants (please see definition above)
MS	Method Statement
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act (Act No. 107 of 1998) as amended
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:WA	National Environmental Management Waste Act (Act No. 59 of 2008), as amended
NHRA	National Heritage Resources Act (Act No. 25 of 1998)
NWA	National Water Act (Act 36 of 1998), as amended
PPC&E	Personal Protective Clothing and Equipment
SDF	Spatial Development Framework
RDB	Red Data Book
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute

WULA

Water Use Licence Application - in terms of the National Water Act 1998 (Act 36 of 1998)

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1. INTRODUCTION

The company Secundis Beleggings (Pty) Ltd. is proposing to commence with the process of procuring the Remaining Extent of the Farm Reliance No. 347 near the town of Griekwastad in the Northern Cape Province (135ha). The reason for the intended procurement is for establishing fourteen (14) seed potato farming pivots on the farm of natural previously uncultivated land.

The Environmental Management Plan aims to present management measures that will eliminate, offset or reduce adverse environmental impacts, as well as to provide a framework for environmental monitoring. The primary purpose of the Environmental Management Plan is to ensure that negative environmental impacts of the project are effectively managed within acceptable limits and that the positive impacts are enhanced. In order to give full effect to the Environmental Management Plan, it must form part of the contractual agreement between the relevant contractor(s) and the developer.

1.1 Legislative requirements

Regulation 19(4) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2017 provides the content requirements for Environmental Management Programmes. The table below lists the relevant requirements, indicates whether the relevant information is included in this report or not, and provides cross-references as to where the relevant information can be found in this report.

Table 1: EMP Requirements and content

Reg.	EMPr Content	Included (Yes, No or N/A)	Report Section Reference
(a)	(1) An EMPr must comply with section 24N of the Act and include- (a) details of - (i) the EAP who prepared the EMPr; and	Yes	Chapter 2
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Yes	Chapter 2
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Yes	Chapter 9
(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;	Yes	Chapter 3
(d)	a description 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 for all phases of the development including-	Yes	Chapter 9
	(i) planning and design;	Yes	Chapter 9
	(ii) pre-construction and construction activities;	Yes	Chapter 9
	(iii) construction activities;	Yes	Chapter 9

Reg.	EMPr Content	Included (Yes, No or N/A)	Report Section Reference
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	Yes	Chapter 11
	(v) where relevant, operation activities;	Yes	Chapter 9
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Yes	Chapter 3 and 11
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Yes	Chapter 9
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Yes	Chapter 9
	(ii) comply with any prescribed environmental management standards or practices;	Yes	Chapter 9
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	Yes	Chapter 9
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Yes	Chapter 9
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Yes	Chapter 5, 6 and 9
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Yes	Chapter 9
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Yes	Chapter 9
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Yes	Chapter 9
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Yes	Chapter 9
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Yes	Chapter 9
(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	Yes	Chapter 8
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Yes	Chapter 8
(n)	any specific information that may be required by the competent authority.	N/A	

2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

The National Environmental Management Act, Act 1998 stipulates that an Independent Environmental Assessment Practitioner need to be appointed for the compilation of the Environmental Management Plan. This Environmental Management Plan was prepared by Mr. Johan Botes from Eco-Con Environmental. The sections below provide the detail of the EAP and explain the EAP's expertise to prepare this Environmental Management Plan.

2.1 Details of the EAP

Table 2: Details of the EAP

Company Name	Eco-Con Environmental (Pty) Ltd.
Individuals Name:	Mr. Johan Botes
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E-mail:	johan@eco-con.co.za
EAP Qualifications:	B.A Honours in Geography - UFS B.A Geography and Environmental Management - UFS
EAP Registrations:	IAIA`sa: 4043 SAGIC: 1032

2.2 Expertise of the EAP

The experience of the EAP can be summarised under different sub-sections as outlined below:

Project Management Experience

- Conducting of Environmental Impact Assessment Report for the proposed 45MW Meerkat Hydro Power Facility in the Northern Cape.
- Conducting of Environmental Impact Assessment Report for the proposed 150MW PV Metsimatala Solar Power Project in the Northern Cape.
- Conducting of Basic Assessment processes for the proposed Optic fibre cable installation in and around the town of Lephalale on behalf of NEOTEL.
- Conducting of Basic Assessment processes for the proposed Optic fibre cable installation in and around the town of Thohoyandou on behalf of NEOTEL.
- Conducting of Basic Assessment processes for the proposed Optic fibre cable installation in and around the town of Groblersdal on behalf of NEOTEL.
- Conducting of Basic Assessment processes for the proposed upgrading and widening of Nathen Bridge in Blomfontein on behalf of the Mangaung Metropolitan Municipality

- Conducting of Basic Assessment processes for the proposed construction of two new roads and the upgrading of one existing road in Botshabeo on behalf of the Mangaung Metropolitan Municipality.

Environmental Impact Assessment Experience

- Conducting of Environmental Impact Assessment Report for the proposed 180 hectare Cecilia Park Residential development in Bloemfontein on behalf of Mzansi Africa Civils Engineering.
- Conducting of Environmental Impact Assessment Report for the proposed construction of a steel galvanizing plant in Botshebelo, Free State Province on behalf of Bombenero Investments.
- Conducting of Environmental Impact Assessment Report for the proposed opening of 3 borrow pits and 1 gravel quarry around the Ladybrand area, Free State Province.

Basic Assessment Experience

- Conducting of Basic Assessment report for the proposed construction of the Lucas Steyn Filling station in Bloemfontein, Free State Province.
- Conducting of Basic Assessment report for the proposed construction of Gabions in the Bath River in Caledon, Western Cape Province.
- Conducting of Basic Assessment report for the proposed expansion of the Nicsha Petroleum Depot in Bloemfontein, Free State Province.
- Conducting of Basic Assessment report for the proposed Fuel Zone Petroleum Depot in Welkom, Free State Province.
- Conducting of Section 24 G Rectification application for the already established residential development on the farm Proteahof 217, Delpoortshoop, Northern Cape.
- Conducting of Basic Assessment processes for the proposed opening of 9 borrow pits around the Ladybrand area, Free State Province.
- Conducting of Basic Assessment processes for the proposed Optic fibre cable installation between Prince Albert and Oudtshoorn on behalf of NEOTEL.
- Conducting of Basic Assessment report for the proposed Nooitgedach Retirement Village in White River, Mpumalanga.
- Conducting of Basic Assessment processes for the proposed construction of 19 signalling masts in the railway reserves of Cape Town and Stellenbosch on behalf of the Passenger Rail Association of South Africa (PRASA).
- Conducting of Basic Assessment processes for the proposed construction of 1 signalling mast in the railway reserve at St James Station, Cape Town on behalf of the Passenger Rail Association of South Africa (PRASA).
- Conducting of Basic Assessment processes for the proposed construction of 1 signalling mast in the railway reserve at Clovelly Station, Cape Town on behalf of the Passenger Rail Association of South Africa (PRASA).
- Conducting of Basic Assessment processes for the proposed upgrading and widening of Nathen Bridge in Bloemfontein on behalf of the Mangaung Metropolitan Municipality.

- Conducting of Basic Assessment processes for the proposed construction of two new roads and the upgrading of one existing road in Botshabeo on behalf of the Mangaung Metropolitan Municipality.

Experience in Auditing and as an Environmental Control Officer

- Annual Environmental Audit in Terms of Section 34 of Government Notice 982 for the Mission Point Mining near Sasolburg, Free State Province.
- Environmental Gap Audit for the Meadow Meats Abattoir in Vryheid, KwaZulu-Natal.
- Environmental Gap Audit for the Meadow Meats Abattoir in Wesselbron, Free State Province.
- Environmental Control Officer (ECO) for the Mission Point Sand Mining facility near Sasolburg, Free State Province.
- Environmental Control Officer (ECO) for the Rooikraal Truck stop facility near Vrede, Free State Province.
- Environmental Control Officer (ECO) for the widening of bridge structures over the Orange River for BVi on behalf of SANRAL, near Hopetown, Northern Cape
- Environmental Control Officer (ECO) for the construction of a 2.7 km Bus route, Thaba Nchu, Free State Province.
- Environmental as an Environmental Control Officer (ECO) for the installation of optic fibre cables in and around the town of Nelspruit on behalf of NEOTEL.
- Environmental as an Environmental Control Officer (ECO) for the construction of the Khi Solar One Concentrated Solar Power facility near Upington.
- Environmental as an Environmental Control Officer (ECO) for the construction of a 132kV Substation in Bloemfontein for Dihlase Consulting Engineers.
- Environmental as an Environmental Control Officer (ECO) for the installation of optic fibre cables in and around the town of Thohoyandou on behalf of NEOTEL.
- Environmental as an Environmental Control Officer (ECO) for the installation of optic fibre cables in and around the town of Lephaale on behalf of NEOTEL.
- Environmental as an Environmental Control Officer (ECO) for the installation of optic fibre cables in and around the town of Grobersdal on behalf of NEOTEL.
- Environmental as an Environmental Control Officer (ECO) for the installation of optic fibre cables in and around the town of Kathu on behalf of NEOTEL.

Experience in Permits and Licencing

- Water Use Licence Application for the installation of carbon optic fibre cable within 32 metres of a watercourse on behalf of NEOTEL.
- Water Use Licence Application (General Authorisation) for the installation of carbon optic fibre cable within 500 metres of a wetland on behalf of NEOTEL.
- Waste Management Licence for the storage and reuse of hazardous waste water for the Bombenero Galvanizing Steel Facility in Botshabelo, Free State Province on behalf of Bombenero Investments.

Experience in Environmental Risk Assessments

- Conducting of Environmental Risk Assessment for the proposed establishment of a Diesel Depot in Welkom, Free State Province.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Groblersdal on behalf of NEOTEL.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Lephhalale on behalf of NEOTEL.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Thohoyandou on behalf of NEOTEL.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Nelspruit on behalf of NEOTEL.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Kathu on behalf of NEOTEL.
- Compiling Environmental Risk Assessment for the proposed optic fibre cable installation in and around the town of Groblersdal on behalf of NEOTEL.

Other Experience

- Compilation of Fire Management Plan for the Proposed 150MW Metsimatale CSP Facility, Postmansburg, Northern Cape.
- Calculating Financial Provisions (Quantum Calculations) for the Mission Point Mining near Sasolburg, Free State Province.
- Compilation of construction and operational phase Waste Management Plan for the proposed Cecilia Park Residential Development, Bloemfontein, Free State Province.
- Training of construction personnel and environmental advisory services for personnel of the Khi Solar One Concentrated Solar Power facility near Upington.
- GIS mapping and technical support for various projects, including the drawing of locality and sensitivity maps.
- Public participation processes and assistance to several projects.
- Compilation of Bitumen Waste Report for Penny Farthing Engineering, Venterstad, Eastern Cape.

3. PROJECT DESCRIPTION

The company Secundis Beleggings (Pty) Ltd. is proposing to commence with the process of procuring the Remaining Extent of the Farm Reliance No. 347 near the town of Griekwastad in the Northern Cape Province (135 ha). The reason for the intended procurement is for establishing fourteen (14) seed potato farming pivots on the farm of natural previously uncultivated land.

It has to be noted that the seed potato pivot planting/development follow an 8-year rotation cycle. In other words, the pivot will be planted only once every 8 years. After each season, the pivot will be rehabilitated using buffalo grass and will remain dormant/inactive for a period of 7 years, before planting will again commence on the pivot. This cycle will continue.

In order to achieve the above, the following is proposed:

Layout Alternative 1 (Preferred Alternative)

The preferred layout alternative includes the development of fourteen (14) seed potato pivots which will constitute 7 x approximate 3 ha cultivated pivot lands; 2 x approximate 9.5 ha cultivated pivot lands and 5 x approximate 19 ha cultivated pivot lands. This results in a total footprint area of approximately 135 ha in size. Six (6) of the 3 ha pivots are located towards the Eastern portion of the study area and is located east of the gravel road. The remaining pivots as per above description will all be located West of the gravel road.

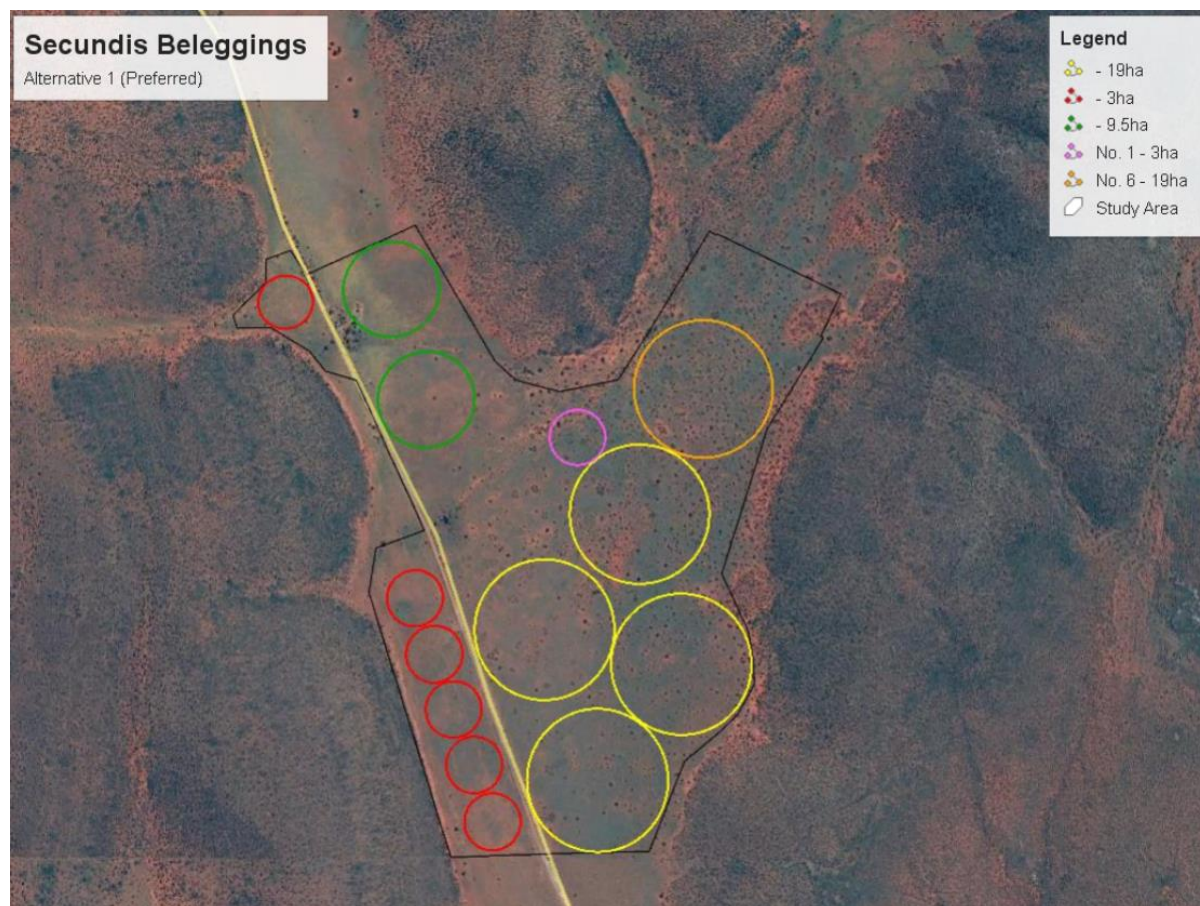


Figure 1: Preferred Layout Alternative

Layout Alternative 2

Layout Alternative two includes the development of thirteen (13) seed potato pivots which will constitute 7 x approximate 3 ha cultivated pivot lands; 2 x approximate 9.5 ha cultivated pivot lands and 4 x approximate 19 ha cultivated pivot lands. This results in a total footprint area of approximately 116 ha in size. Six (6) of the 3 ha pivots are located towards the Eastern portion of the study area and is located east of the gravel road. The remaining pivots as per above description will all be located West of the gravel road. This alternative is the same as Alternative 1 (preferred) except for the

exclusion of 1 x approximate 19 ha cultivated pivot land situated in the north-eastern corner of the assessment area.

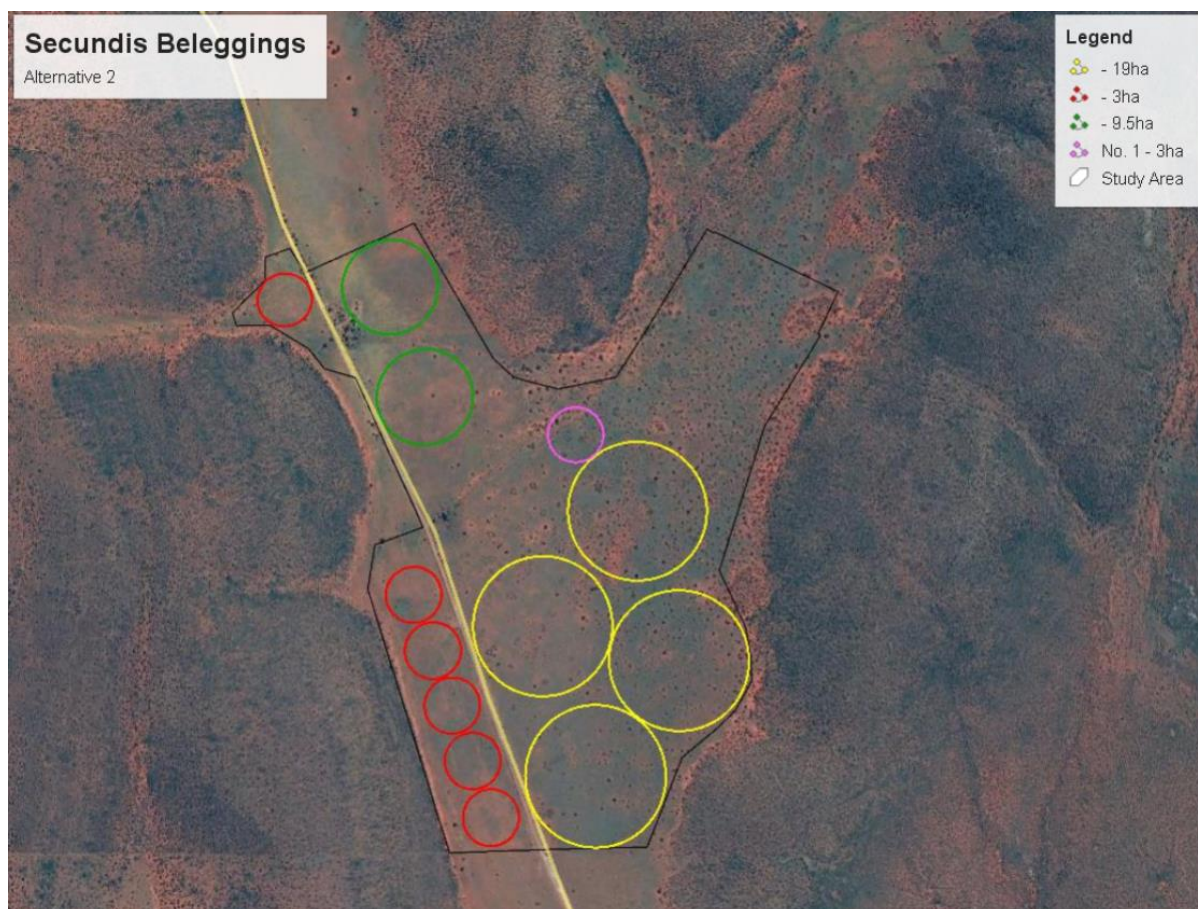


Figure 2: Secundis Beleggings Alternative 2

Seed potato farming is very labour intensive and numerous job opportunities will be created. Furthermore, seed potato farming has one of the highest value per cubic metre water (R50/m³) in comparison with wheat which is R5/m³).

Already established two track farm roads are already in place and will link up most of the pivots. In some cases, where tracks do not exist, some new two track farm road might be established.

A new water pipeline will be constructed and put in place to extract water from the already existing and approved / licensed 4 X boreholes. This will be used for the irrigation of all seed potato pivots as described in this report.

The project will entail two major aspects namely:

- The construction of a pipeline for irrigation form the existing boreholes.

- Cultivation of 135 ha seed potato pivots and some two track access roads

Construction of a pipeline for irrigation from the existing boreholes.

A new water pipeline will be constructed and put in place to extract water from the already existing and approved / licensed 4 X boreholes. This will be used for the irrigation of all seed potato pivots as described in this report.

Extraction Pump:

- The following extraction pumps will be erected at each of the already approved and licensed boreholes: 1 x 5.5kW, pump and 3 x 2.2kW pumps which will pump into a new 116 000 litre zinc dam. This borehole was drilled around 1975 and used to irrigate crops since. Water will be pumped by a centrifugal pump from the dam to the centre pivot.
- The power for the extraction pumps will be obtained from existing 100 KVA point.
- The extraction pumps will run for approximately 12 hours per day, pumping water to the amount of 95 m³ per hour (Monday to Saturday for a 3-month period).

Pipelines:

- A new 250 mm pipeline of approximately 0.8 km in length joining a 200mm pipeline of approximately 2.8km will be constructed to transport water from the zinc dam to the pivot areas. A narrow section of approximately 900mm will be cleared in order to accommodate the piping infrastructure. A trench of approximately 900 mm wide will be excavated in order to accommodate the subsurface burial of the pipeline.

On site Settling Dams:

As part of the above-mentioned pipeline and extraction pumps, the following settling dam and pumps will also be constructed on site:

- The existing boreholes will feed into an 8m zinc dam (50m² / 116m³). The co-ordinates of the dam: 28°43'53.75"S; 23°10'23.88"E. The dam level will be kept between 50% and 90% by a level sensor that automatically switches the borehole pumps on/off as required. The overflow of the dam will be directed into a natural existing drainage line.
- The dam will also be fitted with a 55 kW pump that will feed into the pipeline towards the centre pivots. Due to the long distance and high hill over which the pipeline will traverse, the pump will only deliver water at a rate of 95 m³/h and will run on average 12 hours per day (1140 m³) and will peak for about 3 weeks at 1900m³ per day. The growing season for early generation seed potatoes is from 10 January to 10 April with peak water requirements in March.
- At the dam site there will also be 2 x 5000L JoJo tanks for liquid fertilizer application through the irrigation system. These tanks will be mounted on a concrete foundation with a retainer wall (bund wall) surrounding the tanks to prevent environmental damage in case of spillages.

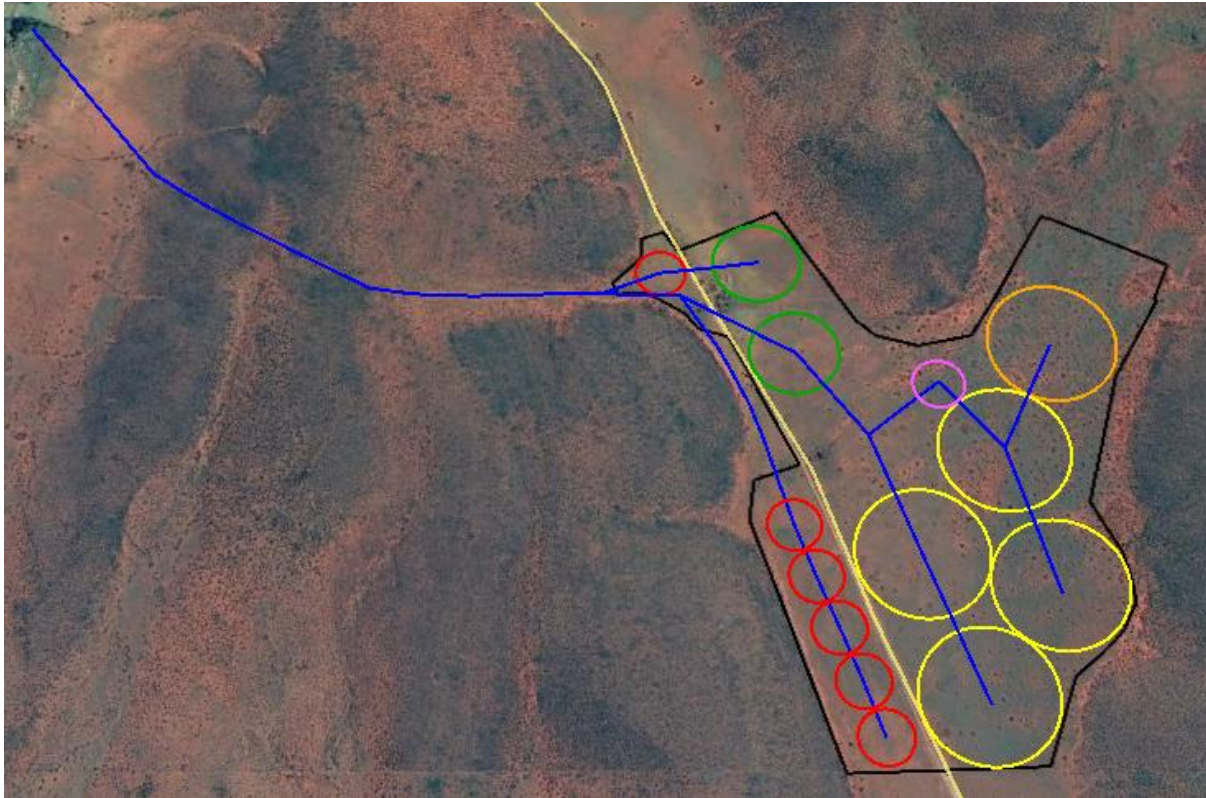


Figure 3: Proposed Pipeline Route

Cultivation of Seed potato pivot

135 ha (Fourteen (14) pivot circles) will be established on the proposed project footprint with only 19ha being cultivated per season. The other circles are establishing to dryland pasture and left fallow for 7 years.

The cultivation and planting process will work as follows:

- The area will be cleared with the use of a Bulldozer and deep-ripped with the dozer tines to breakup and aerate the soils.
- Surface rocks will be manually removed from the area.
- Soil preparation will then be conducted by cultivation with the use of a chisel plough.
- Amelioration recommendations will be obtained from a soil scientist through chemical and organic soil analyses in order to ensure the appropriate nutrients/minerals, as required for the pivots, are incorporated into the growth medium (soil) prior to planting.
- A pivot irrigation system will be constructed and implemented over the entire proposed pivot area.
- Irrigation water will be abstracted from the existing and licensed four (4) boreholes as per the allotted water use license for the farm portion.
 - See Appendix G for the water use rights documentation indicating the allowable water use.

- Planting of seed potatoes will be conducted manually through manual labour.

3.1. Project Phases

This document includes the EMP for the planning/construction phase and the operational phase of the project. Should the applicant wish to decommission the project, an additional Impact assessment with EMPr should be compiled which is in line with the NEMA listed activities.

Planning/Construction Phase

- The Planning and construction phase of the project will involve the clearance of vegetation and soil preparation for the planting season for planting seed potatoes.

Operational Phase

- The operational phase of the project will involve the continuous replanting of seed potatoes during their respective seasons, as well as the continuous maintenance of the pipeline and pivot areas.

3.2. Listed activities triggered

This proposed project triggered the following listed activities in terms of the National Environmental Management Act, 1998 and the Environmental Impact Regulation of 2017.

Table 3: NEMA Listed Activities triggered

Regulation	Activity	Description of trigger activity in proposed project
GN. R. 325 Listing Notice 2	Activity 13 The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.	Cultivation and establishment of 14 seed potato pivots of approximately 135 ha of natural vegetation.
GN. R. 325 Listing Notice 2	Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for - (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Cultivation and establishment of 14 seed potato pivots of approximately 135 ha of natural vegetation.

4. EXISTING ENVIRONMENT AND IMPACT SUMMARY

The following sections provide for a summary of impact as identified during the Impact Assessment phase and also provide for a description of the baseline environment.

4.1 Baseline Environment

The Present Ecological State (PES) of the western section of the assessment area is classified as Class B as it is largely natural. A change in natural habitats and biota has taken place in a confined area within one of the proposed cultivated pivot land footprints due to significant degradation caused by concentrated cattle grazing and resting activities but the ecosystem functionality of the larger area has remained essentially unchanged.

The Olifantshoek Plains Thornveld vegetation type (SVk 13), within which the assessment area is situated, is merely classified as least threatened by Mucina & Rutherford (2006) and the footprints of the western section of the assessment area are small relative to the surrounding natural landscape associated with the vegetation type which is vast and relatively homogenous. The entire assessment area is also merely classified as 'other natural land' in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

A total of approximately 36 shrub individuals of the nationally protected tree species *Vachellia haematoxylon* are present within the proposed five footprint areas which will need to be removed. The fact that their sizes and growth forms are mainly restricted to low shrubs (≤ 2 m) indicates the potential impact of historic farm management practices which may have induced a degree of bush encroachment of this species, rather than natural representation/distribution. This assumption therefore detracts somewhat from their significance as nationally protected species on this specific site. Only a single isolated clump of two medium sized tree individuals of the nationally protected tree species *Vachellia erioloba* were found to be present within this southern portion of the western section. They however fall closer to the footslope of the hill complex and outside the proposed five footprint areas and will be left in situ. No Red Data Listed-, or any other species of conservational significance were found to be present within the proposed cultivated pivot land footprints of the western section of the assessment area.

The mobility of smaller antelope species, burrowing mammals as well as reptiles, along with the vast, continuous surrounding natural landscape allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas. The assessment area also does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map). No important bird species, unique or specialised bird habitats were observed either.

The Ecological Importance and Sensitivity (EIS) of the western section of the assessment area is therefore merely classified as Class C (moderate) as it could be viewed as ecologically important and sensitive on local scale mainly due to the sparse presence of nationally protected tree species. Biodiversity is however still relatively ubiquitous within the broader area. The western section of the assessment area is therefore not necessarily viewed as being of high conservational significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type or protected tree species.

The Present Ecological State (PES) of the eastern section of the assessment area is classified as Class B as it is largely natural. A change in natural habitats and biota has taken place in two confined areas

due to significant degradation caused by concentrated cattle grazing and resting activities but the ecosystem functionality of the larger area has remained essentially unchanged.

The Olifantshoek Plains Thornveld vegetation type (SVk 13), within which the assessment area is situated, is merely classified as least threatened by Mucina & Rutherford (2006). The eastern section footprints of the assessment area are moderately sized relative to the surrounding natural landscape associated with the vegetation type which is vast and relatively homogenous. The entire assessment area is also merely classified as 'other natural land' in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

A total of approximately 2662 shrub and tree individuals of the nationally protected tree species *Vachellia haematoxylon* are present within the proposed footprint areas which will need to be removed. The fact that their sizes and growth forms in the grassland are mainly restricted to low shrubs (≤ 2 m) indicates the potential impact of historic farm management practices which may have induced a degree of bush encroachment of this species, rather than natural representation/distribution. This assumption therefore detracts somewhat from their significance as nationally protected species on this specific site. The tree and shrub individuals of this species within the denser woody portions are however of more conservational significance as they form part of the dense savannah in closer proximity to the woody hill complex and ESA. A single isolated clump of five medium sized tree individuals of the nationally protected tree species *Vachellia erioloba* were found to be present within the southern portion of the eastern section. They however fall on the edge of the most southerly located footprint and it is therefore recommended that they be left in situ if practically possible. Two other isolated clumps of two and five medium sized tree individuals respectively of this species were also found to be present within two of the approximate 19 ha footprints of the eastern section. They will have to be removed. A single individual of the nationally protected tree species *Boscia albitrunca* was found to be present on the edge of the additional footprint associated with Alternative 1 (preferred) which must be left in situ. With the exception of the single individual of the provincially protected species *Boophone disticha*, no Red Data Listed-, or any other species of conservational significance were found to be present within the proposed cultivated pivot land footprints of the eastern section of the assessment area.

The mobility of smaller antelope species, burrowing mammals as well as reptiles, along with the vast, continuous surrounding natural landscape allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas. The assessment area also does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (www.birdlife.org.za/conservation/important_bird_areas/iba-map). No important bird species, unique or specialised bird habitats were observed either. The denser woody areas of the eastern section of the assessment area along with the hill complex are however utilised by various larger antelope species such as Kudu as well as other mammal and bird species as refuge and for breeding/persistence purposes. Although a portion of these denser woody areas will be transformed by the proposed development, the hill complex and ESA will remain intact and should provide sufficient remaining ecological connectivity and functionality. It is recommended that a sufficient corridor must be buffered out around the footslope of the hill complex if practicably possible in order

to ensure continued ecological connectivity and functionality of the adjacent ESA and to allow for movement of fauna and flora through the broader area.

The Ecological Importance and Sensitivity (EIS) of the eastern section of the assessment area is therefore classified as Class C (moderate) as it could be viewed as ecologically important and sensitive on provincial scale mainly due to the significant presence of nationally protected tree species within the denser woody areas. Biodiversity is however still relatively ubiquitous within the broader area. The denser woody areas within the eastern section of the assessment area are however viewed as being of moderate conservational significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA and protected tree species.

4.2 Summary of Impacts

Below is a summary of impact evaluated during the Impact Assessment process:

Construction Phase Impacts:

PLANNING, DESIGN AND CONSTRUCTION PHASE					
Potential Flora Impacts:					
Nature of impact: Direct impact on Flora as a result of the transformation of terrestrial vegetation on the assessment area associated with the Olifantshoek Plains Thornveld vegetation type (SVk 13).				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Direct impact on Flora as a result of the destruction/damage to Red Data Listed, nationally or provincially protected species individuals associated with the Olifantshoek Plains Thornveld vegetation type (SVk 13)				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium-high (MH)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Direct impact on Flora as a result of alien invasive species establishment				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)

Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Avifauna Impacts:					
Nature of impact: Direct impact on other avifaunal species as a result of vegetation clearance transforming the breeding habitat			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium-high (MH)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Direct impact on other avifaunal species as a result of vegetation clearance transforming the foraging area			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Potential Fauna Impacts:					
Nature of impact: Direct impact on other faunal species as a result of vegetation clearance transforming the breeding habitat			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium-high (MH)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Direct impact on other faunal species as a result of vegetation clearance transforming the foraging area			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Low (L)
Potential Dust Impacts:					
Nature of impact: Dust nuisance generated during the development / preparation of the pivots.			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Low (L)	Medium (M)	Low (L)	Low (L)

Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Noise Impacts:					
Nature of impact: Noise nuisance generated during the development / preparation of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Cultural and Heritage Impacts:					
Nature of impact: Damage and destruction of vertebrate fossils during excavation activities.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Surface and Groundwater Contamination Impacts:					
Nature of impact: Surface and Groundwater Contamination during the development / preparation of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Impeding and contamination of the surface water catchment and drainage area towards the south				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Waste Management Impacts:					
Nature of impact: Waste impacts by means of waste storage and littering during the development / preparation of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	

Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Traffic Impacts:					
Nature of impact: Traffic impacts by means of additional truck and transportation to and from site during the development / preparation of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Fire Risk Impacts:					
Nature of impact: Increase risk of fires during the development / preparation of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Medium (M)
Potential Soil Contamination Impacts:					
Nature of impact: Increased Soil contamination by means of hazardous substances.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Soil Erosion Impacts:					
Nature of impact: Increased Soil erosion due to construction activities.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Visual Impacts:					
Nature of impact: Increased visual impact due to increased working activities on-site.				Activity: Proposed development of seed potato pivots	
	Preferred Layout Alternative		Layout Alternative 2		

Evaluation Component:	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	No-Go Alternative
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Socio-Economic Impacts:					
Nature of impact: Increased socio-economic conditions due to job creation				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	+ Medium (M)	+ Medium-high (MH)	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	+ Medium (M)	+ Medium (M)	Medium (M)

Operational Phase Impacts:

OPERATIONAL PHASE					
Potential Flora Impacts:					
Nature of impact: Direct impact on flora as a result of Alien invasive species establishment				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Low (L)	Medium (M)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Impeding of the ecological connectivity and functionality of the broader remaining natural area				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Low (L)	Medium (M)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Fauna and Avifauna Impacts:					
Nature of impact: Continuous impact on Fauna as a result of cleared vegetation / habitat loss.				Activity: Proposed development of seed potato pivots	
	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative

Evaluation Component:	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Dust Impacts:					
Nature of impact: Dust nuisance generated during the operational phase of the project.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Low (L)	Medium (M)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Noise Impacts:					
Nature of impact: Noise nuisance generated during the operational phase of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Cultural and Heritage Impacts:					
Nature of impact: Damage and destruction of vertebrate fossils during the operational phase.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Surface and Groundwater Contamination Impacts:					
Nature of impact: Surface and Groundwater Contamination during the operational phase by means of fertilizer and/or any other hazardous substances or pesticides.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)

Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Nature of impact: Impeding and contamination of the surface water catchment and drainage area towards the south			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Waste Management Impacts:					
Nature of impact: Waste impacts by means of waste storage and littering during the operational phase of the pivots.			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Traffic Impacts:					
Nature of impact: Traffic impacts by means of additional truck and transportation to and from site during the operational phase of the pivots.			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Fire Risk Impacts:					
Nature of impact: Increase risk of fires during the operational phase of the pivots.			Activity: Proposed development of seed potato pivots		
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Medium (M)
Potential Soil Contamination Impacts:					
Nature of impact: Increased Soil contamination by means of hazardous substances.			Activity: Proposed development of seed potato pivots		

Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Soil Erosion Impacts:					
Nature of impact: Increased Soil erosion due to operational activities.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Medium (M)
Potential Visual Impacts:					
Nature of impact: Increased visual impact due to increased working activities during the operational phase.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Water Usage Impacts:					
Nature of impact: Impact on water usage due to over extraction from groundwater.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Medium (M)	Low (L)	Medium (M)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Socio-Economic Impacts:					
Nature of impact: Increased socio-economic conditions due to job creation				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	

Significance rating:	+ Medium (M)	+ Medium-high (MH)	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	+ Medium (M)	+ Medium (M)	Medium (M)

Decommissioning Phase Impacts:

DECOMMISSION PHASE					
Potential Dust Impacts:					
Nature of impact: Dust nuisance generated during the decommissioning phase of the project.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Surface and Groundwater Contamination Impacts:					
Nature of impact: Surface and Groundwater Contamination during the decommissioning phase by means of fertilizer and/or any other hazardous substances or pesticides.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Waste Management Impacts:					
Nature of impact: Waste impacts by means of waste storage and littering during the decommissions phase of the pivots.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Soil Contamination Impacts:					
Nature of impact: Increased Soil contamination by means of hazardous substances.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)

Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Potential Soil Erosion Impacts:					
Nature of impact: Increased Soil erosion due to decommissioning activities.				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)	Medium (M)	Medium (M)
Potential Socio-Economic Impacts:					
Nature of impact: Increased socio-economic conditions due to job loss				Activity: Proposed development of seed potato pivots	
Evaluation Component:	Preferred Layout Alternative		Layout Alternative 2		No-Go Alternative
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	
Significance rating:	Low (L)	Low (L)	Low (L)	Low (L)	+ Medium (M)
Cumulative impact:	Low (L)	Low (L)	Low (L)	Low (L)	+ Medium (M)

5. PERSONS RESPONSIBLE FOR IMPLEMENTING THE EMP

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase.

The following stakeholders will be involved with the EMP either during the construction phase, operational phase or both.

5.1 Competent Authority: DENC

DENC is the Northern Cape competent authority responsible for issuing environmental authorisations in term of NEMA, NEM:WA, NEM:BA. This Directorate has overall responsibility for ensuring that the Applicant complies with the conditions of its environmental authorisation as well as this EMP once approved.

During the operational and decommissioning phases of the EMP the lead authority will have the following role to play:

- Conduct ad hoc compliance inspections.
- Read the ECO's performance reports and take action as deemed necessary.
- Whenever necessary, the authorities are to provide assistance in understanding and meeting the specified requirements.

- Ensure and timeously recommend suitable corrective measures are undertaken by the Applicant/ER where the applicant has reported non-compliance or when an audit report is received indicating any non-compliance
- Enforcing compliance by the Applicant

5.2 Applicant

Under South African environmental legislation, the Applicant is accountable for the potential impacts of the activities that are undertaken and is responsible for managing these impacts, both in the construction and operational phases. The Applicant therefore has overall and total environmental responsibility to ensure that the EMPr is implemented and that both the EMPr and the EA are complied with at all times. The Applicant is also responsible for ensuring that all other environmental and water related legislation is complied with.

The Applicant is responsible for the development and implementation of the conditions of the Environmental Authorisation in terms of the planning and design of the development and construction thereof.

The Applicant remains fully responsible for the implementation of this EMPr, and compliance with the EMPr and EA until such time as an application for amendment indicating a change in ownership or transfer of the EA to another party is submitted to DEA. Only once this amendment application has been approved is this responsibility then shifted to the new holder of the EA.

Amongst the general responsibilities above the applicant is also completely and solely responsible for:

Ensuring that any changes to the project or aspects thereof, as approved during the EIA process by the issuance of an EA, are timeously communicated to DESTEA as these may require amendments to the EA via an amendment application process.

- Appointing an ECO, and where required an environmental auditor
- It is the Applicants responsibility to notify DESTEA within 24 hours of an occurrence of any non-compliance with the EA, EMPr or any other environmental and water related legislation.
- Take the necessary action in terms of non-compliances.
- Ensuring that all of the applicants, staff, representatives, contractors, consultants and any other agent operating under the employ of the applicant comply with the EA, EMPr and any other environmental and water related legislation.
- Ensuring that all the necessary authorisations and permits have been obtained.
- Considering the ECO's observations and recommendations, taking action where required.

5.3 Applicants Representative

The Employer's Representative (ER) would act as the Applicant's (Employer's) on-site implementing agent and has the responsibility to ensure that the Employer's responsibilities are executed in compliance with relevant legislation and the environmental authorisation.

Any on-site decisions/inputs regarding environmental management are ultimately the responsibility of the ER.

The on-site ER will have the following responsibilities in terms of the implementation of the Construction phase of this EMPr and assisting the applicant to ensure compliance with the EA, EMPr and any other environmental and water related legislation:

Ensuring, in conjunction with the applicant, that the authorisations and permits have been obtained and conditions have been met.

- Ensure where required by the EA that a notice of commencement is submitted to DENC at least two (2) weeks prior to commencement.
- Assist the Applicant with the appointing of an ECO and, where specifically required by the EA an Environmental Auditor.
- The ER will ensure that the appointed ECO is paid timeously thereby ensuring an ongoing ECO service.
- Should the Applicant or the ER change ECO's, should the applicant or ER cancel the ECO's services (either verbally, in writing or implied due to non-payment of fees) or should the ECO terminate their services the ER must notify DEA of this in writing within 14 days.
- Take action in regards to any non-compliance that is reported on or noted.
- Ensuring that the Applicant is aware of any environmental non-compliance on site.
- Considering the ECO's observations and recommendations.
- Ensuring that ECO is made aware of any changes in terms of the project.
- Reviewing and approving the Contractor's method statements.
- Ensuring that all Contractor's and Sub-contractors are implementing the EMPr and meeting the necessary requirements of the EA.
- Ensuring that all works are occurring within the permitted areas.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Ordering the removal of person(s) and/or equipment not complying with the EMPr specifications.
- Ensure that the ECO is provided with any documentation required from the project team or contractors.
- Issuing fines for transgressions of site rules and penalties for contravention of the EMPr, with input from the ECO and providing proof in this regard.

5.4 Environmental Control Officer

The Environmental Control Officer (ECO) will be an independent environmental consultant appointed by the Applicant. The role of the ECO is to assist with the monitoring and where possible to provide guidance in terms of environmental matters.

The ECO will regularly monitor and review the on-site environmental management and implementation of the construction phase of this EMPr.

The ECO is not responsible for ensuring or enforcing compliance with the EA, EMPr or any other environmental and water related legislation. This is the responsibility of the applicant and authorities. The role of the ECO is that of a monitoring and supportive function and advising the Applicant of non-compliance with respect to the conditions of the EA.

The ECO's duties consist of the following:

Where required, provide assistance in terms of the Notice of commencement to DEA.

- Conducting monthly site inspections.
- Monitoring and verifying as far as possible adherence to the EMPr and the environmental authorisation.
- Monitoring and verifying that environmental mitigation measures are in place where necessary to facilitate keeping environmental impacts to a minimum.
- Reporting to the applicant and the applicant's representative any relevant observations made during site inspections.
- The ECO will report all noted/observed non-compliances with the EMPr and EA to the applicant's representative.
- As far as possible advise the applicants representative in regards to environmental matters that may become an issue.
- Reviewing the Contractor's construction method statements together with the ER.
- The ECO will make recommendations to the ER, with regards to the issuing of penalties in accordance with the EMPr.
- Facilitating the maintaining of open and direct lines of communication between the ER, Employer, Contractor and where necessary, the public, with regard to environmental matters.
- Assisting with the appointing of the relevant specialists (botanists, wetland specialists, etc.), as required, to advise the Engineer, Applicant or ER.
- Assist the contractor with basic awareness training of all construction staff, as to the requirements for working on the site.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Monitoring the undertaking by the Contractor of environmental awareness training for all personnel and subcontractors coming onto site and assisting with this where necessary.
- Advising on the removal of person(s) and/or equipment not complying with the specifications (via the ER).
- Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMPr to the ER for action.
- Reporting to the applicant on the implementation of the EMPr and compliance with the environmental authorisation on a regular basis.
- Where necessary, recommending additions and/or changes to the EMPr to the directorate.
- The ECO will draft an environmental performance report on a monthly basis (except during shutdown periods). This report will be submitted to the Contractor, ER and to the DEA. The ECO may submit this via email.

5.5 The Contractor

The contractor is bound by the requirements of this EMPr. The Contractor will be subject to the issuance of penalties by the ER as stipulated herein. Any damage to the environment temporary or otherwise as a result of non-compliance with this EMPr will be made good at the contractors cost. In addition, the Contractor will have the following responsibilities:

- The Contractor will ensure that all senior and management staff involved with the project are aware and familiar with the requirements of this EMPr.
- The ECO will assist with the environmental induction training of site staff. It is the contractor's responsibility however to ensure that all staff and sub-contractors attended and undergo the necessary environmental site inductions. The Contractor will maintain a register of all staff and sub-contractors that have undergone an environmental site induction.
- The contractor will adhere to and comply with all of the requirements and specifications of this EMPr. Any noncompliance will be reported to the ECO and ER immediately.
- The contractor is fully responsible for all sub-contractors and service providers and their compliance with this EMPr on site. The Contractor will ensure that all sub-contractors and services providers are made aware of the requirements of the EMPr and that they have a responsibility to comply with the EMPr.
- The Contractor is responsible for ensuring that all sub-contractors and service providers comply with this EMPr.
- The Contractor will read the ECO performance reports and take action as required.

5.6 Environmental Auditor

Where required by the EA an environmental auditor will be appointed by the applicant. The auditor will be an independent environmental consultant. The auditor will carry out a compliance audit based on the EA and EMPr of all of the activities being undertaken. The auditor will conduct and report audit findings based on the audit requirements stipulated in the EA. Any audit costs are for the Applicants account and are in addition to regular ECO services.

6. LIASON, CO-ORDINATING AND REPORTING

The structure for all communication, correspondence and reporting between project stakeholders will be defined at the beginning of the Project with the Contractors. The EMP will be an item on the daily site meeting agenda, which will be attended by the HS Representatives, including the Environmental Coordinator. If, at any time, the Owner's Representative (Field Superintendent) is uncertain in any respect of the implementation of any aspect of the EMP, he shall consult with the Environmental Co-ordinator. The ESO and Environmental Co-ordinator shall report directly to the Owner's Representative (Field Superintendent). All reports concerning non-compliance by any of the sub-contractors shall be routed through the Owner's Representative (Field Superintendent) and shall be discussed at the monthly site meetings. The SHEQ Manager shall be informed of the environmental issues relating to the rectification of non-compliance and any other relevant environmental management aspect.

6.1 Reporting

In addition to all reporting requirements identified in the EMP, records shall be kept by the Environmental Co-ordinator of all monitoring results, monitoring reports, incident records, audit reports and management reviews. Minutes of all environmental project meetings shall be submitted to the Environmental Co-ordinator. All report requirements shall be agreed at the beginning of the Project with sub-Contractors but in general shall be as follows: the sub-contractor site supervisor(s) shall report environmental matters to the ESO, who shall report to the clients Environmental Co-ordinator and the Field Superintendent. The clients Environmental Co-ordinator shall ensure reporting to the Project Manager, and SHE Manager, as well as clear communication about activities to the Field Superintendent.

7. METHOD STATEMENTS

Method statements are written submissions by the Contractor to the ER (with input from the ECO) in response to the requirements of this EMP or to a request by the ER or ECO. A minimum requirement will consist of the listed MS's below. Further MS's may be requested by the ER or ECO.

The Contractor shall be required to prepare method statements for several specific construction activities and/or environmental management aspects as specified. Annexure 2 provides an example for a method statement template. It is the Contractors responsibility to ensure that the required method statements are drafted and submitted.

The Contractor shall not commence the activity for which a method statement is required until the ER has approved the relevant method statement.

Method statements must be submitted at least seven (7) business days prior to the date on which approval is required (start of the activity). Should the method statement be rejected this will be done so with comment. The seven-day submission period will commence once again on re-submission of the MS. Should the MS be submitted and no response (acceptance or rejection) be obtained within 7 days from the ER or ECO the MS will be considered as having been accepted and work can commence in line with the submitted MS.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

An approved method statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract. However, any damage caused to the environment through activities undertaken without an approved method statement shall be rehabilitated at the contractor's cost and to the satisfaction the ECO and ER.

The method statements shall cover relevant details with regard to:

- Construction procedures and location of the construction site.
- Start date and duration of the procedure.
- Materials, equipment and labour to be used.

- How materials, equipment and labour would be moved to and from the site as well as on site during construction.
- Storage, removal and subsequent handling of all materials, excess materials and waste materials of the procedure.
- Emergency procedures in case of any reasonably potential accident / incident which could occur during the procedure.
- Mitigation measure that will be employed.
- Compliance / non-compliance with the EMPr Specification and motivation if non-compliant

8. ENVIRONMENTAL AWARENESS PLAN

8.1 Environmental Awareness and Risk Training

All staff members involved in work on site are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr, prior to work commencing. The briefing will usually take the form of an on-site talk and demonstration by the ECO. The education / awareness programme should be aimed at all levels of management within the contractor team. See “basic rules of conduct” below.

8.2 Basic Rules of Conduct

The following list represents the basic *Do's* and *Don'ts* towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid. **NOTE: ALL new site personnel must** attend an environmental awareness/induction presentation. Please inform your foreman or manager if you have not attended such a presentation or contact the ECO.

DO:

- Clear your work areas of litter and building rubble at the end of each day – use the waste bins provided and prevent litter from being blown away by wind.
- Report all fuel or oil spills immediately and stop the spill from continuing.
- Dispose of cigarettes and matches carefully, so to prevent veld fires (arson and littering is an offence).
- Confine work and storage of equipment to within the immediate work area.
- Use all safety equipment and comply with all safety procedures.
- Ensure a working fire extinguisher is immediately at hand.
- Prevent excessive noise.

DO NOT:

- Do not litter - report dirty or full facilities, i.e. full dustbins and dirty or blocked toilets.

- Do not make any fires.
- Do not enter any fenced off or demarcated areas.
- Do not allow waste, litter, oils or foreign materials into any storm water channels or drains or watercourses.
- Do not litter or leave food lying around.

9. MONITORING AND COMPLIANCE

A suitably-qualified Environmental Control Officer (ECO) should be appointed by the Applicant / Developer to oversee the implementation of the operational and decommissioning phase mitigation measures described in this EMP, as well as the conditions of authorisation as described in the Environmental Authorisation.

The ECO should have at least 5 years' experience as an ECO, or be supported by a qualified ECO. He/she may not be someone appointed by the contractor, engineer or other party involved with this project, other than the Applicant / Developer.

The following applies, amongst others, to the ECO's role:

- The ECO should undertake a **permanent site inspection role during vegetation clearance and ad hoc inspection during the planting seasons (operational phase)**,
- The ECO must **report to** the Applicant / Developer only.
- The ECO should present an **environmental site induction / awareness training session** to all personnel before work on site commences, as are also described below; and
- After completion of the construction activities, an environmental audit should be undertaken by the ECO, before commencement of the operational phase, in order to determine compliance with the EMP and the Environmental Authorisation. The audit report should be submitted to the competent authority.

The ECO can recommend the stopping of works if in his/her opinion there is a serious threat to, or impact on the environment, caused directly from the construction and / or operational phase. This authority is to be limited to emergency situations where consultation with the engineer or applicant is not immediately available and proof of that made available. In all such work stoppage situations the ECO is to inform the engineer and applicant of the reasons for the stoppage as soon as possible.

Upon failure by the contractor or his employee(s) to show adequate consideration to the environmental aspects of this contract, the ECO may recommend to the engineer to have the contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the contractor.

9.1 ECO Site Inspection Reports

The ECO site inspection reports (also called “ECO checklists”) will report on the compliance of the construction and operational phase mitigation measures contained in the EMPr, as well as the conditions of approval described in the Environmental Authorisation. The report should be submitted to the applicant, within five (5) days of the ECO site inspection. Copies of the inspection reports should be kept on site.

The contractor’s meeting minutes must reflect environmental queries, agreed actions and dates of eventual compliance. These minutes form part of the official environmental record.

9.2 Photographs

Photographs of all environmental transgression during the construction and operational phase must be included in ECO reports. These photographs should be stored with other records related to this EMPr. If captured in digital format, hard copies, in colour, must be kept with all other records relevant to the implementation of this EMPr.

10. IMPACTS AND MITIGATION MEASURES

A number of potential environmental impacts that may arise during the project have been identified. These are outlined in the following table below, and guidelines and mitigation measures are provided.

The Contractor must familiarise himself with the requirements of the EMPr, keeping in mind that other site-specific requirements as outlined in the Environmental Authorisation must also be complied with.

Table 4: Construction Phase EMP

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
1. ACTIVITY: PERMITS AND AUTHORISATIONS						
1.1	Legislative compliance.	Non-compliance with South African environmental legislation.	<p>Objective: Ensure compliance with all triggered environmental legislation.</p> <p>Target: Commence site establishment with all permission and approvals received and on hand.</p>	<p>a. The Developer is to have the following permits on commencement:</p> <ul style="list-style-type: none"> • Environmental Authorisation; • Water Use License; and • Environmental Management Programme. 	Obtain copies of all permits; Record Keeping	<p>Responsibility: Developer</p> <p>Monitoring Frequency: Once off - prior to commencement of site clearing & earthworks.</p>
2. ACTIVITY: SITE LAYOUT PLANNING						
2.1	Site Layout Plan.	Negative impact on the environment of unmanaged and unplanned placement of Infrastructure.	<p>Objective: To ensure acceptable impact and management of environmental issues at the main site and storage site during construction by proper planning of layout of infrastructure placement.</p> <p>Target: All areas not demarcated for construction should remain vegetated in</p>	<p>a. Draw up and submit for approval a Site Layout Master Plan. This plan must show the final positions and extent of all permanent and temporary site structures and infrastructure,</p> <p>b. The planning for layout must be done in consultation with the ECO.</p> <p>c. The contractor may not deface, paint, damage or mark any natural features situated in or around the site for survey or other purposes;</p> <p>d. No servicing of vehicles must be permitted on site, unless for emergency purposes;</p> <p>e. Stockpiles should not be situated such that they obstruct pathways; and,</p> <p>f. Place infrastructure as far as possible on sites that have already been transformed.</p>	Record Keeping	<p>Responsibility: Developer</p> <p>Monitoring Frequency: Once off - prior to commencement of site clearing & earthworks.</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			impact should be minimised.			
3. ACTIVITY: CONSTRUCTION PROGRAMME / SCHEDULE						
3.1	Project Management.	Order and timing of construction activities and associated impacts.	<p>Objective: To Provide a clear indication of the order by which key construction activities will transpire.</p> <p>Target: Anticipate timing of impacts to coordinate the availability of any specialists and/or authorities who may be required to conduct site inspections.</p>	<ul style="list-style-type: none"> a. Draw up and sign off a project schedule with all contributing parties and service providers to commit to a timeline during which time construction milestones will be completed; b. Communicate any deviation from this schedule with all parties, so as to provide parties with sufficient opportunity for alternative arrangements to be made; c. Establish a risk register to identify and monitor potential factors which may result in setbacks/ delays on tasks within the project schedule; d. Hold management meetings with representatives of the project manager, contractor, engineer and other contributing parties to monitor and anticipate changes; and, e. Should circumstances/ incidents arise which may pose a risk to the project schedule, the construction contractor, and engineer and ECO are to keep records of this and the latter communicate this in the ECO Bi-Weekly Audit Checklist. 	Meetings; Risk Register; ECO Audit Checklist; Photographs	<p>Responsibility: Contract Project Manager / Contractor / ECO</p> <p>Monitoring Frequency: Once off</p>
4. ACTIVITY: COMMUNICATION WITH LAND-OWNERS						
4.1	Landowner Consent.	Disturbance of existing land use.	<p>Objective: Maintain a conflict-free relationship with landowners / users.</p> <p>Target: No complaints received from</p>	<ul style="list-style-type: none"> a. Landowners are to be aware and in agreement of site access arrangements; b. The landowner has to be requested to liaise with the site supervisor of the construction contractor prior to entering the construction footprint area for safety purposes; 	Meetings; Risk Register.	<p>Responsibility: Contract Project Manager / Contractor / ECO</p> <p>Monitoring Frequency: Once off</p>

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			landowners / users of affected property.	<ul style="list-style-type: none"> c. All property gates are to be kept closed when not in use (or kept in the open/closed state in which it was found); and, d. Any complaint or liaison with regard to environmental aspects, compensation or disorder to economic activities, must not be addressed by the contractor. A public complaint register must be kept on site and the contract project manager must inform the Developer and/or ECO to take further action. e. Construction batching and residence sites or other significant infrastructure required as part of the proposed development must be located in consultation with the landowner or occupants on site. 		
5. ACTIVITY: SITE ESTABLISHMENT						
5.1	Demarcation of the site and vegetation removal.	Direct impact on vegetation during construction and loss of species.	<p>Objective: Prevent unnecessary habitat destruction.</p> <p>Target: All areas not demarcated for construction should remain vegetated</p>	<ul style="list-style-type: none"> a. No natural surfaces are to be marked other than using droppers, beacons or other artificial object; b. Ensure the upkeep of demarcation boundaries throughout the period of construction until rehabilitation has been completed; c. Construction areas must be fenced; d. After the final layout has been approved, conduct a thorough footprint investigation to detect and map (by GPS) any protected plant species and active animal burrows; e. Protected plant species must be relocated where possible; f. Keep areas affected to a minimum, strictly prohibit any disturbance outside the demarcated foundation footprint area; 	ECO to take photographs of site before clearance; ECO Audit Checklist.	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<ul style="list-style-type: none"> g. Clear as little indigenous vegetation as possible, aim to maintain vegetation where it will not interfere with the construction or operation of the development, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations of the relevant EMP'r, if possible; h. Indigenous vegetation unique to the area must be used during landscaping activities; i. There should be a preconstruction environmental induction for all construction staff on site to ensure that basic environmental biodiversity principles are adhered to; j. Where the ECO deems it necessary (e.g. sensitive, natural areas) the ecologist appointed to do the vegetation study will be utilized; k. Restoration measures will be required to reinstate functionality in the disturbed soil and vegetation; l. Impacts to sensitive sites (drainage lines) should be avoided; and, m. No vegetation may be gathered for the purpose of creating fire; 		
5.2	Topsoil stripping and conservation.	Destruction of topsoil.	<p>Objective: Conserve and protect topsoil from erosion and destruction.</p> <p>Target: Topsoil condition maintained.</p>	<ul style="list-style-type: none"> a. In the absence of a distinguishable topsoil layer, strip the uppermost 300 mm of soil; b. Stockpile topsoil separately from subsoil, in heaps no higher than 2m; c. Topsoil stockpiles are to be kept free of weeds; d. Limit unnecessarily prolonged exposure of stripped areas and stockpiles; e. Topsoil stockpiles to be placed on a levelled area and measures to be implemented to 	ECO Audit Checklist; Photographs;	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				safeguard the piles from being washed away in the event of heavy rains/ storm water; f. Topsoil need to be stored in designated areas only. This need to be planned and indicated on the site-layout plan; g. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area; h. Strip and stockpile herbaceous vegetation, overlying grass and other fine organic matter along with the topsoil; i. Ensure that topsoil is not mixed with subsoil and/or any other excavated material; j. Temporarily stored topsoil must be re-applied within 6 months, topsoil stored for longer need to be managed according to a detailed topsoil management plan; k. Topsoil must be used in all rehabilitation activities, and may not be compacted to ensure that its plant support capacity remain of high quality; l. No topsoil may be stored within a watercourse; m. Do not strip topsoil when it is wet; and, n. Do not mix topsoil obtained from different sites, unless the ECO gives permission.		
6. ACTIVITY: EARTH-WORKS						
6.1	Excavations; cut and fill; shaping and trimming.	Alteration of the terrain by civil works.	<u>Objective:</u> Minimise impact to the physical terrain features of the site. <u>Target:</u>	a. Cut and fill areas must be identified by the Engineer and protection measures provided through an appropriate method and technology; b. Dispose of excess material at a registered solid waste landfill site (Bloemfontein Landfill Site as per the Basic Assessment Report); and,	ECO Audit Checklist	<u>Responsibility:</u> Construction contractor; ECO <u>Monitoring Frequency:</u> Monthly

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			Maintain Civil Works to within the construction footprint area.	c. Shaping and trimming operations are to be planned to allow for topsoil application, with provision for the specified depth of reapplied topsoil made.		
7. ACTIVITY: SITE INFRASTRUCTURE PLACEMENT AND OPERATION						
7.1	Structures and lay-down areas.	Deterioration of site features and surrounding areas.	<p>Objective: Prevent the deterioration of site features like soil, rainwater runoff and erosion</p> <p>Target: The preservation of site conditions evident on establishment of structures and lay-down areas.</p>	<p>a. Locate all structures and storage areas, including offices, workshops and stores in approved locations are per the Site Layout Plan;</p> <p>b. The camp with storage and laydown areas are to be kept secure and neat with access control measures adopted during construction;</p> <p>c. Clearly define which activities are to occur within which areas of the site by erecting signage.</p> <p>d. All hazardous substances, such as fuel, oil, diesel, paint, etc., must be stored in a secondary containment system (trays or bund) which is capable of storing at least 110% of the liquid capacity. If bund areas are used, it should be sealed to avoid seepages; and</p> <p>e. A vehicle service area should be in place, for vehicle repairs, in such way that no spillages will occur into the environment.</p>	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>
8. ACTIVITY: CONSTRUCTION SITE OPERATIONS						
8.1	Security and fencing.	Prevent danger to trespassing of persons.	<p>Objective: Keep the site secure from trespassing or theft and keep animals out.</p> <p>Target: Site remains secure during construction</p>	<p>a. Be responsive to open or closed status of gates;</p> <p>b. New or the upkeep of fences should align to ensure safety of animals and maintain a reliable boundary area;</p> <p>c. Limit clearing of vegetation for fencing to the removal of trees and shrubs within 1 m of the fence line. All undergrowth should be maintained;</p>	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			with no incidences of trespassing, theft and injury or death to animals.	<ul style="list-style-type: none"> d. Should construction activity require the removal of fences or gates to execute tasks, this must be replaced as soon as possible following completion; and, e. In all cases, the landowners on whose property any use of fences or gates, must be consulted, to ensure that parties are informed of construction activity, schedules and vehicle movement. 		
8.2	Existing Services and Infrastructure.	Damage to existing services and infrastructure.	<p>Objective: No damages to existing services and infrastructure.</p> <p>Target: No damages to existing services and infrastructure.</p>	<ul style="list-style-type: none"> a. Take cognisance of the position of existing services and infrastructure (e.g. roads, pipelines, power lines and telephone services) that may get damaged due to construction activities. b. Ensure that existing services are not damaged or disrupted unless required by the contract and with the permission of the project manager; and c. In the event that infrastructure is damaged or services interrupted during construction, it will be done at the expense of the Contractor and shall receive top priority over all other activities. 	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>
8.3	Traffic.	Impact on traffic.	<p>Objective: Minimise the disruption of road users.</p> <p>Target: Minimal disruption of road users.</p>	<ul style="list-style-type: none"> a. All vehicles must be road-worthy and drivers must be qualified, made aware of the potential road safety issues, and need for strict speed limits; b. Vehicles used for transport of materials and sand must be fitted with tarpaulins to prevent the release of such material or items onto road surfaces; 	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<ul style="list-style-type: none"> c. Construction vehicles may not leave the designated roads and tracks and turnaround points must be limited to specific sites; d. Abnormal loads should not be transported after dark; e. Abnormal loads should be timed to avoid times of year when traffic volumes are likely to be higher, as would be expected over national holidays, weekends and school holiday periods; f. Transport of materials should be limited to the least amount of trips possible; and g. Traffic deviations around the construction area must be planned in conjunction with the local authority to ensure safe and free flow of traffic. Safety signs must be utilised. 		
8.4	Traffic.	Traffic impacts associated with the movement of construction vehicles on site.	<p>Objective: To minimise the destruction of biodiversity, compaction of valuable topsoil and mortalities of fauna on site.</p> <p>Target: Minimal destruction of biodiversity, compaction of valuable topsoil and mortalities of fauna on site.</p>	<ul style="list-style-type: none"> a. After the final layout has been approved, conduct a thorough footprint investigation (walk-through) to detect and map (by GPS) all protected plant species, which have to be removed and animal burrows present within the project site. b. Animal burrows must be monitored by the ECO prior to construction for activity/presence of animal species. If detected, such animals must be removed and relocated by a qualified professional/contractor; c. During construction create designated turning areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas; d. Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion 	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<p>from being initiated (storm water and erosion management plan required).</p> <ul style="list-style-type: none"> e. Ensure adequate drainage where roads cross drainage lines or ephemeral tributaries; f. Monitor the establishment of (alien) invasive species and remove as soon as detected, before regenerative material can be formed; g. Abnormal loads and machinery should avoid movement over gravel roads during and immediately after rainfall events, so as to limit destruction of road surfaces and sedimentation of downhill rivers/streams; h. All vehicles must be road-worthy, be maintained to prevent fuel or oil leaks and drivers are to be licensed appropriately for the driving of their assigned vehicle. Drivers responsible for the transportation of personnel must be specifically licensed to do so; i. Construction vehicles may not leave the designated roads and tracks, whilst U-Turns are prohibited on all roads; j. Signage is to be placed on vehicles at all times; k. All construction vehicles should adhere to construction sites and avoid off road to minimise impact on vegetation and soil; l. After decommissioning, if access roads or portions thereof will not be of further use to the landowner, remove all foreign material and rip area to facilitate the establishment of vegetation, followed by a suitable revegetation program; and, m. Construction-related vehicles and machinery may not operate on site without reflective 		

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				safety signage, car-top lights and reflective personnel gear.		
8.5	Erosion Control.	Loss of topsoil, formation of bare soil and deterioration of habitat quality.	<p>Objective: Prevent soil erosion.</p> <p>Target: No signs of soil erosion are evident on site.</p>	<p>a. Disturb as little ground area as possible, stabilize that area as quickly as possible, control drainage through the area, and trap sediment on site;</p> <p>b. Conserve topsoil with its leaf litter and organic matter, and re-apply this material to local disturbed areas to promote the growth of local native vegetation;</p> <p>c. Apply erosion control measures before the rainy season begins and after each season of construction, preferably immediately following construction; and,</p> <p>d. Maintain and reapply erosion control measures until vegetation is successfully established. Do soil chemistry tests if necessary to determine available soil nutrients.</p>	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>
8.6	Handling of general – and hazardous waste materials on the construction site.	The presence of personnel and construction operations will increase the likelihood of littering and dumping of solid waste.	<p>Objective: Management and disposal of general – and hazardous waste in an appropriate manner.</p> <p>Target: No record of pollution or site contamination by solid waste.</p>	<p>a. An adequate number of scavenger proof litter bins are to be placed throughout the site. Two waste bins; at least; must be present, one (1) for hazardous waste and one (1) for general waste at each working station. Dumping of waste on site is prohibited;</p> <p>b. Waste sorting and separation should form part of the environmental induction and awareness programme, to encourage personnel to collect waste paper, glass and metal waste separately;</p> <p>c. Keep all work sites including storage areas, offices and workshops neat and tidy;</p> <p>d. Dedicate a demarcated and signposted storage area on site for the collection of construction waste;</p>	ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<ul style="list-style-type: none"> e. All domestic waste is to be removed from site and disposed of at a registered solid waste landfill site; as mentioned in the Basic Assessment Report; f. Care should be taken to ensure that no waste fall off disposal vehicles on-route to the landfill. If needed, a tarpaulin can be utilised; g. The burning or burying of solid waste on site is prohibited. Do not burn PVC pipes or other plastic materials, as this is regarded as hazardous waste; h. Littering by construction workers shall not be permitted; i. Workers from the immediate area need to be encouraged to take their waste with them at the end of each day; j. General refuse/rubbish shall be removed from site on a weekly basis to an approved registered landfill site or as soon as the waste bins are reaching full capacity; k. Minimise waste by sorting waste into recyclable and non-recyclable waste; l. Ablution facilities must be serviced by a registered service provider, cleaned at least once a week, and safe disposal slips must be on file at the site office; m. A bi-weekly (twice a week) litter patrol of the entire site shall be conducted by the designated Environmental Officer (EO); n. Hazardous waste must be sorted general waste and disposed of at a hazardous treatment facility, records and proof of disposal must be kept; and, 		

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				o. Do not dump waste of any nature, or any foreign material in the Bath River or any drainage line.		
8.7	Sewage waste.	Pollution and site contamination due to sewage.	<p>Objective: Provide facilities for appropriate collection and disposal of sewage.</p> <p>Target: No record of pollution or site contamination by sewage.</p>	<p>a. Provide portable chemical ablution facilities, situated at convenient locations in proximity to work areas. This must be in relation to the quantity of users on site, with 1 ablution facility per 15 users and for each gender;</p> <p>b. Locations for the placement of ablution facilities include the workshop and areas for resting and eating.</p> <p>c. Do not locate a site ablution facility within the 1:100 year flood line, or within a distance of 100m of any drainage lines;</p> <p>d. Ablution facilities are to be maintained and cleaned regularly to ensure functionality and an adequate level of hygiene;</p> <p>e. Drinking water facilities, comprising of a water tank with a manual tap can be combined with hand washing facilities near site ablution; and,</p> <p>f. Only toilet paper is to be flushed down the chemical ablution facility. Personnel are to be informed on sanitary implementation as part of the environmental awareness.</p>	ECO to take photographs of site before clearance; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>
8.8	Dust Generation and visual Impact.	Dust nuisance from site operations and visual impact of site operations on surrounding land owners.	<p>Objective: To avoid dust from excavated materials and construction activity and unnecessary visual impact caused by site operations.</p>	<p>a. Implement dust suppression measures by watering (or acceptable methods) areas to be cleared as well as already exposed surfaces with damaged soil particles, particularly during dry, windy periods;</p> <p>b. Ensure all vehicles remain on designated roads;</p> <p>c. Dust masks are to be supplied to workers;</p> <p>d. The transfer of soil or aggregate should be done over the shortest possible distance;</p>	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			<p>Target: Minimise the incidence of dust generation and visual impact.</p>	<ul style="list-style-type: none"> e. Access roads are to be kept clean; f. Surface material that is scraped off during construction should be conserved and used for rehabilitation. Any spoil material must be disposed of in a manner that appears natural; g. After construction decommissioning, if access roads or portions thereof will not be of further use to the landowner, remove all foreign material and rip the area to facilitate the establishment of vegetation, followed by a suitable revegetation program; h. Lay-down area(s) should be screened with shade cloth in an earth tone or other appropriate neutral colour; i. Site offices and structures should be limited to one location and carefully situated to reduce visual intrusion. Roofs should be grey and non-reflective; j. Lights within the construction camp should face directly downwards (angle of 180°); k. Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare; l. Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact; and, m. The minimum amount of topsoil and vegetation should be removed during construction, and should be conserved and used for final rehabilitation. n. Shiny materials in structure should be avoided as far as possible and where possible shiny 		

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				material should be darkened or screened to prevent glare.		
8.9	Noise Generation.	Noise nuisance from site operations.	<p>Objective: To avoid excessive noise generation from site operations.</p> <p>Target: Minimise the incidence of noise generation.</p>	<ul style="list-style-type: none"> a. Should multiple activities result in the excessive generation of noise, it should be strived to coordinate the incidence of these at the same time; b. Fit machinery with silencers; c. All stationary noisy equipment such as compressors and pumps should be contained behind acoustic covers, screens or sheds where possible; d. The regular inspection and maintenance of equipment must be undertaken to ensure that all components function optimally; e. Vehicles should avoid use of the reverse gear as far as possible so as to avoid the sounding of sirens. This should not be considered for temporary access routes as disturbance of adjacent vegetation is to be avoided; f. Where recurrent use of machinery is frequent, machines should be shut down during intermediate periods; g. Unless otherwise specified by the ESA, normal working hours will apply (i.e. from 07H00–18H00, Mondays to Fridays); h. No loud music is permitted on site or in the Camp; i. Ensure that Employees and staff conduct themselves in an acceptable manner while on site, both during working hours and after hours; and, j. Vehicles are to abide by speed restrictions on access roads and limit trip generation so as to 	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				minimise disturbance to surrounding land users. k. The construction crew must abide the national noise bylaws regarding noise on site.		
8.10	Fire Prevention.	Uncontrollable fire.	<p>Objective: Prevent the outbreak of fires emanating from construction activity.</p> <p>Target: No incidences of fires are recorded for the site.</p>	a. The potential risk of veld fires is heightened by windy conditions in the area, specifically during the dry, windy winter months; b. Assume acceptable precautions to guarantee that fires are not started as a result of works on site as specified below: the Contractor will be held responsible for any damage to structures or property on or neighbouring the Site as a result of any fire caused by personnel; c. Contractor should ensure that construction related activities that pose a potential fire risk, such as welding etc., are properly managed and confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months; d. Contractor should provide fire-fighting training to selected construction staff and take cognisance of the Veld and Forest Fire Act, Act No. 101, 1998; e. As per the conditions of the Code of Conduct, in the event of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also	Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				compensate the fire-fighting costs borne by farmers and local authorities; f. Fire breaks are to be established and maintained around the Work Sites as and when specified by the ECO; g. Equip vehicles and site structures with fire extinguishers. Rubber beaters should also be stored on site; h. No open fires are allowed anywhere on site; i. Storage of fuel or chemicals under trees is not permitted; j. Gas and liquid fuel is not to be stored in the same place; k. Smoking may only occur within a 3m radius from designated areas; l. Personnel must be adequately trained in the handling of firefighting equipment; and, m. Fuel, diesel, oil, or any other flammable substance should be stored 6m away from the smoking area.		
8.11	Local communities.	Impact of construction workers on local communities, construction personnel and the local community.	<p>Objective: Construction workers should not alter existing social dynamics of local communities.</p> <p>Target: No incidences of conflict between.</p>	a. Where possible, the Employer should make it a requirement for contractors to implement a ‘locals first’ policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks; b. The Employer should consider the establishment of a Monitoring Forum (MF) for the construction phase. The MF should be established before the construction phase commences and should include key stakeholders, including representatives from	ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<p>the local community, local councillors, farmers, and the contractor. The role of the MF would be to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should also be briefed on the potential risks to the local community associated with construction workers;</p> <p>c. The Employer and the contractors should, in consultation with representatives from the MF, develop a Code of Conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation;</p> <p>d. The Employer and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;</p> <p>e. The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis;</p> <p>f. The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by</p>		

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				non-local construction workers to local family structures and social networks; g. The contractor should make the necessary arrangements for ensuring that all non-local construction workers are transported back to their place of residence once the construction phase is completed. This would reduce the risk posed by non-local construction workers to local family structures and social networks; and, h. No construction workers, will be permitted to stay overnight on the site. Security personnel will be housed in the vicinity of the site.		
8.12	Soil and water contamination due to construction activities such as the use of hazardous materials on site.	Pollution of soil and water contamination by hazardous waste.	<p>Objective: Provide facilities for appropriate collection and disposal of hazardous waste.</p> <p>Target: No record of pollution or site contamination by hazardous waste.</p>	a. Concrete can be mixed on mixing trays only and not on exposed soil. Concrete must be mixed only in areas which have been specially demarcated for this purpose (preferable where no natural vegetation occur); b. Concrete mixing to be carried out away from sensitive areas and on impermeable surfaces; c. Material Safety Data Sheets (MSDSs) should be available on site for all chemicals and hazardous substances to be used on-site, including information on their ecological impacts and how to minimise the impacts in case of leakage; d. All spillage must be cleaned up immediately after they have occurred; e. Spillage of petrochemical products must be avoided. In the case of accidental spillage, contaminated soil must be removed for bioremediation or disposed of at a facility for the substance concerned. Disturbed land must	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				be rehabilitated and seeded with vegetation seed naturally occurring on site; f. Do not locate any ablution facilities, sanitary convenience, septic tank or French drain within the 1:100 year flood line, or within a horizontal distance of 100m (whichever is greater) of a watercourse or drainage line; g. Vehicles and machinery must be regularly serviced to avoid leakages; h. No uncontrolled discharges from the site or working area to depressions may be permitted. All discharge points will require approval from the Environmental Site Agent (ESA); i. No water courses may be used to clean equipment, or for bathing. All cleaning operations should take place off site at a location where waste water can be disposed of correctly; j. The discharge of any pollutants such as cement, concrete, lime, chemicals, etc. into the natural environment and the storm water system must strictly be prohibited; k. Fuel and chemical storage should be done within a designated area only, which is properly bund and able to contain 110% of the capacity of fuel or chemicals stored within; l. Construction vehicles must be inspected every morning before work commence to ensure that no leakages do occur; m. All personnel must receive induction on how to report spillages, contain them and treat them accordingly;		

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<ul style="list-style-type: none"> n. Spill kits must be available at each working station; o. Drip trays must be placed beneath all construction equipment that is stationary on site or within the site camp; and, p. Hazardous waste must be stored in bins with a lid in a demarcated waste area, and must be disposed of at a hazardous treatment facility with records on file. 		
8.13	Water Conservation.	Wasting water as a result of negligence.	<p>Objective: Promote and implement water use efficiency mechanisms.</p> <p>Target: No Water Wastage.</p>	<ul style="list-style-type: none"> a. Re-use water where possible; b. Implement rain catchment strategies; c. Prevent leakages at taps and hoses by means of maintenance; d. Use buckets of water to clean tools instead of running water; e. Capture and reuse stormwater runoff for site cleaning, truck washing and dust suppression; f. Make sure that sediment, concrete, sand and rubbish does not end up going down the stormwater drain. Cover or filter stormwater inlets and drains; and, g. Require workers to use a broom rather than a hose to clean paths and gutters. If water use is necessary, use high pressure hoses which are both water efficient and more effective cleaners. 	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>
8.14	Health and Safety.	Dangerous working conditions for workers.	<p>Objective: To prevent any casualties on site.</p> <p>Target:</p>	<ul style="list-style-type: none"> a. Ensure that PPE is available to Personnel; b. Adhere to the Occupational Health and Safety Act; c. Keep the first aid kit stocked; d. Issue all workers with necessary health and safety items; 	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Construction contractor; ECO</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			No Personnel casualties on site.	<ul style="list-style-type: none"> e. Potentially hazardous areas must be demarcated with danger tape; f. Appropriate signage must be placed to caution Employees and contractors not to enter certain structures without authorisation; g. Regular safety inspections must be conducted to ensure that participants are equipped with necessary safety equipment; and, h. All construction personnel to wear hard hats and reflector jackets at all times. 		
8.15	Heritage Resources.	Damage and destruction of vertebrate fossils during excavation activities.	<p>Objective: To prevent any destruction of valuable artefacts.</p> <p>Target: No destruction of any vertebrate fossils and artefacts.</p>	<ul style="list-style-type: none"> a. Should any heritage resources (including but not limited to fossil bones, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts or bone remains, structures and other built features, rock art and rock engravings) be exposed during excavation for the purpose of construction, construction in the vicinity of the finding must be stopped. A trained palaeontologist or heritage specialist must be notified to assess the finds, and this must then be reported to the applicable heritage authority; b. Heritage remains uncovered or disturbed during earthworks must not be disturbed further until the necessary approval has been obtained from the heritage authority. A registered heritage specialist must be called to the site for inspection and removal once authority to do so, has been given; c. Excavations must be limited to the footprint area and be maintained in a narrow corridor; 	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Contractor</p> <p>Monitoring Frequency: Monthly</p>

CONSTRUCTION/DEVELOPMENT PHASE

No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				<p>d. All operations of excavation equipment must be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures must be followed:</p> <ul style="list-style-type: none"> • All construction in the immediate 50 m vicinity radius of the site must cease; • The heritage practitioner must be informed as soon as possible; • In the event of obvious human remains SAPS must be notified; • Mitigation measures (such as refilling, etc.) must not be attempted; • The area in a 50 m radius of the find must be cordoned off with hazard tape; <p>e. Public access must be limited and the area must be placed under guard;</p> <p>f. The Furnace area must be protected and declared a no-go area until the developer appoints a suitably qualified archaeologist to conduct a Phase 2 archaeological assessment of the terrain and to draw up a heritage management plan for the site; and,</p> <p>g. The appointed archaeologist must apply for a valid permit from SAHRA to excavate the furnace for display and educational purposes.</p>		

Table 5: Operational Phase EMP

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
1	Legislative compliance	Non-compliance with South African environmental legislation.	<p>Objective: Ensure compliance with all triggered environmental legislation.</p> <p>Target: Commence operational processes with all authorisations, permits and approvals received and available on site.</p>	<p>b. The Developer is to have the following permits on site:</p> <ul style="list-style-type: none"> • Environmental Authorisation • Ploughing certificate • Environmental Management Program (EMPr) • Water Use Authorisation 	Obtain copies of all required documents and ensure they are filed and readily available on site; Adequate record keeping	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: Once off Keep on site</p>
2	Traffic.	Impact on traffic.	<p>Objective: Minimise the disruption of road users.</p> <p>Target: Minimal disruption of road users.</p>	<p>a. All vehicles must be road-worthy and drivers must be qualified, made aware of the potential road safety issues, and need for strict speed limits;</p> <p>b. Abnormal loads should not be transported after dark;</p> <p>c. Abnormal loads should be timed to avoid times of year when traffic volumes are likely to be higher, as would be expected over national holidays, weekends and school holiday periods; and,</p> <p>d. Transport of materials should be limited to the least amount of trips</p>	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: Monthly</p>

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				possible. Accommodation and disbursements		
3	Erosion Control.	Erosion of soil on site.	<p>Objective: Prevent soil erosion.</p> <p>Target: No signs of soil erosion are evident on site.</p>	<ul style="list-style-type: none"> a. Ensure correct drainage of areas; b. The layout of the area should be optimised to limit the erosion potential; c. Rehabilitate denuded areas especially slopes with appropriate plant species. Erosion protection measures such as geotextile, rocks and topsoil mixtures as specified should be used. 	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: Monthly</p>
4	Solid Waste Handling during harvesting times	Pollution and site contamination by solid waste	<p>Objective: Minimise the generation of solid waste. Dispose of solid waste in the appropriate manner to a landfill site.</p> <p>Target: No record of pollution or site contamination by solid waste.</p>	<ul style="list-style-type: none"> a. Adequate waste containers to be provided on site during harvesting time. b. Keep the footprint area litter free and tidy. c. All domestic waste is to be removed from site as and when required and disposed of at a registered solid waste landfill site. d. Care should be taken to ensure that no waste is lost off disposal vehicles on route to the landfill. If needed, a tarpaulin can be utilised. e. Do not dump waste of any nature, or any foreign material in any drainage lines. f. The burning or burial of solid waste on site is prohibited. 	Applicant project manager to manage waste management and removal during harvesting times.	<p>Responsibility: Applicant / Project manager</p> <p>Monitoring Frequency: During harvesting times</p>
5	Water Conservation	Wasting water as a result of negligence or inadequate usage planning and management of irrigation (overuse)	<p>Objective: Promote and implement water use efficiency mechanisms through adequate</p>	<ul style="list-style-type: none"> h. Implement adequate irrigation and water usage planning and management measures in accordance with site requirement and allocated water volumes in order to avoid unnecessary water usage (wastage). 	Applicant project manager to continually	<p>Responsibility: Applicant / Project manager</p>

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			planning and management of irrigation. Target: No unnecessary water wastage. Keep irrigation and water use within the allocated water volumes and as required for the operational processes. Reduce usage as far as possible.	i. Prevent leakages in the irrigation system by means of frequent maintenance.	monitor water usage	Monitoring Frequency: Continual
6	Sewage waste during harvesting times	Pollution and site contamination by sewage.	Objective: Provide facilities for appropriate management collection and disposal of sewage during harvesting times. Sewage containment sizes and removal frequencies should be appropriate in order to prevent any potential chances of overflow	a. Sufficient portable chemical toilets will be supplied on site for the manual labourers during the harvesting times. These toilets will be cleaned and waste removed by an appropriate contractor on a regular basis as and when required. b. Do not locate a site toilet within the 1:100 year floodline, or within a distance of 100 m of any drainage lines; c. Toilets are to be maintained and cleaned regularly to ensure functionality and an adequate level of hygiene. This will assist with disease prevention.	Applicant project manager to manage sewage management and removal during harvesting times.	Responsibility: Applicant / Project manager Monitoring Frequency: During harvesting times

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
			and environmental contamination. Target: No record of pollution or site contamination by sewage.	d. Removal of sewage from sight should be conducted on an adequate and frequent basis by an accredited contractor. e. Only toilet paper is to be flushed down the chemical toilets. Personnel are to be informed on sanitary implementation as part of the environmental awareness.		
7	Noise Generation.	Noise nuisance from site operations.	Objective: To avoid excessive noise generation from site operations. Target: Minimise the incidence of noise generation.	a. Machinery should be in sound mechanical condition and equipped with the necessary silencers; and b. Workers on site should adhere to the prescribed working hours (7am – 6pm).	Applicant to adhere to business hours.	Responsibility: Applicant Monitoring Frequency: Monthly
8	Fire Prevention.	Uncontrollable fire.	Objective: Prevent the outbreak of fires emanating from operational activities. Target: No incidences of fires are recorded for the site.	a. Ensure the work site is equipped with adequate firefighting equipment according to SANS 10087; b. All equipment must have at least one firefighting extinguisher; c. Workers must be adequately trained in the handling of firefighting equipment as well as in fire drills; d. No open fires are permitted anywhere on site due to the handling of petroleum on site; e. A designated smoking area must be identified where it does not pose a risk for starting a fire; and	Applicant to comply with firefighting regulations.	Responsibility: Applicant Monitoring Frequency: Monthly

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				f. All health and safety signage must be in place to warn the public.		
9	Soil and water contamination due to operational activities such as the use of hazardous materials on site.	Pollution of soil and water contamination by hazardous waste.	<p>Objective: Provide facilities for appropriate collection and disposal of hazardous waste.</p> <p>Target: No record of pollution or site contamination by hazardous waste.</p>	<p>a. Material Safety Data Sheets (MSDSs) should be available on site for all chemicals and hazardous substances to be used on-site, including information on their ecological impacts and how to minimise the impacts in case of leakage;</p> <p>b. All spillage must be cleaned up immediately after they have occurred;</p> <p>c. Spillage of petrochemical products must be avoided. In the case of accidental spillage, contaminated soil must be removed for bioremediation or disposed of at a facility for the substance concerned. Disturbed land must be rehabilitated and seeded with vegetation seed naturally occurring on site;</p> <p>d. Vehicles and machinery must be regularly serviced to avoid leakages;</p> <p>e. No uncontrolled discharges from the site or working area to depressions may be permitted.</p> <p>f. The discharge of any pollutants such as cement, concrete, lime, chemicals, etc. into the natural environment and the storm water system must strictly be prohibited;</p> <p>g. Fuel and chemical storage should be done within a designated area only, which is</p>	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: Monthly</p>

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				properly bund and able to contain 110% of the capacity of fuel or chemicals stored within; h. Construction vehicles must be inspected every morning before work commence to ensure that no leakages do occur; i. All personnel must receive induction on how to report spillages, contain them and treat them accordingly; j. Spill kits must be available at each working station; k. Drip trays must be placed beneath all construction equipment that is stationary on site or within the site camp; and, l. Hazardous waste must be stored in bins with a lid in a demarcated waste area, and must be disposed of at a hazardous treatment facility with records on file.		
10	Health and Safety.	Dangerous working conditions for workers.	<p>Objective: To prevent any casualties on site.</p> <p>Target: No Personnel casualties on site.</p>	a. Ensure that PPE is available to Personnel; b. Adhere to the Occupational Health and Safety Act; c. Keep the first aid kit stocked; d. Issue all workers with necessary health and safety items; e. Potentially hazardous areas must be demarcated with danger tape; f. Appropriate signage must be placed to caution Employees and contractors not to	Incident Register; Photographs; ECO Audit Checklist	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: Monthly</p>

OPERATIONAL PHASE						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
				enter certain structures without authorisation; g. Regular safety inspections must be conducted to ensure that participants are equipped with necessary safety equipment; and, h. All construction personnel to wear hard hats and reflector jackets at all times.		
11	Local communities during harvesting times	Local job creation	<p>Objective: Create new jobs and provide a manner of income to local communities.</p> <p>Target: Implement the principle of local employment as far as possible.</p>	a. Implement the principle of local employment as far as possible in order to provide job opportunities and a manner of income to the local communities.	Applicant project manager to ensure implementation of local employment principle.	<p>Responsibility: Applicant</p> <p>Monitoring Frequency: During harvesting times</p>

Table 6: Decommissioning Phase EMP

DECOMMISSIONING PHASE EMP						
No.	Aspect	Associated Impacts	Objective & Target	Management Action	Monitoring Action	Responsible Party & Monitoring Frequency
It is not foreseen that this project will be decommissioned as this is an existing profitable agricultural project. If in the future the applicant wishes to decommission the pivots and water pipelines, a new/separate Environmental Impact Assessment in line with the NEMA listed activities has to be undertaken, with an Environmental Management Plan, for the decommissioning phase of the project.						

11. EMERGENCY RESPONSE PLAN

The following table is provided to assist the ECO and Site Manager contractor with remedial work options and problem solving:

Observation or Event	Action by Inspector or Observer	Action by Site Manager
Spillage of diesel or hydrocarbons on soil	<p>Report to Site Manager and continue observations.</p> <p>Also check:</p> <ul style="list-style-type: none"> ➤ That the source causing the spillage has ceased, and that the affected area is isolated to prevent spreading of the hazardous substance, where after it should be rehabilitated. 	<p>Action will be required ASAP by following the next steps:</p> <ul style="list-style-type: none"> ➤ Dig down into the soil to see how far down the pollution penetrated, ➤ If less than 300mm penetrated: <ul style="list-style-type: none"> a. Turn the soil over to expose it to the air. b. Apply Mono Ammonium Phosphate (MAP) at a rate of 58gr/m² to the overturned soil. c. Water enough to keep the soil moist. ➤ If penetration is greater than 300mm: <ul style="list-style-type: none"> a. Remove the affected soil and spread in a layer not more than 300mm thick. b. Apply MAP at a rate of 50gr/m². c. Water enough to keep the soil moist. ➤ Repeat the above steps every 6 weeks or until the soil is clean.
Erosion	<p>Report to Site Manager and continue observations.</p> <p>Also check:</p> <ul style="list-style-type: none"> ➤ That all vehicular movement is restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. 	<p>Action will be required ASAP:</p> <ul style="list-style-type: none"> ➤ Implement erosion protection works at identified problem areas. ➤ Implement remedial works at affected areas in order to restore the area to its previous or better status.

12. INCIDENT REGISTER

INCIDENT REGISTER: SECUNDIS BELEGGINGS AGRICULTURAL DEVELOPMENT					
NAME OF PERSON REPORTING THE INCIDENT	INCIDENT	DATE OF INCIDENT IDENTIFIED	HOW WAS INCIDENT ADDRESSED?	DATE OF RECTIFICATION	SIGNATURE

13. REHABILITATION MEASURES AND CLOSURE PLAN

The rehabilitation phase follows completion of the operational phase and entails site clean-up and site rehabilitation. The underlying aim of rehabilitation is the process of returning land within the site boundary to some degree of its former natural state.

Key aspects within this process include the:

- Removal of structures and infrastructure;
- Handling of inert waste and rubble;
- Handling of hazardous waste and pollution control;
- Final shaping of the terrain;
- Topsoil replacement and soil amelioration;
- Ripping and scarifying of surfaces;
- Planting of indigenous occurring vegetation (if deemed necessary); and
- Maintenance.

12.1 Rehabilitation Measures

Removal of structures and infrastructure

- On completion of a section of works, the area must be rehabilitated by suitable landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and where ascribed for by the ECO, vegetation establishment;
- Clear and completely remove from site all operational structures and temporary infrastructure;
- All permanent infrastructures must be returned to a useable state.
- Once construction is completed and these areas are vacated, they must be rehabilitated to a standard as set by the ECO.

Topsoil replacement and soil amelioration

- The reinstatement of disturbed areas must follow immediately after the removal of structures and temporary infrastructure;
- Topsoil backfilling must be undertaken when the soil is dry, and not following any recent rainfall events;
- All stockpiled topsoil together with herbaceous vegetation should be replaced and redistributed over a disturbed area such as temporary access roads;
- Topsoil must be returned to the same site from where it was stripped;
- When insufficient topsoil remains, soil of a similar quality can be obtained from a nearby area within the site area which was disturbed;
- Once topsoil has been returned to the ground, stripped vegetation should be randomly spread by hand over the area.

Inert waste

- Domestic waste must be completely removed from the site and disposed of at a landfill site.

Maintenance

- All re-growth of invasive vegetative material will be monitored by the Developer for one year;
- All areas under rehabilitation are to be treated as no-go areas using danger tape and steel droppers/fencing and cordoned off, to prevent vehicular, pedestrian and livestock access.
- Any re-vegetation must be done using plant species in occurrence on site;
- Control invasive plant species and weeds using approved methods of manual or chemical intervention;
- The reestablishment of vegetation should be allowed several rainy seasons, given the arid nature of the climate and region.

14. PREVENT TRIGGERING OF FURTHER LISTED ACTIVITIES

It is of utmost importance to adhere to the following guidelines in order to prevent the triggering of activities that may need to be authorised:

PLEASE DO NOT	TO PREVENT TRIGGERING
ARCHAEOLOGY	
Avoid archaeological, historical sites or any exhumed artefacts discovered through excavations.	Archaeological survey / SAHRA permit

15. REFERENCES

Mucina, L. & Rutherford, M.C. (eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

National Environmental Management Act (Act 107 of 1998)