

DRAFT IMPACT ASSESSMENT REPORT

NEMA Section 24G Rectification Process for the already established 4 X circular agricultural pivots to a total of approximately 100ha on the Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 near Hopetown, Northern Cape Province

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EXECUTIVE SUMMARY

The applicant, Mr. Pieter Louw, has developed four (4) cultivated circular pivot lands (100ha) on the Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 near Hopetown, as well as two water extraction points in the Orange River for which environmental authorisation was not previously obtained from the Northern Cape Department of Environment and Nature Conservation (DENC). The applicant has become aware of this transgression and has opted to follow a Section 24G rectification process in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA).

Eco-Con Environmental (Pty) Ltd. was appointed by Mr. Piet Louw as the independent Environmental Assessment Practitioner (EAP) to conduct a NEMA Section 24G Rectification Application. Eco-Con Environmental was established in May 2017. Although the formal establishment of the company took place in 2017, it is backed by more than 15 years of collective professional service and experience in the environmental field. The qualifications, expertise and experience of our professional team form the backbone of the company's continued success.

NEMA LISTED ACTIVITIES TRIGGERED BY THE PROPOSED PROJECT

The development activities in the National Environmental Management Act (Act 107 of 1998): Environmental Impact Assessment Regulations, 2014 (Government Notices R983, R984 and R985 in Government Gazette No. 38282 of 04 December 2014) (as amended in April 2017) which are triggered by the proposed project are listed in the table below:

Regulation	Activity	Description of trigger activity in proposed project
GN. R. 983 Listing Notice 1	Activity 12 The development of – (i) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs – (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse	The water pipeline and water pump extracting water from the Orange River, and the extraction pump infrastructure and building exceeding 100m ² is located within 32 meter of the orange river which is regarded as a watercourse.
GN. R. 983 Listing Notice 1	Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the	The water pipeline and water pump extracting water from the Orange River, and the extraction pump

Regulation	Activity	Description of trigger activity in proposed project
	dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse	infrastructure and building exceed the 10m ³ within the watercourse.
GN. R. 984 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.	The already developed four (4) agricultural pivots cover a total area of 100 hectares.
GN. R. 984 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.	The already developed four (4) agricultural pivots cover a total area of 100 hectares.
GN. R. 985 Listing Notice 3	Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with the maintenance management plan. (G) In Northern Cape: (ii) Within critical biodiversity areas identified in bioregional plans	Although the two vegetation types associated with the development are merely classified as least threatened, the entire terrestrial assessment area associated with the four pivot lands falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.
GN. R. 985 Listing Notice 3	Activity 14 The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs— (A) Within a watercourse- (G) In Northern Cape (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by	the entire terrestrial assessment area associated with the water extraction pump falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

Regulation	Activity	Description of trigger activity in proposed project
	the competent authority or in bioregional Plans	

PROJECT LOCATION

Pivot lands numbers 7 & 12 (*see attached locality map for pivot number and position*) as well as the two water extraction points are situated on the Remaining Extent of the Farm New Waterford no 229 (SG 21 Digit Code: C0320000000022900000) while numbers 8 & 11 (*see attached locality map for pivot number and position*) are situated on Portion 2 of the Farm New Waterford no 229 (SG 21 Digit Code: C0320000000022900002). The farm is located approximately 4.5 km outside the town of Hopetown towards Kimberley. The property falls inside the Thembelihle Local Municipality which, in turn forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. The area falls outside the municipal urban edge. Access is obtained by way of the R 385 provincial road which branches off from the N 12 highway.

NEEDS AND DESIRABILITY OF THE PROJECT

Various key factors must be taken into consideration as motivation/incentive for the potential benefits involved with the proposed project. The Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 previously had little economic value due to low grazing capacity for livestock purposes. The development of these four (4) rotary crop production pivots on the above mentioned farms have significantly increased the agricultural potential of the property, which in turn increased the economic value. Operational phase job creation (local employment) and sustainable capacity building (skills, experience and resources development) of this project also aid continuous local community upliftment and poverty alleviation and are therefore regarded as significant socio-economic benefits associated with the project to motivate the need and desirability. The outcomes of this project are also in line with the requirements and objectives of the National Development Plan; Northern Cape Provincial Spatial Development Framework; Northern Cape Provincial Growth and Development Strategy as well as the Thembelihle Local Municipality and Pixley Ka Seme District Municipality Integrated Development Plans.

ALTERNATIVES CONSIDERED

As this application / impact assessment report relates to a Section 24G rectification application for the already established four (4) rotation crop pivots and two water extraction points and water pipelines, no alternatives are available for evaluation.

PUBLIC PARTICIPATION PROCESS

A continual and comprehensive Public Participation Process (PPP) will be undertaken throughout the entire Section 24G rectification process with all stakeholders and Interested and Affected Parties (I & AP's), including the relevant organs of state and competent authority (Northern Cape Department of Environment and Nature Conservation) as identified. The PPP will be conducted in accordance with the requirements of Regulation 41 of the EIA Regulations, 2014 and the designated Public Participation Officer will ensure that the PPP is facilitated in a manner which ensures reasonable opportunity for all stakeholders and registered I & AP's to comment and provide input on the proposed project.

ENVIRONMENTAL IMPACT ASSESSMENT

The S24G rectification application has identified various potential impacts which are discussed in detail in this report (below is only the summary of the impact identified). No "red flag" impacts were identified.

Impact Summary

Construction / Development Phase: *(These impacts were calculated by means of the natural surrounding areas as if construction is yet to take place. The reason being: to give an indication of what impact the construction phase had on the natural environment).*

PLANNING, DESIGN AND CONSTRUCTION PHASE			
Potential Flora Impacts:			
Nature of impact: Direct impact on Flora as a result of vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	65	55	55
Significance rating:	Medium (M)	Medium (M)	Medium (M)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Potential Fauna and Avifauna Impacts:			
Nature of impact: Direct impact on Fauna and Avifauna as a result of vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Dust Impacts:			

Nature of impact: Dust nuisance generated during the development / preparation of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	28	22	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Noise Impacts:			
Nature of impact: Noise nuisance generated during the development / preparation of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Cultural and Heritage Impacts:			
Nature of impact: Damage and destruction of vertebrate fossils during excavation activities.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	7	4	0
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)

Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Potential Soil Contamination Impacts:			
Nature of impact: Increased Soil contamination by means of hazardous substances.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Soil Erosion Impacts:			
Nature of impact: Increased Soil erosion due to construction activities.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	20	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Potential Visual Impacts:			
Nature of impact: Increased visual impact due to increased working activities on-site.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	

Component:	Before Mitigation	After Mitigation	
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Socio-Economic Impacts:			
Nature of impact: Increased socio-economic conditions due to job creation		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	52	75	60
Significance rating:	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	Medium (M)

Operational Phase

OPPERATIONAL PHASE			
Potential Flora Impacts:			
Nature of impact: Direct impact on flora as a result of continuous vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	65	55	55
Significance rating:	Medium (M)	Medium (M)	Medium (M)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Potential Fauna and Avifauna Impacts:			
Nature of impact: Continuous impact on Fauna and Avifauna as a result of cleared vegetation / habitat loss.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Dust Impacts:			
Nature of impact: Dust nuisance generated during the operational phase of the project.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	28	22	16
Significance rating:	Low (L)	Low (L)	Low (L)

Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Noise Impacts:			
Nature of impact: Noise nuisance generated during the operational phase of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	7	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	7	4	0
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	

Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	7	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Potential Soil Contamination Impacts:			
Nature of impact: Increased Soil contamination by means of hazardous substances.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Soil Erosion Impacts:			
Nature of impact: Increased Soil erosion due to operational activities.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	20	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Potential Socio-Economic Impacts:			

Nature of impact: Increased socio-economic conditions due to job creation		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Total SP:	52	75	60
Significance rating:	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	Medium (M)

Decommissioning Phase

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.

SUMMARY OF SPECIALIST STUDIES

The section below outlines the main finding of all specialists involved in the impact assessment process. More detailed insight may be gathered from the specialist report which is attached as Appendix E.

Ecological and Wetland Specialist study

The development of the four pivot lands and two water extraction points have completely transformed the majority of the surface vegetation on the footprint areas.

The historic ecology of the pivot lands is assumed to have been comparable to that of the surrounding natural, undeveloped areas as no significant change in soil structure or landscape topography or features is evident. The entire natural, undeveloped area surrounding the four pivot lands is very homogenous with no significant or distinct variation in vegetation structure or landscape features. It consists of a gently to moderately sloping shrubland (towards the Orange River located to the south and west), dominated by dwarf karoo shrubs and grasses which are associated with the Northern Upper Karoo vegetation type (NKu 3). The vegetation type is merely classified as least threatened. A distinct lack of a well-established woody component is evident resulting in no nationally protected *Acacia* species potentially being present. With the exception of individuals of the provincially protected species *Ruschia spinosa*, *Moraea pallida* and to a lesser extent, *Euphorbia burmanni* no Red Data Listed, nationally protected or any other species of conservational significance were found to be present within the assessment area.

The terrestrial area associated with the pivot lands also falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. Critical Biodiversity Areas are areas which play an important role in conservation and reaching certain required biodiversity targets for ecosystem types, species or ecological processes. The CBA 2 forms part of a larger continuous ecological corridor associated with the Orange River catchment and sensitive riparian zone and is therefore of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type.

The pivot lands are however located a significant distance away from the abrupt start of the actual riparian zone (approximately 400 m away) and the transformation of surface area caused by the four pivot lands is relatively small and isolated when compared to the broader river catchment area. The area therefore scored a moderate EIS value and the significance of the four pivot land developments on the CBA 2 is relatively moderate.

The pumping infrastructure of the two water extraction points is situated directly within the Orange River riparian zone which is confined to the river banks. The riparian zone is associated with the Upper Gariep Alluvial vegetation type (AZa 4) which is classified as vulnerable. The piping infrastructure of the south-westerly situated water extraction point subsequently runs up a steep, rocky slope associated with the Vaalbos Rocky Shrubland vegetation type (SVk 5) which is merely classified as least threatened. Individuals of the nationally protected tree species, *Boscia albitrunca* were sporadically encountered but only on the rocky slope area. The provincially protected species *Ruschia spinosa*, is the dominant forb on the rocky slope area. No Red Data Listed or any other species of conservational significance were found to be present within the assessment area.

The footprint area of the two water extraction points also falls within a Critical Biodiversity Area one (CBA 1) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. The CBA 1 forms part of a narrow continuous ecological corridor associated with the sensitive Orange River riparian zone. The area is therefore of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type.

It is in the opinion of the specialist that the identified significant ecological impacts associated with transformation of the CBA 1 and CBA 2 can be suitably managed and mitigated to within acceptable levels. The development therefore does not necessarily warrant the requirement of an offset area to be identified and assessed or for project operations to be completely ceased and the areas rehabilitated and restored.

The project operations should be allowed to continue but all recommended mitigation measures as per the ecological report must be adequately implemented and managed for the remainder of the operational phase

and subsequent future decommissioning phase. All necessary authorisations and permits must also be obtained as soon as reasonably and practicably possible.

Heritage Specialist study

The field assessment indicates that the proposed pivot development will primarily affect geologically recent soils (alluvium and wind-blown sand). Impact on potentially intact Stone Age archaeological remains or Quaternary fossils is considered unlikely. The extent of the proposed upgrade is considered low in terms of palaeontological and archaeological impact. The terrain is not considered paleontologically or archaeologically vulnerable and is assigned a site rating of Generally Protected C.

Soil Suitability Study

The soil survey and accompanying analysis of soil properties indicate that most the two areas investigated are suitable for irrigation. Site A is suitable for irrigation, while Site B is suitable in the north and west. In the south, about halfway across the fourth centre pivot, the soils are unsuitable for irrigation of cash crops according to the guidelines of the Northern Cape Department of Agriculture. However, due to the arguments considered in the full soil suitability report (Appendix E), it is advised that the unsuitable half of the fourth centre pivot could be retained for planted pastures.

CONCLUSION

In conclusion, there are no “red flag” impacts associated with the said project. Although the development is situated in a CBA 1 and CBA 2 area, the Ecological specialist is of the opinion that the proposed continuous operational impacts can be mitigated to an acceptable level and therefore has no objections. No Heritage sites, significant area, nor palaeontological soils will be negatively affected as the area is already transformed. The soil specialist also recommends the project.

It is therefore the opinion of the EAP that no fatal flaws exist and that the Section 24G impact Assessment be approved.

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ABBREVIATIONS

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CEL	Cost Estimate Letter
CIA	Cumulative Impact Assessment
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CPA	Communal Property Association
CRR	Comments and Responses Report
CSP	Concentrated Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DENC	Department of Environment and Nature Conservation
DM	District Municipality
DMR	Department of Mineral Resources
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
Ha	Hectares
HTF	Heat Transfer Fluid
I & APs	Interested and Affected Parties
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolt
LED	Local Economic Development
LM	Local Municipality
LSA	Late Stone Age
MAP	Mean Annual Precipitation
MASL	Metres Above Sea Level

MLL	Minimum living level
MSA	Middle Stone Age
MVA	Megavolt ampere
MW	Megawatt
NCPSDF	Northern Cape Provincial Spatial Development Framework
NDP	National Development Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NERSA	National Energy Regulator of South Africa
NFA	National Forests Act (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NIP	National Infrastructure Plan
NWA	National Water Act (Act 36 of 1998)
PFS	Pre-feasibility Study
PPP	Public Participation Process
PUC	Point of Utility Connection
PoSEIA	Plan of Study for Environmental Impact Assessment
REIPPP	Renewable Energy Independent Power Producers Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SIP	Strategic Integrated Project
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
WRYCM	Water Resource Yield Computer Model
WULA	Water Use Licence Application

1. INTRODUCTION

The agricultural industry forms a significant part of the annual GDP of the Republic of South Africa. Agriculture primarily contributes in the form of food national production and security and through import and export process as well as primary and secondary employment creation.

The applicant, Mr. Pieter Louw, has developed four (4) cultivated circular pivot lands (100ha) on the Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 near Hopetown, as well as two water extraction points in the Orange River for which environmental authorisation was not previously obtained from the Northern Cape Department of Environment and Nature Conservation (DENC). The applicant has become aware of this transgression and has opted to follow a Section 24G rectification process in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA).

In accordance with the National Environmental Management Act (Act 107 of 1998); Environmental Impact Assessment Regulations of 2014 (as amended in April 2017), a Section 24G rectification application processes is required for the proposed project in order to obtain the necessary environmental authorisation from the competent authority. Eco-Con Environmental was appointed by Mr. Pieter Louw to act as the independent Environmental Assessment Practitioner (EAP) to facilitate the entire environmental authorisation application process and complete the Section 24G rectification application processes for the said project.

The following report aims to give context to the proposed development through providing a comprehensive description of the envisaged activities and relevant infrastructure; the identification of significant environmental impacts associated to the proposed project; identification of appropriate alternatives and mitigation measures for reduction of undesired impacts; and communication of results in a clear and concise manner to the competent authority and other relevant parties.

1.1 PROJECT APPLICANT INFORMATION

Table 1: Project applicant information

Company/Applicant name:	Mr. Pieter Louw
Company Registration number:	N/A
Physical address:	Nova, Hopetown, 8750
Postal address:	P.O. Box 188, Hopetown, 8750
Contact person:	Mr. Pieter Louw
ID number:	621218 5036 089

Designation:	Owner
Contact number:	053 203 1110 / 082 494 1827
E-mail address:	admin@louwboerdery.co.za

2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

2.1 DETAILS OF THE EAP

Eco-Con Environmental (Pty) Ltd. was appointed by Mr. Pieter Louw as the independent Environmental Assessment Practitioner (EAP) to conduct a Section 24G rectification application process for the proposed project.

Eco-Con Environmental was established in May 2017. Although the formal establishment of the company took place in 2017, it is backed by more than 15 years of collective professional service and experience in the environmental field. The qualifications, expertise and experience of our professional team form the backbone of the company's continued success.

The vision of Eco-Con Environmental is being dedicated to environmental management that fosters a sustainable future and leads to improvements in the communities where we do business. Eco-Con Environmental believes that in time we will become the most respected Environmental Management Consultancy firm in all regions where we work.

The company continuously engages existing and emerging legislation, guidelines and practices in order to ensure the execution of high quality and appropriate studies. Through an integration of skills and expertise, it is envisioned that Eco-Con Environmental will deliver exceptional, competitive services for task execution and to meet deliverables. Eco-Con Environmental, through years of experience and industry presence, assures the seamless execution and roll out of tasks to achieve projected results on time. Our past experience on agricultural projects further benefits our understanding of the required and associated processes and the impacts thereof.

Table 2: Details of the EAP

Company/entity name:	Eco-Con Environmental (Pty) Ltd.
Physical address:	9 Gascony Crescent; Helicon Heights; Bloemfontein; 9300
Postal address:	P.O Box 29262; Danhof; Bloemfontein; 9310
Contact person:	Mr. Johan Botes
Designation:	Senior Environmental Consultant and Managing Director
Contact number:	082 459 8206
E-mail address:	johan@eco-con.co.za
Qualifications:	B.A Honours in Geography – UFS B.A Geography and Environmental Management - UFS

2.2 EXPERTISE OF THE EAP REPRESENTATIVE

Johan Botes, is a Senior Environmental Specialist Consultant and Managing Director at Eco-Con Environmental (Pty) Ltd. His qualifications include an Honours degree in Geography from the University of the Free State and a Bachelors of Arts in Geography and Environmental Management also from the University of the Free State. Johan Botes has 7 years of environmental management experience. Johan also brings with him a strong background in environmental law and monitoring. He was previously employed at Envioworks and Savannah Environmental Consultants as a General Manager and Environmental Control Officer respectively.

Relevant Project Experience

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, Delportshoop, 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 Lephalale 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.

See Appendix A for Curriculum Vitae of the EAP.

2.3 PUBLIC PARTICIPATION OFFICER

The entire Public Participation Process for the impact assessment report will also be conducted and coordinated by Mr. Johan Botes.

See Appendix A for Curriculum Vitae.

3. RELEVANT ENVIRONMENTAL LEGISLATION AND GUIDELINES

3.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT 108 OF 1996)

Section 24 of the Constitution of South Africa provides the main national legislative obligation towards sustainable environmental management and development. This section forms the foundation of all other subsequent environmental legislation and governance in South Africa. Section 24 states the following:

every person shall have the right -

- (a) to an environment that is not harmful to their health nor well-being; and
- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that -
 - (i) prevent pollution and ecological degradation;
 - (ii) promote conservation; and
 - (i) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

The following sections provide an overview of the relevant environmental legislation and guideline documents applicable to the proposed project.

3.2 OTHER RELEVANT ENVIRONMENTAL LEGISLATION

Aside from NEMA, other key environmental legislation, policies, plans and guidelines will also be triggered by the proposed project, whilst others shall provide strategic goals and priorities for different resources and sectors.

The environmental legislation relevant to the proposed project and which has been taken into account in the preparation of the impact assessment Report is summarised below:

3.2.1 National

3.2.1.1 National Environmental Management Act (Act 107 of 1998) (NEMA)

NEMA is the principle/framework legislation governing EIA and subsequent EA processes under the authority of the National Department of Environmental Affairs.

NEMA makes provisions for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment; institutions that will promote co-operative governance;

procedures for co-ordinating environmental functions exercised by Organs of State and to provide for matters connected therewith.

Section 2 of the Act establishes a set of principles, which apply to the activities of all Organs of State that may significantly affect the environment. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised and positive impacts enhanced; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its entire life cycle.

These principles are taken into consideration when a Governmental Department needs to exercise its powers for example, during the processes of granting permits or Environmental Authorisations or the enforcement of existing legislation or conditions of approval.

Section 23 of NEMA furthermore provides for general objectives of Integrated Environmental Management. In alignment with these objectives, the potential impacts on the biophysical and socio-economic environments are identified and evaluated. These potential environmental impacts have been assessed during the impact assessment Report phase and mitigation measures are provided where relevant.

The subsequent Environmental Impact Assessment Regulations, 2014 (Government Notices R983, R984 and R985 of 04 December 2014) (as amended in April 2017), which are also referred to as Listing Notices 1, 2 and 3 respectively, list development activities which will trigger the necessity to conduct either a Basic Assessment or a full Scoping & EIA process prior to EA being obtained for a proposed project. Listing notices 1 & 3 activities require only a Basic Assessment to be conducted while Listing notice 2 activities trigger the requirement for a full Scoping & EIA process to be conducted.

Considering the nature and scale of the development activities triggered by the proposed project, it was required that a Section 24G Rectification process be conducted to provide sufficient information to the competent authority in order for them to make an informed decision regarding the approval or rejection of the EA applied for.

Only once the EA is granted and the required supporting permits have been issued, may the applicant lawfully commence with the proposed project. The Section 24G rectification application process is therefore a critical component in the feasibility and planning stage of any proposed project.

3.2.1.2 National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA)

NEMBA aims to provide for the management and conservation of the country's rich biodiversity within the framework of NEMA. It aids in the protection of species and ecosystems which warrant national protection and provides for the sustainable usage of the country's indigenous biological resources.

NEMBA and its Regulations was therefore utilised for determining the ecological/biodiversity significance, value and subsequently the adequate management of the proposed project area with regards to ecosystems, habitats and individual species.

The Department of Environmental Affairs is responsible for the implementation and overseeing of this legislation along with the South African National Biodiversity Institute (SANBI).

3.2.1.3 National Forests Act (Act 84 of 1998) (NFA)

The aim of the NFA is to promote the sustainable usage, management and development of forests for the benefit of all in South Africa. The Act also makes special provisions for the protection of specific forests and tree species which duly require formal protection in order to ensure their prolonged existence.

The National Forests Act was therefore utilised to determine the potential presence of any protected forests or tree species in the proposed project area in order to ensure that the correct processes are followed for the approval of any listed activities for which a permit may be necessary regarding such forests or species, should it be required.

Permit applications in terms of the National Forests Act are lodged with the Department of Agriculture, Forestry and Fisheries.

3.2.1.4 Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA)

CARA aims to provide for the protection and control over utilisation of the country's agricultural resources in order to promote conservation of soils, water and natural vegetation as well as the combatting of weeds and invader plants. Sustainable utilisation is a key objective.

CARA was therefore used for determining the agricultural significance, value and subsequently the adequate management of the proposed project area.

It is overseen by The Department of Agriculture, Land Reform and Rural Development in the Northern Cape Province.

3.2.1.5 National Water Act (Act 36 of 1998) (NWA)

The NWA aims to ensure sustainable use of water through the protection of the quality of water resources for the benefit of all water users. Its principal focus is the rectification and equitable allocation and use of the scarce and disproportionately distributed water resources of South Africa.

The property of the proposed project has standing water rights which allows the owner to extract from the Orange River. Section 21 of NWA defines the types of water uses which require a Water Use License to be applied for. The Act stipulates that a Water Use License Application must be submitted if a development takes place within 500 m of a natural watercourse. The relevance of this section of the Act to the specific project will be determined during the Environmental Impact Assessment phase.

The Department of Water and Sanitation is responsible for the implementation and overseeing of this legislation and is also the responsible authority for the issuing of permits for water use.

3.2.1.6 National Heritage Resources Act (Act 25 of 1999) (NHRA)

The NHRA aims to provide for the integrated and interactive management and conservation of the national heritage resources in South Africa so that they may be bequeathed for future generations.

Section 38 lists categorised development processes which require the South African Heritage Resources Agency (SAHRA) to be notified and furnished with an archaeological and palaeontological study of a proposed project area in order to obtain project authorisation. The following development processes are triggered during the construction and operational phases of the proposed project:

- (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as -
- (c) any development or other activity which will change the character of a site -
 - (i) exceeding 5 000m² in extent; or

The South African Heritage Resources Agency (SAHRA) has a mandate, in terms of the NHRA, to enforce the conditions of the NHRA, and hence oversees the management of heritage resources together with provincial heritage agencies.

3.2.1.7 National Development Plan – 2030 (NDP)

The executive summary of the National Development Plan (NDP) initiates with the following paragraph, *“The National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society.”*

Chapter 6 of the NDP specifically discusses the role and importance of commercial agriculture in the success of the country's economy and reaching the objectives of the NDP. It discusses the potential associated with the expansion of irrigated land towards food security and also job creation and capacity building (skills development and experience).

The development of the proposed potato pivots therefore be beneficial in terms of the goals/objectives described with regards to agriculture in the NDP.

3.2.2 Provincial

3.2.2.1 Northern Cape Nature Conservation Act (Act 9 of 2009)

In addition to the NFA, the Northern Cape Nature Conservation Act also makes provision for the protection and sustainable utilisation of wild animals, aquatic biota and plants on a provincial scale in the Northern Cape Province. It is therefore used in conjunction with the NFA to determine the ecological/biodiversity significance, value and subsequent management of the proposed project area.

The Northern Cape Nature Conservation Act was utilised to determine the potential presence of any provincially protected or specially protected species in the proposed project area in order to ensure that the correct processes are followed for the approval of any listed activities for which a permit may be necessary regarding such species, should it be required.

Permit applications in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) are lodged with the relevant provincial authority, which in this case is the Department of Environment and Nature Conservation in the Northern Cape Province.

3.2.2.2 Northern Cape Provincial Spatial Development Framework

The Northern Cape Provincial Spatial Development Framework (NCPSDF) was formulated in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000). Prepared in accordance with a bioregional planning approach adapted to suit the site-specific requirements of the Northern Cape, the NCPSDF recognises that no region or area should be planned and managed as an 'island' in isolation from its surroundings. Together, unit areas form part of the broader environment and the mutual relationships and linkages between adjacent units must be understood and applied.

The framework aims to act as a policy and strategy providing direction and guidance for:

- future land use,

- spatial context for provincial sectoral strategies,
- promoting a developmental state,
- alignment of environmental management priorities, and
- mobilising the overarching objective of the Northern Cape Provincial Growth and Development Strategy (PGDS) to build prosperous, sustainable and growing provincial economy to eradicate poverty and improves social development.

A focus for achieving sustainable development as discussed in the framework, requires four areas of capital, being environmental, human, infrastructure and monetary. The plan further stresses the need for integrative participation, positive interventions and innovative finance. The SDF makes specific reference to the importance of agriculture and capacity increase in this sector in the Northern Cape Province.

The proposed project will make a positive contribution towards various objectives of the SDF.

3.2.2.3 Northern Cape Provincial Growth and Development Strategy (NCPGDS)

The Northern Cape Provincial Growth and Development Strategy (NCPGDS) (2004 – 2014) highlights the most significant growth and development challenge as the reduction of poverty, and that only through long-term sustainable economic growth and development shall this be achieved. Important areas where growth can be achieved include agriculture and agro-processing, transport and tourism. In support of such growth areas the creation of opportunities for life-long learning, improvement of labour force skills to enhance productivity and expanding access to education and knowledge shall lead to the further realisation of such growth. Specialist

The inclusion of macro-level objectives shall mobilize these primary growth areas. Such objectives include the developing of human and social capital, improving the efficiency and effectiveness of governance and associated institutions and enhancing infrastructure for economic growth and development.

3.2.3 District and Local

3.2.3.1 Pixley Ka Seme District Municipality Integrated Development Plan 2017-2022

The District Municipality has developed its vision, development priorities, objectives and strategies with specific outcomes and outputs for the 2017-2022 financial year.

Vision

"Developed and Sustainable District for Future Generations."

Mission

The Pixley Ka Seme District Municipality will achieve its vision by:

- Supporting our local municipalities to create a home for all in our towns; settlements and rural areas to render dedicated services;
- Providing political and administrative leadership and direction in the development planning process;
- Promoting economic growth that is shared across and within communities;
- Promoting and enhancing integrated development planning in the operations of our municipalities; and
- Aligning development initiatives in the district to the National Development Plan.

The proposed project will be able to contribute positively to these objectives through job creation and sustainable capacity building (skills development and experience).

3.2.3.2 Thembelihle local municipality Integrated Development Plan 2015/2016

The following vision and mission is engrained into the Integrated Development Plan (IDP) of the Thembelihle local municipality

Vision

“We as Thembelihle Municipality, commit ourselves to a better life for all through sound economic growth, provision of basic infrastructure, disciplined social welfare, a sound and participative institutional management system, as we stand united.”

Mission

To improve the lives of citizens of Thembelihle Municipal area through:

- Quality Service Delivery
- Have a two way approach to communication and service
- Ensuring a safe and enabling environment for economic growth
- Ensuring integrated sustainable human settlements
- Ensuring equal opportunities

The proposed project will be able to contribute positively to these objectives through job creation and sustainable capacity building (skills development and experience).

3.3 RELEVANT GUIDELINES

The table (table 3) below lists the Guideline Documents that are applicable to the proposed project, and which are considered as part of the EIA process, as are required in terms of the NEMA EIA Regulations; 2014 (as amended in April 2017).

Table 3: Applicable guideline documents

1	DETEA EIA Guideline and Information Document Series
1.1	<i>Draft Guideline on the Need and Desirability in terms of the EIA Regulations of 2010. Integrated Environmental Management Guideline Series 9, Government Notice 792 of 2012.</i>
2	DEA & DP EIA Guideline and Information Document Series
2.1	<i>Guideline on Generic Terms of Reference for EAPs and Project Schedules, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning, March 2013.</i>
2.2	<i>Guideline on Need and Desirability, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning, March 2013.</i>
2.3	<i>Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning, March 2013.</i>
2.4	<i>Guideline on Public Participation, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning, March 2013.</i>
3	DEA&DP Guideline Document Series for Involving Specialists in the EIA Process, and others
3.1	<i>Guideline for Environmental Management Plans. CSIR Report No ENV-S-C2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town (Lochner, P. 2005).</i>

3.4 NEMA LISTED ACTIVITIES TRIGGERED BY THE PROPOSED PROJECT

The development activities in the National Environmental Management Act (Act 107 of 1998): Environmental Impact Assessment Regulations, 2014 (Government Notices R983, R984 and R985) (as amended in April 2017) which are triggered by the proposed project are listed in the table (table 4) below:

Table 4: Environmental Impact Assessment Regulations, 2014 listed activities triggered by the proposed project (as amended in April 2017)

Regulation	Activity	Description of trigger activity in proposed project
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Regulation	Activity	Description of trigger activity in proposed project
GN. R. 983 Listing Notice 1	<p>Activity 12 The development of – (ii) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs – (b) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse</p>	The water pipeline and water pump extracting water from the Orange River, and the extraction pump infrastructure and building exceeding 100m ² is located within 32 meter of the orange river which is regarded as a watercourse.
GN. R. 983 Listing Notice 1	<p>Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse</p>	The water pipeline and water pump extracting water from the Orange River, and the extraction pump infrastructure and building exceed the 10m ³ within the watercourse.
GN. R. 984 Listing Notice 2	<p>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.</p>	The already developed four (4) agricultural pivots cover a total area of 100 hectares.
GN. R. 984 Listing Notice 2	<p>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.</p>	The already developed four (4) agricultural pivots cover a total area of 100 hectares.
GN. R. 985 Listing Notice 3	<p>Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with the maintenance management plan. (G) In Northern Cape: (ii) Within critical biodiversity areas identified in bioregional plans</p>	Although the two vegetation types associated with the development are merely classified as least threatened, the entire terrestrial assessment area associated with the four pivot lands falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.

Regulation	Activity	Description of trigger activity in proposed project
<p>GN. R. 985 Listing Notice 3</p>	<p>Activity 14 The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs— (A) Within a watercourse- (H) In Northern Cape (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional Plans</p>	<p>the entire terrestrial assessment area associated with the water extraction pump falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan.</p>

4. PROJECT LOCATION AND DESCRIPTION

The following section provides an overview of the proposed project location as well as a detailed description of the proposed project.

4.1 PROJECT LOCATION

Pivot lands numbers 7 & 12 (*see attached locality map for pivot number and position*) as well as the two water extraction points are situated on the Remaining Extent of the Farm New Waterford no 229 (SG 21 Digit Code: C0320000000022900000) while numbers 8 & 11 (*see attached locality map for pivot number and position*) are situated on Portion 2 of the Farm New Waterford no 229 (SG 21 Digit Code: C0320000000022900002). The farm is located approximately 4.5 km outside the town of Hopetown towards Kimberley. The property falls inside the Thembelihle Local Municipality which, in turn forms part of the Pixley Ka Seme District Municipality, Northern Cape Province. The area falls outside the municipal urban edge. Access is obtained by way of the R 385 provincial road which branches off from the N 12 highway.

See locality map below.

Table 5: Farm name and Number with SG code and Landowner name

Farm Name and Number	SG 21 Digit Code	Land owner
Remaining Extent of the Farm New Waterford no 229	C0320000000022900000	Manzi Trust (IT416/2007)
Portion 2 of the Farm New Waterford no 229	C0320000000022900002	Amanzi Trust (IT415/2007)

(See Appendix F1 for the title deeds)

The four corner coordinate points for the study area are as follows:

- Northern corner 29°34'18.15"S; 24° 5'24.34"E
- Eastern corner 29°34'41.04"S; 24° 6'5.55"E
- Southern corner 29°35'50.89"S; 24° 5'13.50"E
- Western corner 29°34'59.31"S; 24° 4'29.38"E

The centre points of all the ***Already Established*** pivots are as follows:

Pivot Numbers 7 (20 hectare pivot) and 12 (30 hectare Pivot):

- Pivot 7 - 29°35'23.68"S; 24° 5'22.76"E
- Pivot 12 - 29°34'42.40"S; 24° 5'45.72"E

Pivot Numbers 8 (20 hectare Pivot) and 11 (30 hectare Pivot):

- Pivot 8 - 29°35'12.27"S; 24° 5'3.07"E
- Pivot 11 - 29°34'31.41"S; 24° 5'23.88"E

The start, deviation and split points of the **water pipeline routes** are as follows:

The first pipeline is for the extraction of water from the orange river to the four pivots being applied for.

- Start point - 29°35'25.12"S; 24° 4'37.04"E
- Split Point 1 - 29°35'14.19"S; 24° 4'48.77"E
- Deviation point 1 - 29°35'21.45"S; 24° 4'59.24"E
- Split Point 2 - 29°35'8.46"S; 24° 4'54.50"E
- Dam - 29°34'46.19"S; 24° 5'16.17"E
- Dam Extraction Point - 29°34'45.36"S; 24° 5'18.60"E
- Deviation Point 2 - 29°34'31.76"S; 24° 5'23.68"E
- End - 29°34'42.12"S; 24° 5'45.63"E

The second pipeline is for the extraction of water from the orange river to the existing pivots. The existing pivots are not being applied for they do not require environmental authorisation due to their establishment prior to the Environmental Legislation being implemented.

- Start point - 29°35'45.07"S; 24° 6'14.41"E
- Dam - 29°35'30.10"S; 24° 6'22.87"E
- Dam Extraction Point - 29°35'30.39"S; 24° 6'21.37"E
- Pivot A - From Dam - 29°35'36.99"S; 24° 6'12.69"E
- Pivot B - From Dam - 29°35'35.49"S; 24° 5'57.57"E
- Pivot C – From Pivot D - 29°35'19.78"S; 24° 5'46.99"E
- Pivot D - From Dam - 29°35'21.12"S; 24° 6'10.59"E
- Split Point - From Pivot D - 29°35'2.05"S; 24° 6'8.53"E
- Pivot E - From Split Point - 29°35'3.44"S; 24° 6'21.78"E
- Pivot F - From Split Point - 29°35'0.52"S; 24° 5'55.68"E

Table 6: Details of relevant land owner

Company/entity name:	Manzi Trust (IT416/2007) and Amanzi Trust (IT415/2007)
Postal address:	PO Box 188, Hopetown, 8750

Contact person:	Mr. Pieter Louw
Designation:	Owner
Contact number:	082 494 1822
E-mail address:	admin@louwboerdery.co.za

A visual illustration of the proposed project area is provided in Figures 1 & 2 while the location of the proposed project illustrated on the locality map in Figure 3 below:



Figure 1: Image visually illustrating one of the established pivots



Figure 2: Image visually illustrating the general vegetation cover in the area

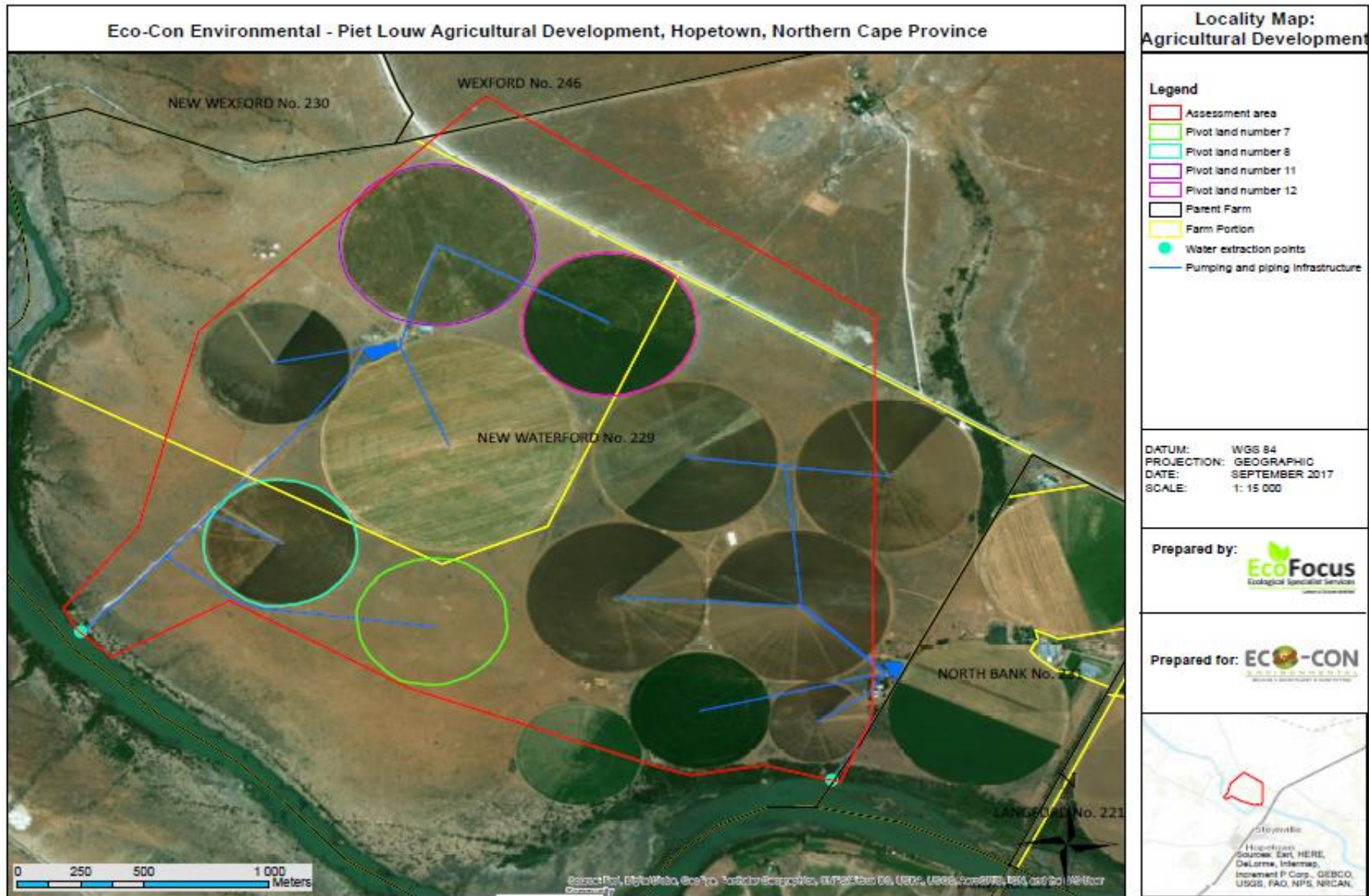


Figure 3: Locality map of the proposed project layout (see Appendix B for an A3 size version)

4.2 PROJECT DESCRIPTION

The applicant, Mr. Pieter Louw, has developed four (4) cultivated circular pivot lands (100ha) on the Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 near Hopetown, as well as two water extraction points in the Orange River for which environmental authorisation was not previously obtained from the Northern Cape Department of Environment and Nature Conservation (DENC). The applicant has become aware of this transgression and has opted to follow a Section 24G rectification process in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA).

Two of the pivots (pivots number 7 and 8) are 20 hectares and the remaining two pivots (pivots number 11 and 12) are 30 hectares. These pivots are primarily being utilised for the planting of maize during the months of December until June and Wheat from July to November. Cotton seed and Soya seeds are also planted on these pivots on a crop rotation cycle in order to maintain soil fertility quality.

Also established are two water pipelines extracting water from the Orange river for irrigation purposes. The first pipeline (as per coordinates above) is for irrigation of the four pivots being applied for in this impact assessment report. The pipeline is currently 300mm in diameter and stretch a total distance of 1.3km to the existing dam. The applicant will however upgrade the current pipeline to a 500mm diameter pipeline in order to accommodate for the additional water which is being purchased at the moment. From the dam, water is being extracted and fed to the respective pivot areas for irrigation.

The second pipeline (as per coordinates above) is an existing 500mm pipeline extracting water from the orange river to the onsite settling dam over a distance of 500 meters. The pivots for which this water is extracted are not being applied for as they were established prior to the environmental legislation being put in place. However, the pipeline is a new pipeline and therefore being applied for.

Already established farm roads are already in place which link up with the pivots.



Figure 4: Pivots being applied for

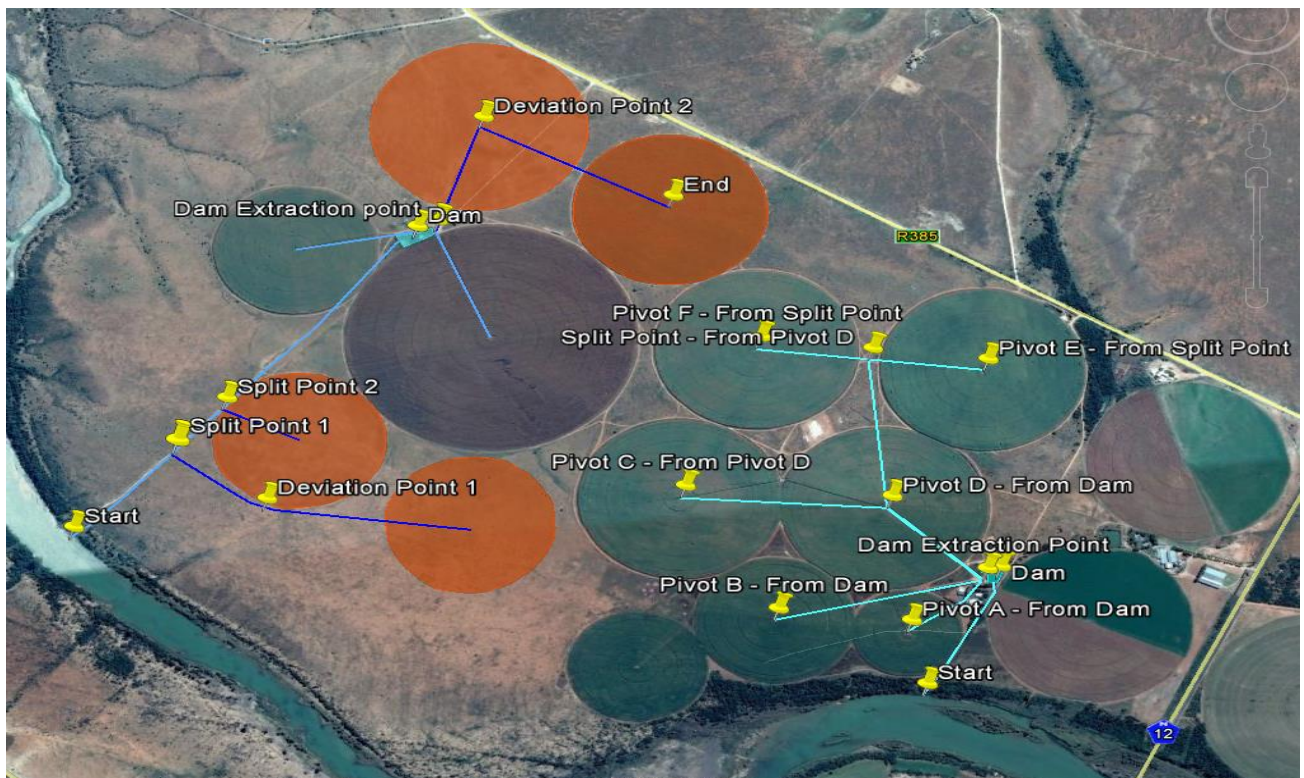


Figure 5: Established Pipeline routes

4.3 PROJECT SERVICES

4.3.1 Electricity Supply

- The water extraction pumps are the only aspect requiring electricity. Electricity is already obtained from nearby electrical connection points for which the applicant is responsible for settling accounts received from the local municipality.

4.3.2 Sewage Management

- Sufficient portable chemical toilets are being supplied on site for the manual labourers during the annual harvesting and planting periods. These toilets are cleaned and waste removed by an appropriate contractor on a regular basis as and when required during these timeframes.

4.3.3 Solid Waste Management

- Solid general waste generated on site are removed by the applicant to the local municipal landfill site on a regular basis as and when required.

4.3.4 Water Supply

As discussed under section 4.2 above, water is extracted from the Orange River for irrigation purposes. See Appendix G for the water use rights documentation indicating the allowable water use. Additional Water use rights and authorisations will have to be obtained.

5. NEEDS AND DESIRABILITY OF THE PROJECT

Various key factors must be taken into consideration as motivation/incentive for the potential benefits involved with the proposed project. These factors have been summarised below:

Maize and Wheat production is one of the most valuable agricultural crops that can be grown in South Africa. In fact, Maize is the most important grain crop in South Africa, followed by Wheat which is second.

5.1 FOOD SUPPLY IN SOUTH AFRICA

South Africa is poorly endowed when it comes to Agriculture. Only 14 percent of the total surface area is available for crop production. High potential land comprises only 21,9 percent of total arable land (Breitenbach and Fenyes, 2000).

The most important restriction on agricultural production is the availability of water. Rainfall is distributed unevenly over the country, with humid subtropical conditions in the east and dry desert conditions in the west. South Africa is periodically affected by severe and prolonged droughts that are often terminated by severe floods. About 65 percent of South Africa have an average rainfall of less than 500 mm which is generally regarded as the minimum for rain-fed cropping. This condition is worsened by evapotranspiration, especially in areas with relatively low rainfall (Breitenbach and Fenyes, 2000).

Despite all these restrictions, South Africa is self-sufficient in the production of most major crops. In the 1980s, South Africa was self-sufficient in terms of all important field crop products (except rice) and horticultural products (except coffee, tea, cocoa and spices), thus achieving above 100 points on the Self-Sufficiency Index (SSI)¹ for certain field crops and 160+ for horticultural products (see figure below) This implies that a large percentage of field crops and horticultural crops are available for export. For animal products, the score on a self-sufficiency index is less than 100, implying moderate imports of mainly red meat and industrial milk products. The majority of wool and mohair clips and karakul pelts have always been destined for export markets (Breitenbach and Fenyes, 2000).

Commodity	Imports	Exports	Total supply	Consumption**		Self-sufficiency Index			
				Total	Human	95-99	91-94	85-90	85-94
(1 000 ton) (1995 - 1999)									
Wheat	646	240	2095	2022	1908	103.6	95.0	115.5	107.4
Maize(White and yellow)	361	2277	8159	5957	2672	136.9	109.5	121.1	116.5
Potatoes	2	19	1525	1185	1249	128.7	100.6	100.3	100.4
Vegetables	18	38	2013	1592	1769	126.5	100.9	101.3	101.1
Sugar	47	1119	2250	826	1305	272.4	163.5	162.5	162.9
Beef	106	20	507	472	600	107.4	93.1	89.9	91.2
Mutton, goat's meat and lamb	53	0	103	123	156	83.14	82.0	93.3	88.8
Pork	11	1	122	107	132	114.6	96.1	100.9	99.0
Chicken	34	4	939	741	873	126.7	99.1	99.4	99.3
Eggs	0	3	294	226	256	130.4	101.7	101.7	101.7
Deciduous and subtropical fruit	0	581	1749	872	946	200.5	156.5	152.3	154.0
Dairy products	NA	NA	NA	NA	NA	129.1	NA	101.0	NA
Condensed & powder milk	50	81	335	260	297	124.8	123.5	105.5	112.1
Fresh milk	0	0	2827	2265	1525	119.5	100.0	100.0	100.0
Cheese	3	1	38	32	40	100.0	100.0	100.3	100.8
Butter	4	2	12	12	15	74.11	100.0	100.0	100.7
Sunflower seed oil	181	25	191	257	277	273.2	60.3	87.5	76.6
Citrus fruits	2	635	1356	496	611	0.00	235.5	254.0	246.6
Rice	502	24	0	393	463		0.0	0.0	0.0
COMMODITY GROUP									
Grains and field crops							88.2	97.2	94.0
Horticultural crops							164.3	169.2	167.2
Livestock products							96.0	99.0	99.3

5.2 VALUE OF CROP:

South Africa is a water stressed country and it is therefore essential that we use our irrigation water effectively. Based on water use (m3 of water used per ton of food produced) wheat and maize are some of the most efficient. An example is provided in the image below.

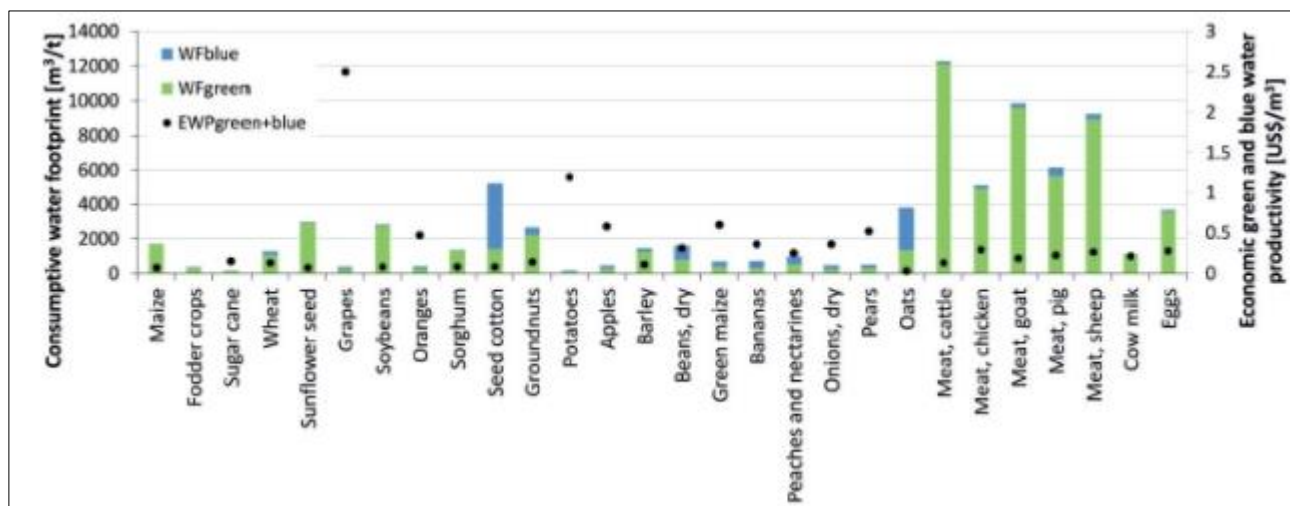


Figure 6: Water footprint of selected foods

The comparison of crops grown in the irrigation areas around Kimberley and Hopetwon are listed below. See Table 7.

Table 7: Crop yield in kg produce per cubic meter water used

Crop	Water requirements m3 per ha	Yield tons/ha	Yield in kg product per m3 water used
Seed Potatoes	5570	70	12.6
Onions	5300	65	12.3
Pecan Nuts	11000	2.5	0.2
Cotton	7534	5.5	0.7
Groundnuts	6900	4	0.6
Lucerne	11000	20	1.8
Maize	6900	15	2.2
Wheat	5700	8	1.4

These water use figures are from the Oranje Riet Water User's Association and are based on long term usage.

It can be seen that with Wheat (1.4 kg) and Maize (2.2 kg) produce is produced with 1 m3 of water compared to 0.2 kg in the case of Pecan Nuts and 0.7 kg in the case of cotton.

Table 8: Value of crops grown under irrigation

Crop	Water requirements m3 per ha	Yield tons/ha	Price of Product Rand/ton *	Gross Income per ha	Income per m3 of water
Seed Potatoes	5570	70	4370	305900	54.92
Onions	5300	65	3200	208000	39.25
Pecan Nuts	11000	2.5	80000	200000	18.18
Cotton	7534	5.5	9200	50600	6.72
Groundnuts	6900	4	12000	48000	6.96
Lucerne	11000	20	2100	42000	3.82
Maize	6900	15	2200	33000	4.78
Wheat	5700	8	4150	33200	5.82

* Price of product = Price of product with delivery at first point of transaction before transaction costs.

**Price of potatoes is a weighted price of ware and seed in a 70:30 ratios.

As can be seen in Table 8 above, the value created by Maize and Wheat production merely exceeds that of Lucerne grown in the Kimberley/Hopetown area on an income per cubic meter of water basis. However, Maize and Wheat are the most important crops in South Africa.

5.3 JOB CREATION

At present, it costs about R7 000 per ha to produce Wheat and Maize and this has a huge multiplier effect in the farming, labour and business community.

The jobs created involve skilled, semi-skilled and a labour component. Today most of the harvesting is done by mechanical harvesters so the labour component is mainly made up of labour in the packing shed and labour used for rogueing which is the continual monitoring and removal of any off-types or diseased plants in the seed plantings. None of the work can be regarded as menial labour.

The skilled and semi-skilled staff component is made up of managers, admin staff, foremen, various machine operators and maintenance personnel. Two of the three managers are white and the rest of the staff are all Black.

The following work opportunities arise from this project:

Seasonal labour: 15 people

Permanent staff: 15 people

The seasonal labour works from June to July and November to December.

6. ALTERNATIVES CONSIDERED

According to Chapter 1 of NEMA EIA Regulations 2014 (as amended in April 2017), Notice R982, “*Alternatives*”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to-

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

These NEMA EIA Regulations 2014 (as amended in April 2017), Notice R982, recognises that details on alternatives need to include “*a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity*”.

The consideration of alternatives is therefore a key component of an EIA process. While an EIA process should investigate and comparatively **consider** all alternatives that have been identified, only those found to be “feasible” and “reasonable” must be comparatively **assessed**, in terms of the advantages and disadvantages that the proposed activity and alternatives will have on the environment and on the socio-economic aspects of communities that may be affected by the activity.

The “feasibility” and “reasonability” of an alternative are measured by:

- the general purpose and requirements of the activity;
- the need and desirability of the activity;
- opportunity costs;
- the need to avoid and/or minimise negative impacts;
- the need to maximise benefits; and
- how it impacts on the community that may be affected by the activity (DEA&DP, 2013b).

As this impact assessment report entails an application for four (4) already developed pivot areas to a total of 100 hectares and two already developed pipelines, no alternative was considered as the development already took place resulting in an application in terms of Section 24G of NEMA.

6.1 LOCATION ALTERNATIVES

As the development already took place, no location alternatives are available. The applicant is also the owner of the two properties as mentioned in the report.

6.2 LAYOUT ALTERNATIVES

As mentioned above, the four (4) pivot areas to a total of 100 hectares have already been developed. The two water pipelines have also been developed. As a result, no layout alternatives are available.

6.3 NO-GO OPTION

As the development already took place, the no-go option will entail the elimination of the already developed four (4) pivot areas to a total of 100 hectares, including the elimination of both the already established water pipeline routes.

Project Advantages

- The proposed project already contribute to local job creation by means of 15 permanent staff;
- The development already uplifted the local economic conditions as the local surrounding area has a very low crazing capacity.

Project Disadvantages

If the proposed project is eliminated, the local communities together with the landowner will forego the economic benefits which the project already have on the area such as immediate employment opportunities and revenue streams and most importantly, sustainable capacity building (skills, experience and resources development) for the future.

7. DESCRIPTION OF THE ENVIRONMENT

The following section provides an overview of the bio-physical as well as the socio-economic environments of the proposed project. The table below (table 9) indicates the list of specialist studies that were conducted during the assessment process:

Table 9: List of Specialist Studies Conducted

Specialist Name	Organisation	Specialist Assessment Type
Mr. Rikus Lamprecht	EcoFokus	Ecological and Wetland Impact Assessment
Dr. Lloyd Rossouw	Palaeo Field Services	Archaeological and Palaeontological Impact Assessment (Heritage Assessment)
Dr. George van Zijl	Digital Soils Africa	Soil Suitability Assessment

7.1 BIO-PHYSICAL DESCRIPTION

This section provides a comprehensive description of the bio-physical environment of the proposed project area.

7.1.1 Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 322 mm (www.climate-data.org). The maximum average monthly temperature is approximately 25.5°C in the summer months while the minimum average monthly temperature is approximately 9°C during the winter. Maximum daily temperatures can reach up to 33.2°C in the summer months and dip to as low as 0.5°C during the winter.

7.1.2 Geology and Soils

According to Mucina & Rutherford (2006) the geology of the landscape and associated vegetation type can be described as the following:

The underlying geology is mainly formed by shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both of the Ecca Group) as well as Dwyka Group diamictites. Broad areas are covered by superficial deposits including calcretes of the Kalahari Group. Soils are variable from shallow to deep, red-yellow apedal and freely draining with potential scattered rocky dolerite outcrops.

The Orange River riparian zones associated with the water extraction points mainly consist of recent alluvial deposits mostly underlain by Karoo Supergroup sediments.

7.1.3 Topography

The proposed project area is mainly characterised by a wide, flat open plain consisting of deep sandy to loamy soils of the Hutton soil form. A slightly elevated rocky ridge area with well drained soils is also present in the southern section of the proposed project area. The topography of the area varies between 1036 to 1074 MASL.

7.1.4 Ecological and Vegetation Conservation Status

According to Mucina & Rutherford (2006), all four pivot lands fall within the Kimberley Thornveld vegetation type (SVk 4) which is characterised by slightly irregular plains with a well-developed woody component (tree and shrub layer). The herbaceous layer is usually open with much uncovered soils. Only the eastern edges of pivot lands numbers 7 & 12 fall within the Northern Upper Karoo vegetation type (NKu 3) which mainly consists of flat to slightly sloping shrubland, dominated by dwarf karoo shrubs and sparse grasses. Both of these vegetation types are merely classified as least threatened because of their broad distributions and them being mostly excluded from being utilised for intensive agricultural cultivation activities (Mucina & Rutherford, 2006).

'Ground truthing' during the site visit however suggests that all four pivot lands rather fall within the Northern Upper Karoo vegetation type (NKu 3) as the entire project site and surrounding natural, undeveloped areas constitute shrubland, dominated by dwarf karoo shrubs and sparse grasses. No distinct woody component, associated with the Kimberley Thornveld vegetation type (SVk 4) is present on and around the project site and no distinct change in vegetation composition or soil structure is evident towards the west of the site which might have indicated a transition towards Kimberley Thornveld vegetation.

The two water extraction points form part of the Orange River riparian zone which is associated with the Upper Gariep Alluvial vegetation type (AZa 4). This vegetation type is classified as vulnerable due to significant transformation caused by cultivation activities and dam infrastructure development (Mucina & Rutherford, 2006).

Although the initially mentioned two vegetation types are merely classified as least threatened, the entire terrestrial assessment area associated with the four pivot lands falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. The two water extraction points, associated with the Upper Gariep Alluvial Vegetation Type (AZa 4), fall within a Critical Biodiversity Area one (CBA 1). Critical Biodiversity Areas are areas which play an important role in conservation and

reaching certain required biodiversity targets for ecosystem types, species or ecological processes (Collins, 2015).

The development of the four pivot lands and two water extraction points have however already completely transformed the majority of the surface vegetation on the footprint area.

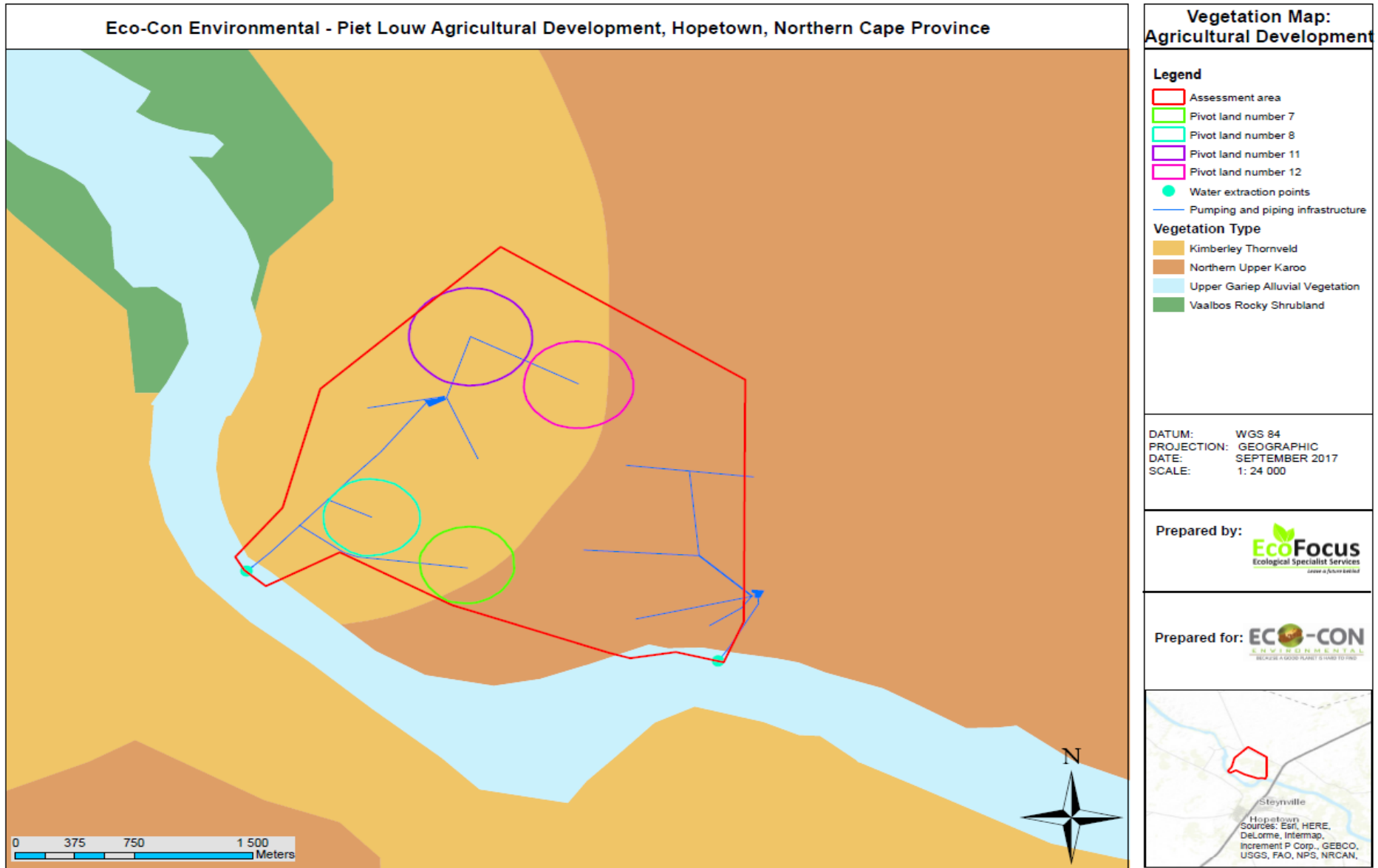


Figure 7: Vegetation map of the proposed project layout (see Appendix B for an A3 size version)

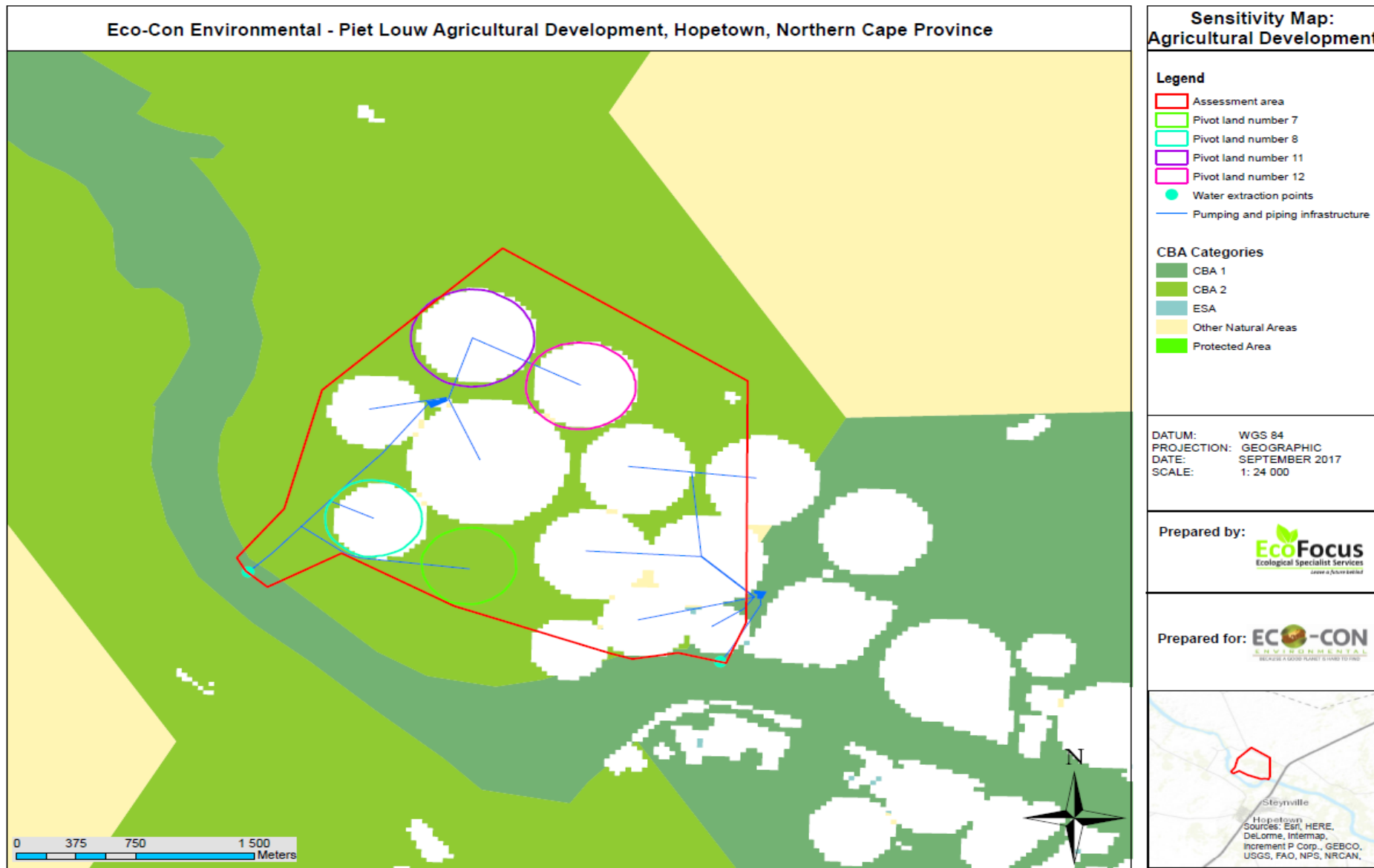


Figure 8: Ecological sensitivity map of the proposed project layout (see Appendix B for an A3 size version)

7.1.4.1 Terrestrial environment

Results and Discussion of the Specialist Report

The proposed project area can be divided into two sections based on landscape structure and condition of vegetation/extent of degradation:

- Terrestrial Vegetation of the surrounding natural, undeveloped areas associated with the Northern Upper Karoo Vegetation Type
- Orange River riparian zone associated with the Upper Gariep Alluvial Vegetation Type

Each of the sections will now be discussed:

Terrestrial Vegetation of the surrounding natural, undeveloped areas associated with the Northern Upper Karoo Vegetation Type

Current Existing Vegetation and Site Condition

A number of cultivated pivot lands, other than the four associated with the NEMA Section 24G process, are present within the assessment area of which the natural vegetation has also been completely transformed. As per confirmation received from the applicant, the necessary environmental authorisations and ploughing certificates have been successfully obtained for these other cultivated pivot lands. The areas to the north, west and south of the four pivot lands applicable to the NEMA Section 24G process, are however in a natural, undeveloped condition while the portions of land situated in-between the individual pivot lands area also still in a semi-natural state. The historic ecology of the pivot lands is assumed to have been comparable to that of these surrounding natural, undeveloped areas as no significant change in soil structure or landscape topography or features is evident.

The entire natural, undeveloped area surrounding the four pivot lands is very homogenous with no significant or distinct variation in vegetation structure or landscape features. It consists of a gently to moderately sloping shrubland (towards the Orange River located to the south and west), dominated by dwarf karoo shrubs and grasses which are associated with the Northern Upper Karoo vegetation type (NKu 3). A distinct lack of a well-established woody component is evident resulting in no nationally protected *Acacia* species potentially being present. The soils are mostly red-yellow apedal with a low rocky coverage which is representative of the relevant vegetation type.

The dominant shrubs are *Phaeoptilum spinosum*, *Pteronia glauca*, *Zygophyllum incrustatum*, *Salsola aphylla*, *Pentzia glubosa* and *Eriocephalus ericoides*. *Euphorbia burmanni* (provincially protected) is also present but to a significantly lesser extent while *Rhigozum trichotomum* is present but confined to isolated rockier soils.

Forbs include *Ruschia spinosa* (provincially protected) *Crotalaria orientalis*, *Felicia spp.*, *Eriocephalus aspalathoides*, *Chrysocoma obtusata*, *Acrotome inflata*, *Moraea pallida* (provincially protected), *Indigastrum argyraeum*, *Peliostomum leucorrhizum*, *Albuca collina*, *Hermannia cococarpa*. The grass layer is dominated by the species *Schmidtia pappophoroides*, *Eragrostis lehmanniana*, *Enneapogon cenchroides* and *Aristida congesta*. Other grasses include *Eragrostis obtusa*, *Fingerhuthia africana* and *Enneapogon desvauxii*. No individuals of *Aloe* (provincially protected) or *Aptosimum* species were encountered within the surrounding natural, undeveloped areas. No underground bulbous species were encountered due to the timing of the site visit which does not fall within their flowering periods.



Figure 9: Image illustrating the landscape of the surrounding natural, undeveloped areas associated with the Northern Upper Karoo vegetation type

With the exception of the three provincially protected species *Euphorbia burmanni*, *Ruschia spinosa*, and *Moraea pallida*, no Red Data Listed, nationally protected or any other species of conservational significance were found to be present within the assessment area.

The assessment area 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 unique or important bird habitats for nesting sites were observed and the mobility of bird species allows for individuals to simply leave an area where disturbance is taking place and disperse to other similar, adequate areas. The lack of a well-established woody component also rules out the possibility of large or significant raptor/predatory nesting sites being present.

Signs of mammals such as small deer species traversing the area, are evident. However, due to the continual anthropogenic disturbance and activities/presence in the area, no large or conservational important faunal species were encountered or are expected to utilise the area for breeding or persistence habitat.

Individuals of common sand lizard species (*Lacertids*) were sporadically encountered which utilise the shrubland for persistence habitat and foraging purposes.

Table 10: Species list for the assessment area (Provincially protected species highlighted in Orange)

Graminoids	Forbs	Shrubs and Trees
<i>Aristida congesta</i>	<i>Acrotome inflata</i>	<i>Eriosephalus ericoides</i>
<i>Enneapogon cenchroides</i>	<i>Albuca collina</i>	<i>Euphorbia burmanni</i>
<i>Enneapogon desvauxii</i>	<i>Chrysocoma obtusata</i>	<i>Pentzia glubosa</i>
<i>Eragrostis lehmanniana</i>	<i>Crotalaria orientalis</i>	<i>Phaeoptilum spinosum</i>
<i>Eragrostis obtusa</i>	<i>Eriosephalus aspalathoides</i>	<i>Pteronia glauca</i>
<i>Fingerhuthia africana</i>	<i>Felicia spp.</i>	<i>Rhigozum trichotomum</i>
<i>Schmidtia pappophoroides</i>	<i>Hermannia cococarpa</i>	<i>Salsola aphylla</i>
-	<i>Indigastrum argyraeum</i>	<i>Zygophyllum incrustatum</i>
-	<i>Moraea pallida</i>	-
-	<i>Peliostomum leucorrhizum</i>	-
-	<i>Ruschia spinosa</i>	-

Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

The Present Ecological State (PES) of the pivot lands is classified as Class E as it is seriously modified. The loss of natural habitat, biota and basic ecosystem functionality is extensive due to the cultivation activities. The historic ecological state of the pivot lands is however assumed to have been comparable to that of the current condition of the surrounding natural, undeveloped areas associated with the Northern Upper Karoo vegetation type (NKu 3). The PES of these areas is classified as Class B as it is largely natural. A small change in natural habitats and biota may have taken place due to the surrounding farming developments and management activities but the ecosystem functionality has remained essentially unchanged.

The pivot lands and virtually the entire surrounding terrestrial, natural, undeveloped area are associated with the Northern Upper Karoo vegetation type (NKu 3) which is extremely vast and homogenous in the area. The vegetation type is also merely classified as least threatened (Mucina & Rutherford, 2006). The terrestrial area associated with the pivot lands however falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. Critical Biodiversity Areas are areas

which play an important role in conservation and reaching certain required biodiversity targets for ecosystem types, species or ecological processes (Collins, 2015). The CBA 2 forms part of a larger continuous ecological corridor associated with the Orange River catchment and sensitive riparian zone.

The pivot lands are however located a significant distance away from the abrupt start of the actual riparian zone (approximately 400 m away) and the transformation of surface area caused by the four pivot lands is relatively small and isolated when compared to the broader river catchment area. The impact on the CBA 2 associated with the Orange River catchment and sensitive riparian zone is therefore relatively moderate.

The historic Ecological Importance and Sensitivity (EIS) of the pivot lands is assumed to have been comparable to that of the surrounding natural, undeveloped areas. The EIS of these areas is classified as Class C (moderate) as it is ecologically important and sensitive on local or possibly provincial scale for the persistence of the CBA 2 ecological corridor. The area is therefore of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type. The impact caused by the pivot lands is relatively small and isolated and surrounding biodiversity is still relatively ubiquitous due to the vast and homogenous surrounding landscape.

Orange River riparian zone associated with the Upper Gariep Alluvial Vegetation Type

Current Existing Vegetation and Site Condition

Two water extraction points with pumping stations and associated piping infrastructure are present within the Orange River riparian zone which borders the assessment area to the south. As per the locality map, the first extraction point is situated in the south-westerly corner of the assessment area while the second is situated in the south-easterly corner.

- South-westerly situated water extraction point:

A sudden steep drop in elevation is experienced towards the Orange River which commences approximately 250 m from the river edge. The soil of the slope area becomes increasingly rockier down the slope until it reaches the riparian zone on the river bank and flat terrace which mainly consists of alluvial deposited sands. This rocky slope is associated with the Vaalbos Rocky Shrubland vegetation type (SVk 5) which is expected to be present in areas around the river riparian zone as per Mucina & Rutherford (2006). The vegetation type is merely classified as least threatened and viewed as a transitional zone from the top flat terrestrial shrubland towards the river riparian zone. The woody component of the rocky slope area is significantly more prominent than that of the top flat shrubland and is mainly dominated by *Acacia mellifera* and *A tortilis* shrubs. Individuals of *Searsia lancea*, *Ehretia rigida* and the nationally protected tree species *Boscia albitrunca* are also sporadically present. The grass layer is sparse and dominated by *Aristida diffusa* while

Ruschia spinosa (provincially protected) dominates the forb layer. Individuals of *Aloe* species (provincially protected) are also sporadically present.

Individuals of ground agamas (*Agama aculeata*) and worm snakes (*Leptotyphlops sp.*) were sporadically encountered on the slope which utilise the rocky slopes for persistence habitat and foraging purposes.



Figure 10: Image illustrating the landscape of the rocky slope area associated with the Vaalbos Rocky Shrubland vegetation type as well as the presence of the nationally protected tree species, *Boscia albitrunca*

The actual pumping infrastructure of the water extraction point is situated directly within the Orange River riparian zone which is confined to the river bank and flat terrace. The riparian zone is associated with the Upper Gariep Alluvial vegetation type (AZa 4) and possesses a well-developed, prominent woody component which is mainly dominated by *Acacia karroo*. Individuals of the tree species *Searsia leptodictya*, *Searsia lancea*, *Salix mucronata* and *Salix babylonica* (exotic) are also present. The grass layer on the flat river bank terrace is mostly dominated by *Cynodon dactylon* while the aquatic river zone is dominated by the reed species *Phragmites australis*.



Figure 11 a & b: Two images illustrating the landscape of the Orange River riparian zone associated with the Upper Gariep Alluvial vegetation type

The vegetation of the rocky slope area and riparian zone has not been significantly impacted upon by the development of the water extraction point. The impact is restricted to a narrow, confined linear section (≤ 8 m in width) which has been historically cleared for the pumping infrastructure in the river and the associated piping infrastructure to run up the slope. The historic vegetation clearance has been neatly confined to the linear section in order to prevent unnecessary tree removal or an increase in the impacted footprint area.

The area seems to be adequately maintained as no significant soil erosion down the slope or hydrocarbon contamination at the pumping infrastructure in the river is evident.



Figure 12: Image illustrating the presence and narrow, confined impact of the pumping infrastructure

- South-easterly situated water extraction point:

No significant rocky slope is present in this portion of the assessment area. The top flat terrestrial shrubland is immediately replaced by a short, steep drop in elevation towards the river which constitutes the riparian zone associated with the Upper Gariep Alluvial vegetation type (AZa 4). The pumping and associated piping infrastructure of the water extraction point is situated directly within the Orange River riparian zone. The woody component of the riparian zone is mainly dominated by *Acacia karroo*. Individuals of the tree species *Searsia leptodictya*, *Searsia lancea*, *Salix mucronata* and *Salix babylonica* (exotic) are also present. Shrubs also include *Lycium hirsutum* and *Blumea sp.* No significant grass layer is present as there is no well-defined flat river bank terrace. The aquatic river zone is also dominated by the reed species *Phragmites australis*.



Figure 13 a & b: Two images illustrating the immediate transition from the flat terrestrial area to the Orange River riparian zone associated with the Upper Gariep Alluvial vegetation type

The vegetation of the riparian zone has not been significantly impacted upon by the water extraction point. The impact is restricted to a narrow, confined linear section (≤ 5 m in width) which has been historically cleared for the pumping infrastructure in the river and the associated piping infrastructure to run up the short slope. The historic vegetation clearance has been neatly confined to the linear section in order to prevent unnecessary tree removal or an increase in the impacted footprint area. The area seems to be

adequately maintained as no significant soil erosion down the slope or hydrocarbon contamination at the pumping infrastructure in the river is evident.



Figure 14 a & b: Two images illustrating the presence and narrow, confined impact of the pumping and associated piping infrastructure

The clearance of vegetation and excavation of soil up the short riparian slope has created a favourable, specialised bird habitat and provided a significant amount of Bee-eaters (*Merops sp.*) with the opportunity to establish nests in the excavated banks of the river.



Figure 15: Image illustrating the presence of Bee-eater birds' (*Merops sp.*) nests in the excavated banks of the river

Table 11: Species list for the assessment area (Nationally protected species highlighted in orange; provincially protected species highlighted in yellow)

Graminoids	Forbs	Shrubs and Trees
<i>Aristida diffusa</i>	<i>Blumea sp</i>	<i>Acacia karroo</i>
<i>Cynodon dactylon</i>	<i>Lycium hirsutum</i>	<i>Acacia mellifera</i>
<i>Phragmites australis</i>	<i>Ruschia spinosa</i>	<i>Acacia tortilis</i>
-	-	<i>Boscia albitrunca</i>
-	-	<i>Ehretia rigida</i>
-	-	<i>Salix babylonica (exotic)</i>
-	-	<i>Salix mucronata</i>
-	-	<i>Searsia lancea</i>
-	-	<i>Searsia leptodictya</i>

Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

The Present Ecological State (PES) of the rocky slope and riparian zone is classified as Class A as it is unmodified, natural and pristine.

The two water extraction points are associated with the Upper Gariep Alluvial vegetation type (AZa 4) which is restricted to the narrow riparian zones of the Orange River. The vegetation type is classified as vulnerable due to significant transformation caused by cultivation activities and dam infrastructure development (Mucina & Rutherford, 2006). The riparian zone associated with the two water extraction points, also falls within a Critical Biodiversity Area one (CBA 1) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. Critical Biodiversity Areas are areas which play an important role in conservation and reaching certain required biodiversity targets for ecosystem types, species or ecological processes (Collins, 2015). The CBA 1 forms part of a narrow continuous ecological corridor associated with the sensitive Orange River riparian zone.

The Ecological Importance and Sensitivity (EIS) of the rocky slope and riparian zone is classified as Class B (high) as it is ecologically important and sensitive on provincial or possibly national scale for the persistence of the CBA 1 ecological corridor associated with the sensitive Orange River riparian zone. The area is therefore of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type. The vegetation of the riparian zone has however not been significantly impacted upon by the two water extraction points. The impact is restricted to two narrow, confined linear sections which have been historically cleared for the pumping infrastructure in the river and associated piping infrastructure to run up the slopes. The historic vegetation clearance has been neatly confined to the two linear sections in order to prevent unnecessary tree removal or an increase in the impacted footprint area.

7.1.4.2 Conclusions and Recommendations in terms of the Ecological report

The development of the four pivot lands and two water extraction points have completely transformed the majority of the surface vegetation on the footprint areas.

The historic ecology of the pivot lands is assumed to have been comparable to that of the surrounding natural, undeveloped areas as no significant change in soil structure or landscape topography or features is evident. The entire natural, undeveloped area surrounding the four pivot lands is very homogenous with no significant or distinct variation in vegetation structure or landscape features. It consists of a gently to moderately sloping shrubland (towards the Orange River located to the south and west), dominated by dwarf karoo shrubs and grasses which are associated with the Northern Upper Karoo vegetation type (NKu 3). The vegetation type is merely classified as least threatened (Mucina & Rutherford, 2006). A distinct lack of a well established woody component is evident resulting in no nationally protected *Acacia* species potentially being present. With the exception of individuals of the provincially protected species *Ruschia*

spinosa, *Moraea pallida* and to a lesser extent, *Euphorbia burmanni* no Red Data Listed, nationally protected or any other species of conservational significance were found to be present within the assessment area.

The terrestrial area associated with the pivot lands also falls within a Critical Biodiversity Area two (CBA 2) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. Critical Biodiversity Areas are areas which play an important role in conservation and reaching certain required biodiversity targets for ecosystem types, species or ecological processes (Collins, 2015). The CBA 2 forms part of a larger continuous ecological corridor associated with the Orange River catchment and sensitive riparian zone and is therefore of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type.

The pivot lands are however located a significant distance away from the abrupt start of the actual riparian zone (approximately 400 m away) and the transformation of surface area caused by the four pivot lands is relatively small and isolated when compared to the broader river catchment area. The area therefore scored a moderate EIS value and the significance of the four pivot land developments on the CBA 2 is relatively moderate.

The pumping infrastructure of the two water extraction points is situated directly within the Orange River riparian zone which is confined to the river banks. The riparian zone is associated with the Upper Gariiep Alluvial vegetation type (AZa 4) which is classified as vulnerable (Mucina & Rutherford, 2006). The piping infrastructure of the south-westerly situated water extraction point subsequently runs up a steep, rocky slope associated with the Vaalbos Rocky Shrubland vegetation type (SVk 5) which is merely classified as least threatened as per Mucina & Rutherford (2006). Individuals of the nationally protected tree species, *Boscia albitrunca* were sporadically encountered but only on the rocky slope area. The provincially protected species *Ruschia spinosa*, is the dominant forb on the rocky slope area. No Red Data Listed or any other species of conservational significance were found to be present within the assessment area.

The footprint area of the two water extraction points also falls within a Critical Biodiversity Area one (CBA 1) in accordance with the Northern Cape Provincial Spatial Biodiversity Plan. The CBA 1 forms part of a narrow continuous ecological corridor associated with the sensitive Orange River riparian zone. The area is therefore of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem and broader vegetation type.

The vegetation of the rocky slope area and riparian zone has however not been significantly impacted upon by the development. The impact is restricted to two narrow, confined linear sections which have been historically cleared for the pumping infrastructure in the river and associated piping infrastructure to run up the slopes. The historic vegetation clearance has been neatly confined to the linear sections in order to

prevent unnecessary tree removal or an increase in the impacted footprint area. Therefore, although the area is pristine and of high conservational significance (high PES and EIS values), the transformation of surface area caused by the two water extraction points is relatively small and isolated when compared to the broader river riparian zone. The significance of the two water extraction point developments on the CBA 1 is relatively low.

It is in the opinion of the specialist that the identified significant ecological impacts associated with transformation of the CBA 1 and CBA 2 can be suitably managed and mitigated to within acceptable levels. The development therefore does not necessarily warrant the requirement of an offset area to be identified and assessed or for project operations to be completely ceased and the areas rehabilitated and restored.

The project operations should be allowed to continue but all recommended mitigation measures as per this ecological report must be adequately implemented and managed for the remainder of the operational phase and subsequent future decommissioning phase. All necessary authorisations and permits must also be obtained as soon as reasonably and practicably possible.

See specialist report in Appendix E.

7.1.5 Agriculture and Soil Suitability Assessment

A Soil and Irrigation Suitability Assessment was conducted for the proposed project area in order to determine the agricultural value of the area. Digital Soils Africa conducted an irrigation potential soil survey for a 100 ha field on the Remaining Extent of the Farm New Waterford no. 229 and Portion 2 of the Farm New Waterford no. 229 in order to assess the suitability of the area for pivot irrigation.

7.1.5.1 Soils forms

The soils encountered during the survey are shown in the table below (table 12).

Table 12: Soil form encountered

Soil Form	A Horizon	B Horizon	B2/C Horizon	Nr of Profiles
Glenrosa/ Coega	Orthic A	Hardpan Carbonate within Lithocutanic B	Lithocutanic B	32
Coega	Orthic A	Hardpan Carbonate		9
Plooyburg	Orthic A	Red Apedal	Hardpan Carbonate	3
Prieska	Orthic A	Neocarbonate B	Hardpan Carbonate	3
Brandvlei	Orthic A	Soft Carbonate		2
Augrabies	Orthic A	Neocarbonate B	Lithocutanic B	1
Addo	Orthic A	Neocarbonate B	Soft Carbonate	1

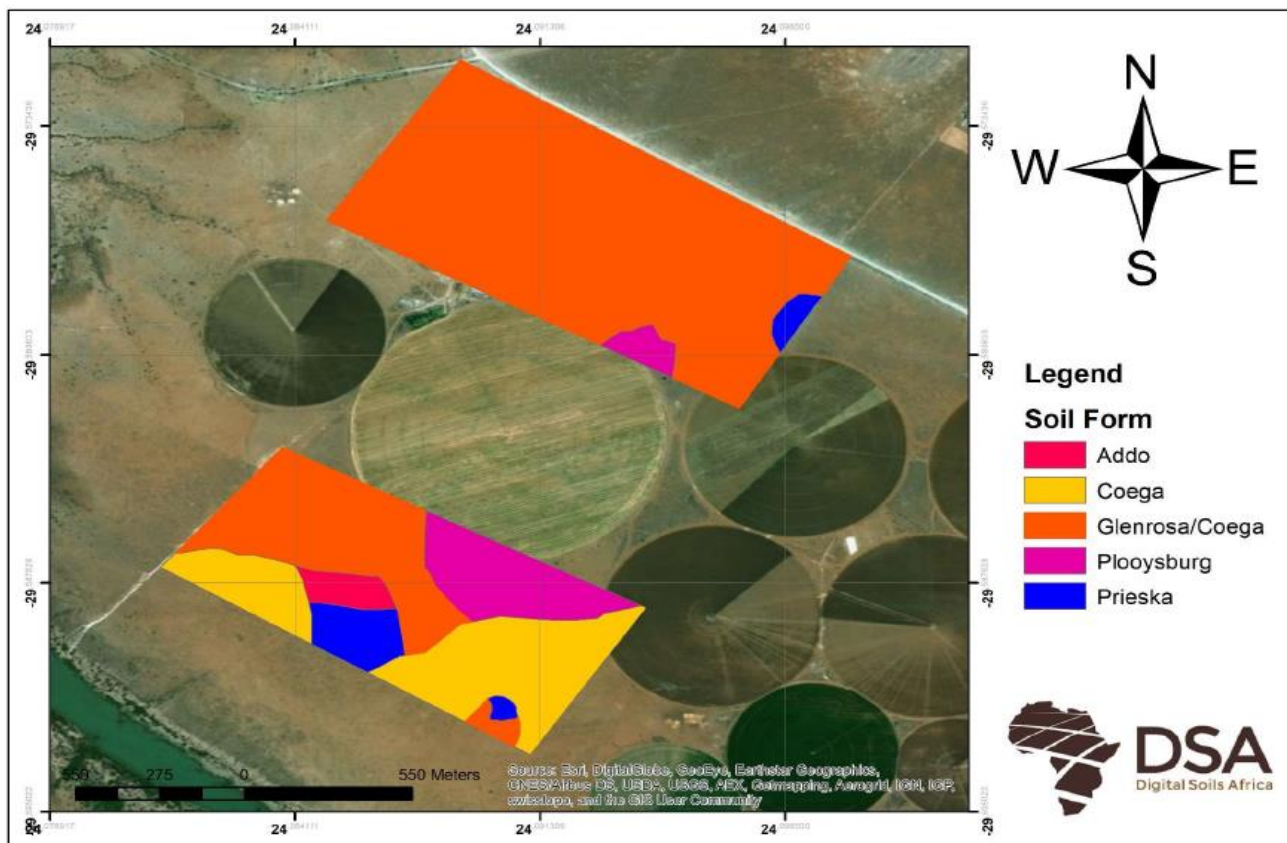


Figure 16: Illustration of soil forms encountered

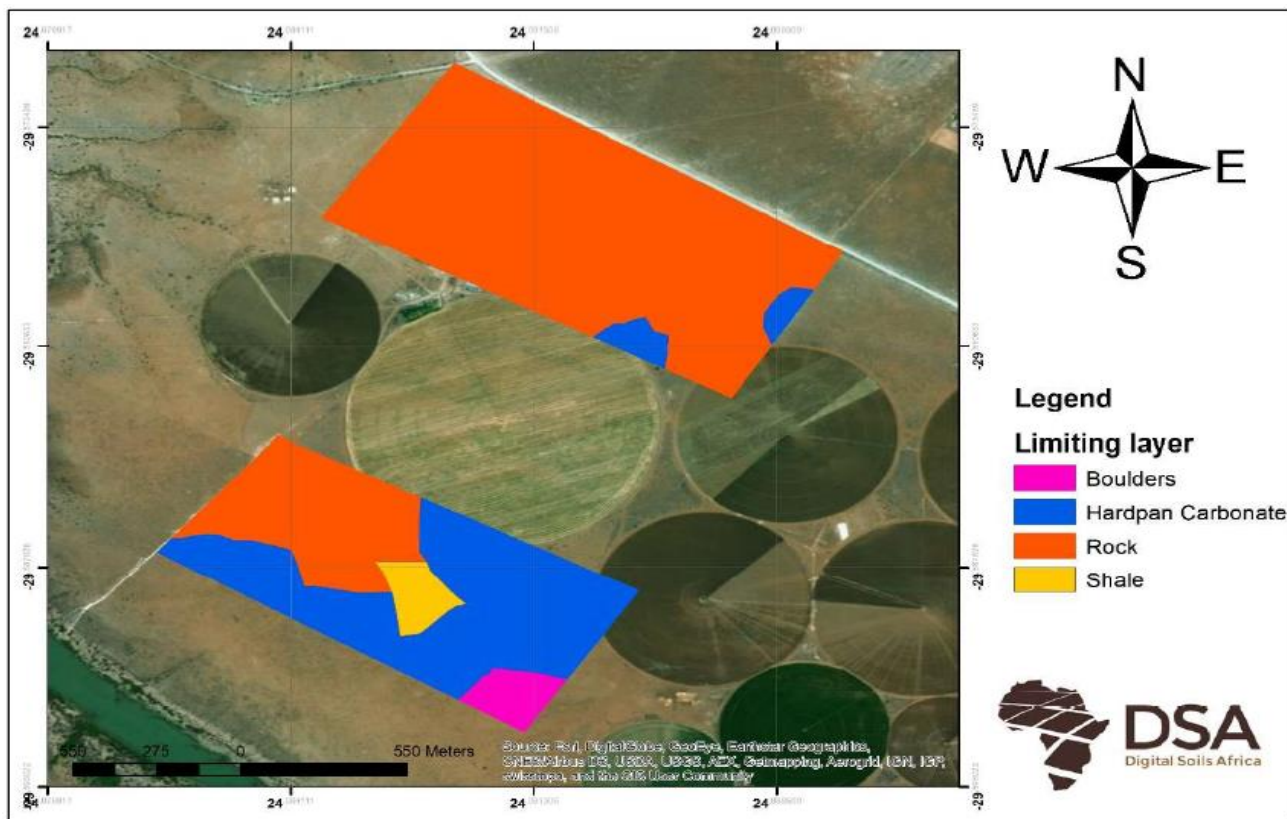


Figure 17: Illustration of infiltration limiting material

7.1.5.2 Soil Depth

The depth limiting layer are presented in Figure 18. On much of the site it is hard rock, while shale also appears in a small portion. Hardpan carbonate is regarded as depth limiting if an impenetrable layer appears underneath, but not if it occurs within a shallow depth (where it can be ripped) on drainable soils (such as with the Glenrosa/Coega soil form). Loose boulders limit the depth at the most southern part of the study area. These boulders are not drainage limiting, as water could move around them, but the TLB did not dig

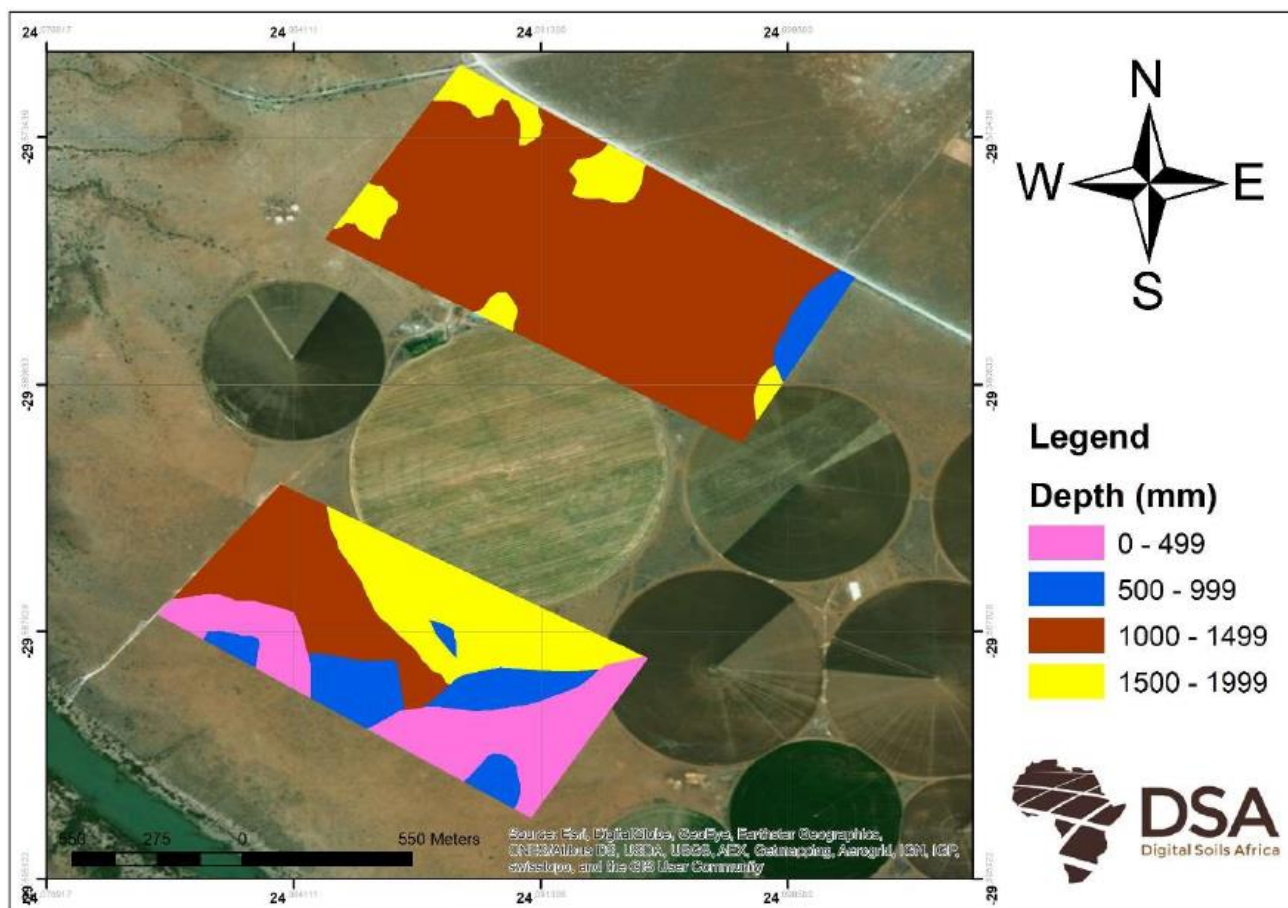


Figure 18: Illustration of drainable depths

7.1.5.3 Suitability

Based on the soil morphology and laboratory analysis, the area shown in Figure 20 is suitable for irrigation according to the norms of the Department of Agriculture, Northern Cape. According to these suitability maps, three of the existing centre pivots could be retained, while only about a half of the fourth centre pivot is suitable for cash crop cultivation under irrigation.

There are however, based on the specific situation, some arguments as to why the fourth pivot could be retained for planted pastures:

- In the south of the centre pivot, where the soil is too shallow according to the Department of Agriculture's guidelines, the limiting layer is loose boulders (Figure 19) which would not limit the drainage.



Figure 19: Loose boulders which is the limiting layer in the shallow southern area.

- The hard carbonate which has formed on top of these boulders has been shown to have extremely high saturated hydraulic conductivity under cultivation, due to the mechanical disturbance and leaching of the carbonates, leading to a fractured layer. This process will be slower with the boulders directly underneath the hardpan carbonate, but will still continue.
- The surface drainage from the fourth pivot leads back to the river, and will not influence other irrigable soils.

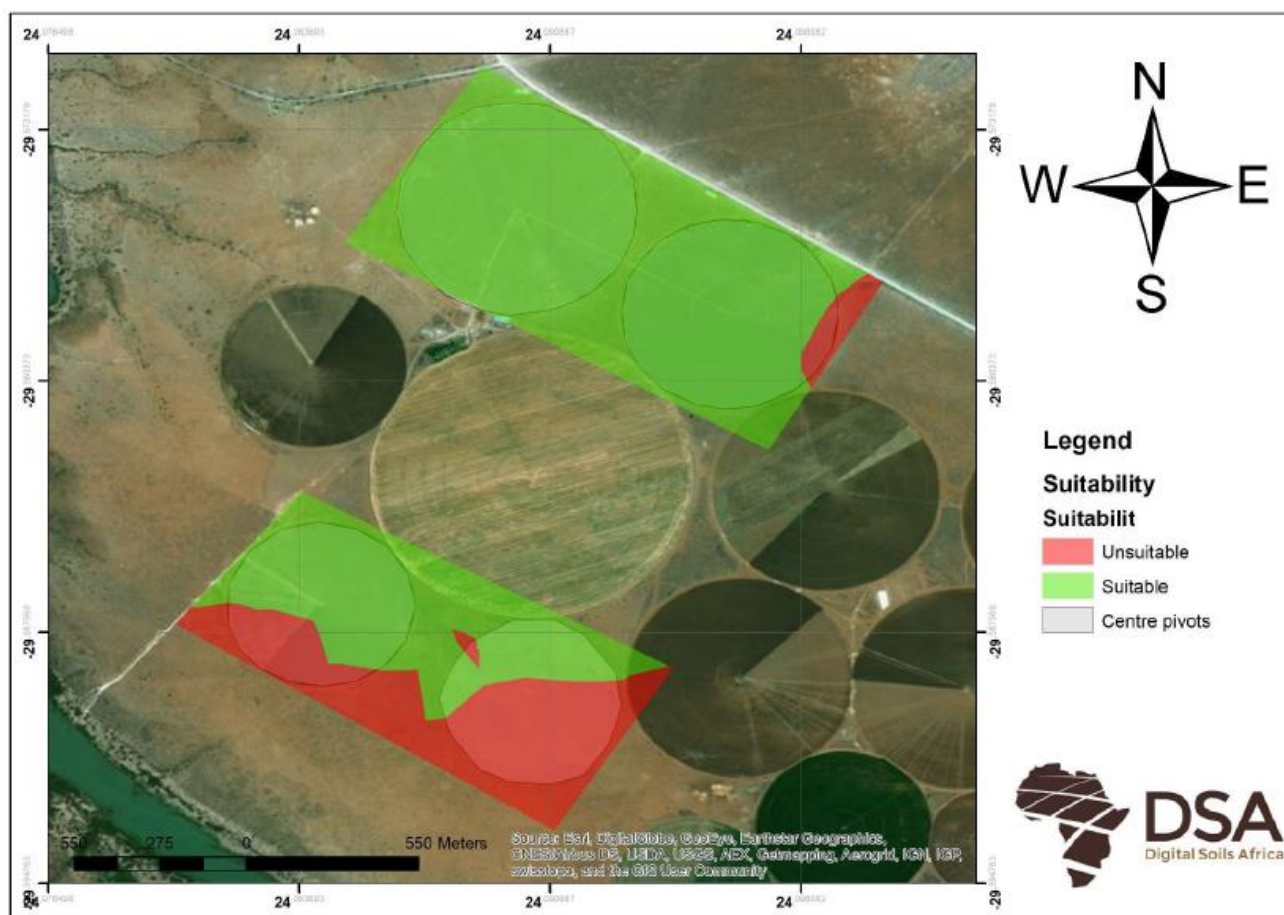


Figure 20: Illustration of suitability of the proposed project area

7.1.5.4 Conclusion in terms of the soil suitability

The soil survey and accompanying analysis of soil properties indicate that most of the two areas investigated are suitable for irrigation. The most Northern site is suitable for irrigation, while the southern site is suitable in the north and west. In the southern part of the southern site, about halfway across the fourth pivot, the soils are unsuitable for irrigation of cash crops according to the guidelines of the Northern Cape Department of Agriculture. However, due to the arguments considered in the text, it is advised that the unsuitable half of the fourth pivot could be retained for planted pastures.

See specialist report in Appendix E.

7.1.6 Heritage

A Phase 1 Heritage Impact Assessment was conducted for the proposed project area in order to determine the heritage value of the area as well as identify and evaluate the potential impacts that the proposed project will have on any areas of historical significance. This information was then used to determine possible mitigation measures which could be implemented in order to reduce the significance of the

associated impacts. An overview of the heritage aspects surrounding the proposed project is provided in the section below:

The field assessment indicates that the proposed pivot development will / have primarily affect geologically recent soils (alluvium and wind-blown sand). Impact on 7 potentially intact Stone Age archaeological remains or Quaternary fossils have not taken place and considered unlikely. The extent of the project is considered low in terms of palaeontological and archaeological impact. The terrain is not considered palaeontologically or archaeologically vulnerable and is assigned a site rating of Generally Protected C.

See specialist report in Appendix E.

7.2 SOCIO-ECONOMIC DESCRIPTION

The project does not hold any overriding negative social impacts to suggest a “no-go” option. The investment, employment and income which is generated by the project will/is positively contributing to the socio-economic development objectives described in the local IDP.

The Department of Economic Development and Tourism in the Northern Cape has recently concluded the development of its Provincial Local Economic Development (LED) Strategy in line with the Northern Cape Growth and Development Strategy. The LED is an approach to sustainable economic development that encourages residents of local communities to work together to stimulate local economic activity that will result in, inter alia, an improvement in the quality of life for all in the local community. These Strategies provide the foundation for Integrated Economic Development Planning throughout the Northern Cape. A development such as the proposed project would present a definite benefit and addition to the LED through local job creation and skills development and contribute to the alleviation of poverty and unemployment in the local municipality. This will enable a better livelihood and a higher quality of life to individuals involved.

The following section will provide a brief insight as to the socio-economic conditions in the respective municipal areas:

Thembelihle local Municipality:

Employment:

There are 5 393 (out of 15 701) people that are economically active (employed or unemployed but looking for work), and of these, 28,4% are unemployed.

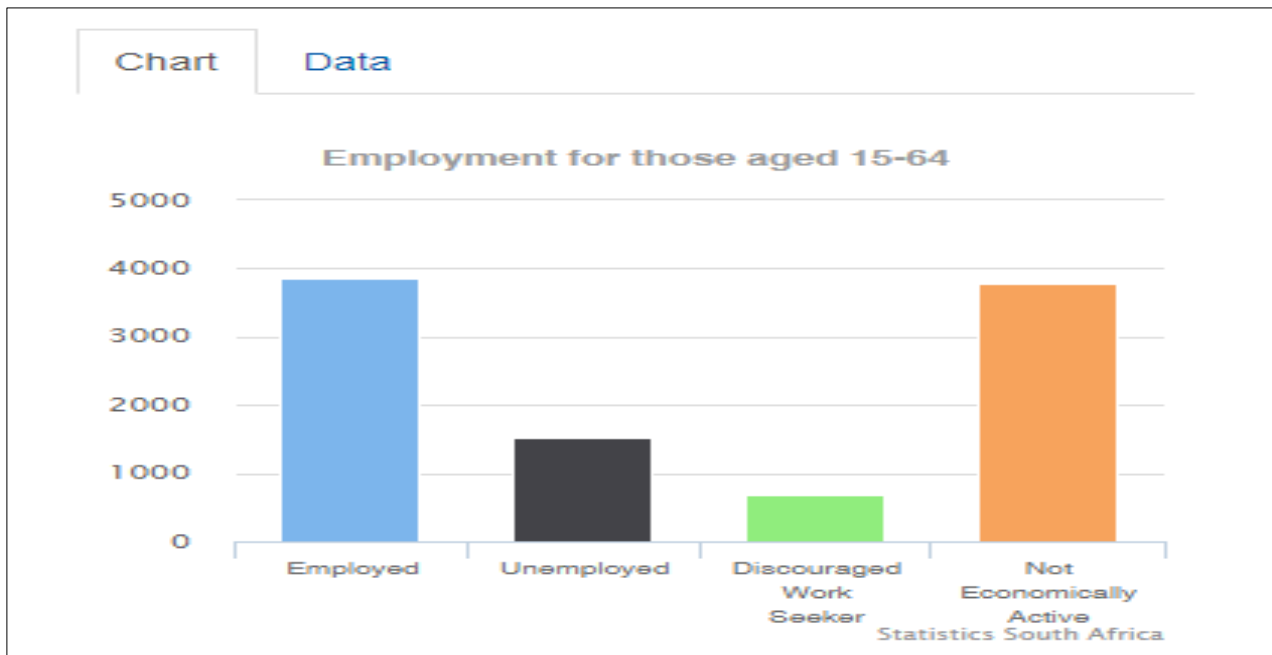


Figure 21: Employment Graph for those aged 15-64

Economic profile:

The Economic Profile of the Thembelihle Local Municipality is summarized below. It is clear that the fourth highest percentage of people have no income. This project contributes by providing continues new working opportunities during the operational phase.

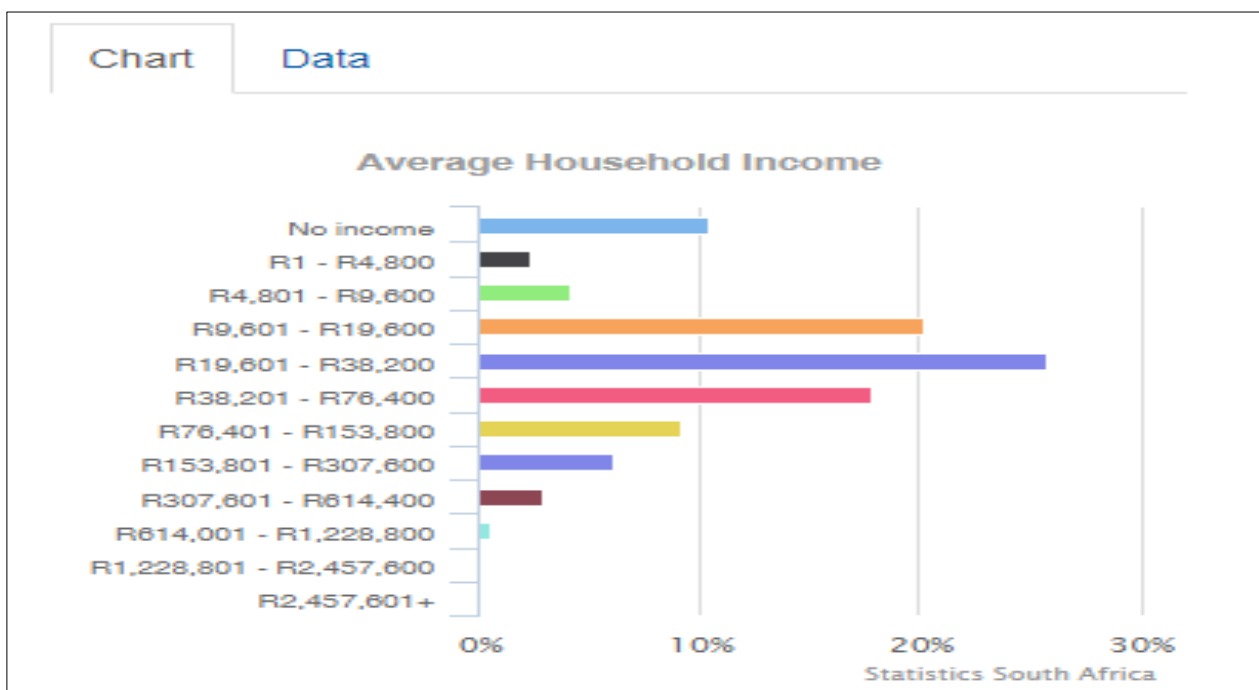


Figure 22: Economic profile graph indicating household income

Level of Education:

According to the Census, Thembelihle Local Municipality has a total population of 15 701 people. The majority of the population in the municipality are coloured at 70,8%, 15,2% are black African, 13,1% are White, 0,5% are Indian/Asian, with the other population groups making up the remaining 0,4%.

Of those aged 20 years and older, 7% have completed primary school, 29,8% have some secondary education, 19,9% have completed matric and 6,6% have some form of higher education. Of the mentioned age group, 15,1% have no form of schooling.

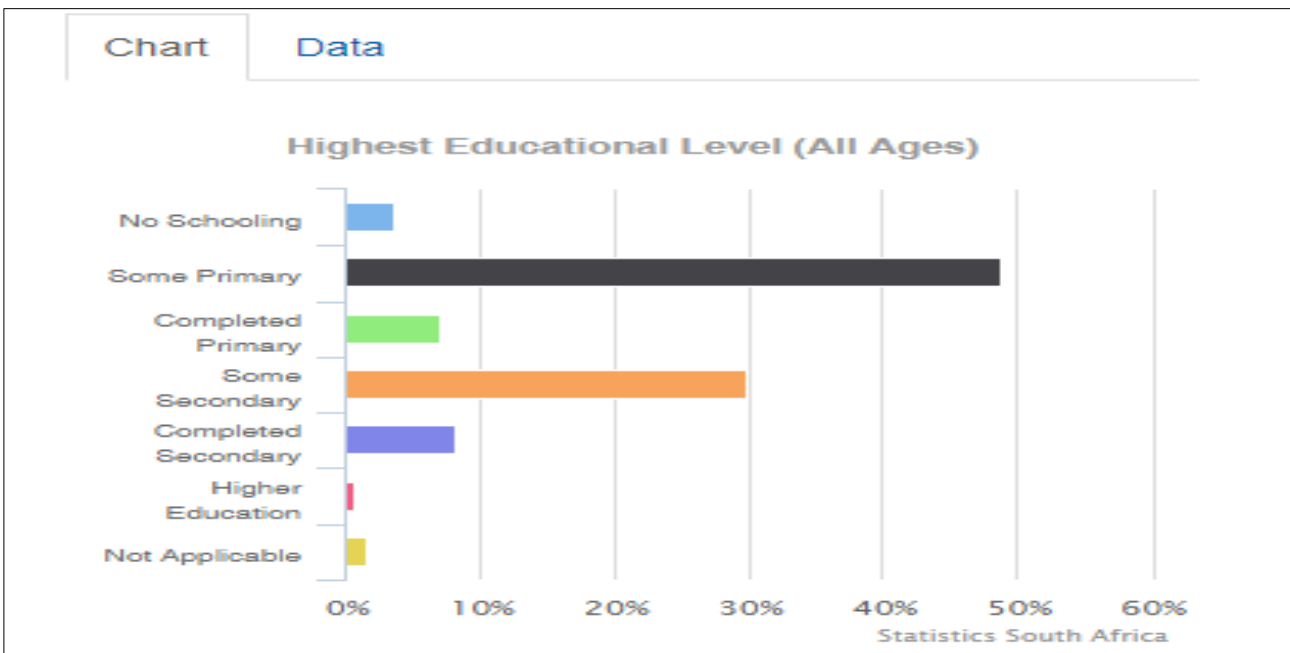


Figure 23: Education graph indicating education levels

Operational phase job creation (local employment) and sustainable capacity building (skills, experience and resources development) of this project will aid in immediate and continuous local community upliftment and poverty alleviation and are therefore regarded as significant socio-economic benefits associated with the project to motivate the need and desirability.

8. PUBLIC PARTICIPATION PROCESS

A continual and comprehensive Public Participation Process (PPP) will be undertaken throughout the entire Impact Assessment process with all stakeholders and Interested and Affected Parties (I & AP's), including the relevant organs of state and competent authority (Northern Cape Department of Environment and Nature Conservation).

The PPP will be conducted in accordance with the requirements of Regulation 41 of the EIA Regulations, 2014 (as amended in April 2017) and the designated Public Participation Officer will ensure that the PPP is facilitated in a manner which ensures reasonable opportunity for all stakeholders and registered I & AP's to comment and provide input on the proposed project.

8.1 REGISTRATION AND NOTIFICATION

The PPP for the Impact Assessment Report commenced on 31 January 2018 and will conclude on 01 March 2018. The following means were used to notify the public of the commencement of the process:

- Email notifications were sent to all identified stakeholders, relevant Organs of State and competent authority on 31 January 2018.
- An advertisement was placed in the local newspaper (Noordkaap Koerant) on 31 January 2018 to inform potential I & AP's and invite them to register for the proposed project.
- Written notices were placed at the Thembelihle local Municipality in Hopetown, public library and post office on 31 January 2018.
- Site notices were placed at the main entrance of the Remaining Extent of the Farm New Waterford no 229 and Portion 2 of the Farm New Waterford no 229, as well as at certain portion along the R 385 on 31 January 2018.
- Hardcopies of the draft Impact Assessment Report were made available at the Thembelihle local Municipality in Hopetown and the public library for public viewing on 31 January 2018.
- A hardcopy of the draft Impact Assessment Report was made available at the Farm office for public viewing on 31 January 2018.
- A hardcopy was hand delivered at the offices of the competent authority on 31 January 2018.

All stakeholders and I & AP's will be adequately notified of the Public Participation Processes taking place as well as the availability of the relevant documents for comment as per Regulation 41 of the EIA Regulations, 2014 (As amended in April 2017).

An I & AP's register containing the names and contact details of all relevant stakeholders and I & AP's was established and will be submitted to the competent authority along with the Final Impact Assessment Report as per Regulation 42 of the EIA Regulations, 2014(as emended in April 2017) (see Appendix C).

All proof of notifications, I & AP registrations as well as comments received and responses provided during the PPP were incorporated into a Public Participation Report which is available in Appendix C.

The sequence of events regarding the Public Participation Processes, which has/will take place, is as follows:

- Upon completion of the draft Impact Assessment Report, the stakeholders and organs of state were notified and the document was made available for comments for a period of 30 days. The competent authority was also consulted to comment on the draft Impact Assessment Report. After the completion of the PPP the comments received and responses provided were incorporated into a Final Impact Assessment Report and will be submitted to the competent authority for decision making.
- The competent authority (Northern Cape Department of Environment and Nature Conservation) will then evaluate and approve/reject the environmental S24G authorisation application within a period of 107 days after receipt of the submitted Final Environmental Impact Report and EMPr and provide feedback to the applicant and EAP on their decision.

8.1.1 LIST OF STAKEHOLDERS / ORGANS OF STATE / LANDOWNERS AND ADJACENT LANDOWNERS NOTIFIED

The following table (table 13) list all identified Stakeholders / Organs of State / Organisations / Interested and Affected Parties which were notified of the proposed project.

Table 13: Stakeholders / Organs of State / Organisations / Interested and Affected Parties notified

Name and Surname	Organisation	Department	Email / Postal:	Tel:
Mr. M. Jack	Thembelihle Local Municipality	Municipal Manager	mrjack@thembelihlemunicipality.gov.za	053 2030 005/8
Mr. Steven Marufu	Thembelihle Local Municipality	Environmental Department	smarufu05@gmail.com	053 2030 005/8
Mr. Jacobus Tallis	Thembelihle Local Municipality	Ward 2 (two) Ward Councillor	nngxabazi@yahoo.com	053 2030 005/8
Mr. Rodney Pieterse	Pixley Ka Seme District Municipality	Municipal Manager	mm@pksdm.gov.za	0536310891
Mr. S. Nkondeshe	Pixley Ka Seme District Municipality	Environmental Department	pixley@telkomsa.net	0536310891
Me. Natalie	Department of	Ecological and	nuys.denc@gmail.com	053 807

Uys	Environment and Nature Conservation	Botanical Department		7300/7472
Mr. Thulani Mthombeni	Department of Environment and Nature Conservation	Environmental Impact Assessment Department	Tmthombeni@ncpg.gov.za	(053) 807 7430 or Cell: 071 673 7525
Mr. Hannes Roux	Agri Noordkaap		hrouxx@gmail.com	0718607550
Me. Kelly Hannie	Northern Cape department of roads and public works		khannie@ncpg.gov.za	053 839 2249
Mr. Vernon Blair	Free State Department of Water and Sanitation	Commenting Authority for the region	blairv@dwa.gov.za	051 405 9000
Mr. Koos de Wet	Neighbouring / Surrounding Landowners / Occupiers		lily@inext.co.za	083 266 4135
Mr. Magiel Pretorius	Neighbouring / Surrounding Landowners / Occupiers		mjlpretorius1949@gmail.com	083 700 9597

8.2 COMMENTS AND RESPONSES

All comments received from the I & AP's, stakeholders and organs of state together with the subsequent responses provided were incorporated into a Public Participation Report which is submitted to the competent authority together with the relevant documents.

See table below (table 14) with the summary of all comments and responses after completion of the PPP:

Table 14: Summary of all comments and responses received during the PPP

Commenting party	Comment received	Response provided
To be completed at the end of the 30 day PPP period		

See Appendix C for the Public Participation Report.

9. ENVIRONMENTAL IMPACT ASSESSMENT

The following section identifies the potential environmental impacts (both positive and negative) which the construction as well as operational phases of the proposed project will have on the surrounding environment.

Once the potential environmental impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified environmental impact.

The same Environmental Risk rating process is then followed for each environmental impact to determine the Environmental Significance if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential environmental impacts of the proposed project and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential environmental impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implement of effective management strategies for them.

9.1 METHODOLOGY FOR IMPACT ASSESSMENT AND RISK RATING

The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental Risk Ratings as well as the calculation of the final Environmental Significance Ratings of the identified potential environmental impacts.

Each potential environmental impact is scored for each of the Evaluation Components as per the table below.

Table 15: Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating Scale and Description/criteria
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high: Bio-physical and/or social functions and/or processes might be <i>severely</i> altered.</p> <p>8 - High: Bio-physical and/or social functions and/or processes might be <i>considerably</i> altered.</p> <p>6 - Medium: Bio-physical and/or social functions and/or processes might be <i>notably</i> altered.</p> <p>4 - Low : Bio-physical and/or social functions and/or processes might be <i>slightly</i> altered.</p> <p>2 - Very Low: Bio-physical and/or social functions and/or processes might be <i>negligibly</i> altered.</p> <p>0 - Zero: Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>

MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high (positive): Bio-physical and/or social functions and/or processes might be <i>substantially</i> enhanced.</p> <p>8 - High (positive): Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced.</p> <p>6 - Medium (positive): Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced.</p> <p>4 - Low (positive): Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced.</p> <p>2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced.</p> <p>0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
DURATION	<p>5 - Permanent</p> <p>4 - Long term: Impact ceases after operational phase/life of the activity > 60 years.</p> <p>3 - Medium term: Impact might occur during the operational phase/life of the activity – 60 years.</p> <p>2 - Short term: Impact might occur during the construction phase - < 3 years.</p> <p>1 - Immediate</p>
EXTENT (or spatial scale/influence of impact)	<p>5 - International: Beyond National boundaries.</p> <p>4 - National: Beyond Provincial boundaries and within National boundaries.</p> <p>3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries.</p> <p>2 - Local: Within 5 km of the proposed development.</p> <p>1 - Site-specific: On site or within 100 m of the site boundary.</p> <p>0 - None</p>
IRREPLACEABLE loss of resources	<p>5 – Definite loss of irreplaceable resources.</p> <p>4 – High potential for loss of irreplaceable resources.</p> <p>3 – Moderate potential for loss of irreplaceable resources.</p> <p>2 – Low potential for loss of irreplaceable resources.</p> <p>1 – Very low potential for loss of irreplaceable resources.</p> <p>0 - None</p>
REVERSIBILITY of impact	<p>5 – Impact cannot be reversed.</p> <p>4 – Low potential that impact might be reversed.</p> <p>3 – Moderate potential that impact might be reversed.</p> <p>2 – High potential that impact might be reversed.</p> <p>1 – Impact will be reversible.</p> <p>0 – No impact.</p>
PROBABILITY (of occurrence)	<p>5 - Definite: >95% chance of the potential impact occurring.</p> <p>4 - High probability: 75% - 95% chance of the potential impact occurring.</p>

	<p>3 - Medium probability: 25% - 75% chance of the potential impact occurring</p> <p>2 - Low probability: 5% - 25% chance of the potential impact occurring.</p> <p>1 - Improbable: <5% chance of the potential impact occurring.</p>
Evaluation Component	Rating Scale and Description/criteria
CUMULATIVE impacts	<p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment.</p>

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per Table 16 below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

Table 16: Scale used for the evaluation of the Environmental Significance Ratings

Significance Score	Environmental Significance	Description/criteria
125 – 150	Very high (VH)	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	Medium-high (MH)	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	Medium (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.

<40	Low (L)	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

9.2 DESCRIPTION OF POTENTIAL IMPACTS AND THEIR RECOMMENDED MITIGATION MEASURES

The following section provides a list of potential environmental impacts which the proposed project will have as well as the recommended mitigation measures to be implemented for each impact as identified during the impact assessment phase.

9.2.1 Construction Phase

The potential environmental impacts associated with the construction / development phase of the proposed development. *(These impacts were calculated by means of the natural surrounding areas as if construction is yet to take place. The reason being: to give an indication of what impact the construction phase had on the natural environment).*

9.2.1.1 Flora Impacts

A direct impact on flora will arise as a result of vegetation clearance.

Mitigation measures to reduce this potential impacts:

- Restoration measures will be required to reinstate functionality in the disturbed soil and vegetation.
- Any accidental fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.
- Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ.
- Existing roads and farm tracks in close proximity to the proposed project area must be used during construction.
- Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment.
- Alien and invasive species need to be eradicated and controlled.

9.2.1.2 Fauna Impacts

A direct impact on flora will arise as a result of vegetation clearance / habitat loss

Mitigation measures to reduce potential impacts:

- The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.
- Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ.
- Existing roads and farm tracks in close proximity to the proposed project area must be used during construction.
- Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment.
- Alien and invasive species need to be eradicated and controlled.

9.2.1.3 Dust Impacts

Dust nuisance generated during the development / preparation of the pivots.

Mitigation measures to reduce potential impacts:

- Dust Management measures must be implemented in order to manage and minimize undesired dust emissions.
- Access roads need to be well maintained and dust suppression need to be applied during windy days.
- Pivots need to be rehabilitated by planting buffalo grass while not in use.

9.2.1.4 Noise Impacts

Noise nuisance will be generated during the development / preparation of the pivots resulting from individuals and equipment.

Mitigation measures to reduce potential impacts:

- Limit working hours of noisy equipment to daylight hours.
- Fit silencers to equipment.
- Unless otherwise specified, normal working hours will apply (i.e. from 07:00 to 17:00 Mondays to Fridays).

- Ensure that Employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.
- No loud music is permitted on site or in the camp.

9.2.1.5 Cultural and Heritage Impacts

Damage and destruction of vertebrate fossils during excavation activities may occur.

Mitigation measures to reduce potential impacts:

- Should any heritage resources (including but not limited to fossils, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts or bone remains, structures and or built features, rock art and rock engravings) be exposed during excavations 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.
- 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.
- Under no circumstances shall any heritage material be destroyed or removed from site.
- Excavations must be limited to the footprint area and be maintained in a narrow corridor.
- 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:
 - All construction in the immediate 50 metre vicinity of the site must be ceased.
 - 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) must not be attempted.
 - The area in a 50 metre radius of the find must be barricaded with visible taping.
- Public access must be limited and the area must be placed under guard.

9.2.1.6 Surface and Groundwater Contamination Impacts

Surface and Groundwater Contamination during the development / preparation of the pivots.

Mitigation measures to reduce potential impacts:

- Ensure that excavation areas have a predetermined stockpile area for excavated materials.
- Use overburden for rehabilitation.

- Any remaining overburden to be disposed of at a licensed waste site.
- Alternatively, 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.
- Material Safety Data Sheets (MSDS) must 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 any leakages.
- All spills must be cleaned as soon as they occur. A spill kit must be used and proof of clean up must be given to the ECO.
- Spillages 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.
- Provide suitable and sufficient ablution facilities (1 for every 15 personnel on site and 1 for each gender).
- Vehicles and machinery must be regularly serviced to avoid spillages.
- Drip trays must be placed beneath all stationary construction equipment and beneath all generators present on site.

9.2.1.7 Waste Management Impacts

Waste impacts by means of waste storage and littering during the development / preparation of the pivots.

Mitigation measures to reduce potential impacts:

- An adequate number of scavenger proof litter bins are to be placed throughout the site, dumping of waste on the site is prohibited.
- Waste sorting and separation should form part of the environmental induction and awareness programme to encourage and educate personnel to recycle.
- Keep all work sites including storage areas, offices and workshops neat and tidy.
- All domestic waste is to be removed from site and disposed of at a registered solid waste landfill site.
- Care should be taken to ensure that no waste fall off disposal vehicles on-route to the landfill site. If needed, a tarpaulin can be utilised.
- The burning and burying of solid waste on site is prohibited.
- Littering by construction workers shall not be permitted.
- General waste shall be removed from site on a weekly basis to an approved landfill site.

- Minimise waste by sorting waste into recyclable and non-recyclable materials. Small scale agricultural job creation in the.

9.2.1.8 Traffic Impacts

Traffic impacts by means of additional truck and transportation to and from site during the development / preparation of the pivots.

Mitigation measures to reduce potential impacts:

- Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, as would be expected over national holidays, weekends and school holiday periods.
- All vehicles should 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.
- Any damage to public roads is to be reported to the management authority and repaired to its original condition.
- Signage is to be placed on vehicles at all times.

9.2.1.9 Fire Risk Impacts

Increase risk of fires during the development / preparation of the pivots.

Mitigation measures to reduce potential impacts:

- Ensure the work site and the contractor's camp is equipped with adequate firefighting equipment.
- All construction equipment must have at least one firefighting extinguisher.
- Workers must be adequately trained in the handling of firefighting equipment.
- No open fires are permitted anywhere on site due to the handling of gas on site. No fires will be permitted for heating or cooking purposes on site.
- Fuel and chemicals must be stored in an area that is acceptable for the client.
- No smoking will be allowed within close vicinity of the site.

9.2.1.10 Soil Contamination Impacts

Increased Soil contamination by means of hazardous substances.

Mitigation measures to reduce potential impacts:

- No leaked oil or fuel tankers may contaminate soil
- All tanks and pipes containing fuel or oil must be inspected on a regular basis

- Spills outside the bund area must be treated with a spill kit
- All significant leaks must be reported to the competent authority in terms of NEMA
- UST must be fitted with leak detectors in order to alert when a leak is occurring.
- Overfill and spillages during tanker refuelling and fuel dispensing should be prevented by the installation of automatic cut off devices.
- Tanker delivery drivers must be present during delivery of fuel with the emergency cut off switch and a fire extinguisher
- A closed coupling must be used when fuel is being transferred from the bulk delivery vehicle to the USTs to prevent fugitive emissions.
- All personnel working with fuel must undergo spill kit training
- The oil/water separator must be inspected on a regular basis and the inspection report must be provided to the ECO and relevant authority.
- Following a leak or accidental spill, a remediation plan must be compiled and executed.
- Fuel stock must be monitored on a daily basis in order to identify if the tank is leaking.

9.2.1.11 Soil Erosion Impacts

Increased Soil erosion due to construction activities.

Mitigation measures to reduce potential impacts:

- During construction, un-channelled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw or hay bales, or bundles of cut vegetation sourced with the ECO's knowledge and consent, should be dug into the soil in contours to slow surface wash and capture eroded soil. The method may also be used where surface run-off becomes concentrated,
- All water flow must be controlled using storm water management techniques before discharge into the existing natural drainage line,
- Temporary cut off drains may be required to capture storm water and promote infiltration,
- All storm water management features must be constructed in a manner that will ensure the continued functioning of the emergent vegetation. Construction must coincide with the dry season.

9.2.1.12 Visual Impacts

Increased visual impact due to increased working activities on-site.

Mitigation measures to reduce potential impacts:

- All waste must be placed in bins during operational phase. Keeping the area litter free.

- Construction activities may only take place during normal working hours.

9.2.1.13 Socio-Economic Impacts

Increased socio-economic conditions due to job creation.

Mitigation measures to reduce potential impacts:

- Ensure that low-, medium- and high skilled workers use provided working opportunities.
- Low-, medium- and high skilled workers must be sourced locally.
- Where practically possible, previously disadvantaged individuals should be provided preference with regards to employment opportunities.
- Individuals must be trained and continuously developed.

9.2.2 Operational Phase

The potential environmental impacts associated with the operational phase of the proposed development.

9.2.2.1 Flora Impacts

Direct impact on flora as a result of continuous vegetation clearance.

Mitigation measures to reduce potential impacts:

- Any accidental fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.
- Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ.
- Existing roads and farm tracks in close proximity to the proposed project area must be used during operation.
- Alien and invasive species need to be eradicated and controlled.

9.2.2.2 Fauna Impacts

Continuous impact on Fauna as a result of cleared vegetation / habitat loss.

Mitigation measures to reduce potential impacts:

- Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ.
- Existing roads and farm tracks in close proximity to the proposed project area must be used during operation.
- No hunting of any animal is to take place on site.
- Special care are to be taken not to work near or disturb any vulture nests, especially during breeding seasons.

9.2.2.3 Dust Impacts

Dust nuisance generated during the operational phase of the project.

Mitigation measures to reduce potential impacts:

- Dust Management measures must be implemented in order to manage and minimize undesired dust emissions.
- Access roads need to be well maintained and dust suppression need to be applied during windy days.
- Pivots need to be rehabilitated by planting buffalo grass while not in use.

9.2.2.4 Noise Impacts

Noise nuisance generated during the operational phase of the pivots.

Mitigation measures to reduce potential impacts:

- Limit working hours of noisy equipment to daylight hours.
- Fit silencers to equipment.
- Unless otherwise specified, normal working hours will apply (i.e. from 07:00 to 17:00 Mondays to Fridays).
- Ensure that Employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.
- No loud music is permitted on site or in the camp.

9.2.2.5 Cultural Heritage Impacts

Damage and destruction of vertebrate fossils during the operational phase.

Mitigation measures to reduce potential impacts:

- Should any heritage resources (including but not limited to fossils, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts or bone remains, structures and or built features, rock art and rock engravings) be exposed during excavations, all works 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.
- 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.
- Under no circumstances shall any heritage material be destroyed or removed from site.
- Excavations must be limited to the footprint area and be maintained in a narrow corridor.
- 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:
 - All construction in the immediate 50 metre vicinity of the site must be ceased.
 - 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) must not be attempted.
 - The area in a 50 metre radius of the find must be barricaded with visible taping.
- Public access must be limited and the area must be placed under guard.

9.2.2.6 Surface and Groundwater Impacts

Surface and Groundwater Contamination during the operational phase by means of fertilizer and/or any other hazardous substances or pesticides.

Mitigation measures to reduce potential impacts:

- When fertilisers / pesticides are used, ensure that all fertilisers / pesticides are environmentally friendly.
- When fertilisers / pesticides are used, only use the correct amount as indicated by the parcels. Do not over use.
- Material Safety Data Sheets (MSDS) must 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 any leakages.
- All spills must be cleaned as soon as they occur. A spill kit must be used and proof of clean up must be given to the ECO.

- Spillages 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.
- Provide suitable and sufficient ablution facilities (1 for every 15 personnel on site and 1 for each gender).
- Vehicles and machinery must be regularly serviced to avoid spillages.
- Drip trays must be placed beneath all stationary equipment and beneath all generators present on site.

9.2.2.7 Waste Management Impacts

As per the construction phase the area poses no archaeological and palaeontological significance or value.

Mitigation measures to reduce potential impacts:

- An adequate number of scavenger proof litter bins are to be placed throughout the site, dumping of waste on the site is prohibited.
- Waste sorting and separation should form part of the environmental induction and awareness programme to encourage and educate personnel to recycle.
- Keep all work sites including storage areas, offices and workshops neat and tidy.
- All domestic waste is to be removed from site and disposed of at a registered solid waste landfill site.
- Care should be taken to ensure that no waste fall off disposal vehicles on-route to the landfill site. If needed, a tarpaulin can be utilised.
- The burning and burying of solid waste on site is prohibited.
- Littering by workers shall not be permitted.
- General waste shall be removed from site on a weekly basis to an approved landfill site.
- Minimise waste by sorting waste into recyclable and non-recyclable materials.

9.2.2.8 Traffic Impacts

Traffic impacts by means of additional truck and transportation to and from site during the operational phase of the pivots.

Mitigation measures to reduce potential impacts:

- Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, as would be expected over national holidays, weekends and school holiday periods.
- All vehicles should 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.

- Any damage to public roads is to be reported to the management authority and repaired to its original condition.
- Signage is to be placed on vehicles at all times.

9.2.2.9 Fire Risk Impacts

Increase risk of fires during the operational phase of the pivots.

Mitigation measures to reduce potential impacts:

- Ensure the work site is equipped with adequate firefighting equipment.
- All equipment must have at least one firefighting extinguisher.
- Workers must be adequately trained in the handling of firefighting equipment.
- No open fires are permitted anywhere on site.
- No fires will be permitted for heating or cooking purposes on site.
- Fuel and chemicals must be stored in an area that is acceptable for the client.
- Dedicated smoking areas are to be provided.

9.2.2.10 Soil Contamination Impacts

Increased Soil contamination by means of hazardous substances.

Mitigation measures to reduce potential impacts:

- No leaked oil or fuel tankers may contaminate soil
- All tanks and pipes containing fuel or oil must be inspected on a regular basis
- Spills outside the bund area must be treated with a spill kit
- All significant leaks must be reported to the competent authority in terms of NEMA
- UST must be fitted with leak detectors in order to alert when a leak is occurring.
- Overfill and spillages during tanker refuelling and fuel dispensing should be prevented by the installation of automatic cut off devices.
- Tanker delivery drivers must be present during delivery of fuel with the emergency cut off switch and a fire extinguisher
- A closed coupling must be used when fuel is being transferred from the bulk delivery vehicle to the USTs to prevent fugitive emissions.
- All personnel working with fuel must undergo spill kit training
- Following a leak or accidental spill, a remediation plan must be compiled and executed.
- Fuel stock must be monitored on a daily basis in order to identify if the tank is leaking.

9.2.2.11 Soil Erosion Impacts

Increased Soil erosion due to operational activities.

Mitigation measures to reduce potential impacts:

- During the operational phase, un-channelled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw or hay bales, or bundles of cut vegetation sourced with the ECO's knowledge and consent, should be dug into the soil in contours to slow surface wash and capture eroded soil. The method may also be used where surface run-off becomes concentrated,
- All water flow must be controlled using storm water management techniques before discharge into the existing natural drainage line,
- Temporary cut off drains may be required to capture storm water and promote infiltration,
- All storm water management features must be constructed in a manner that will ensure the continued functioning of the emergent vegetation. Construction must coincide with the dry season.

9.2.2.12 Visual Impacts

Increased visual impact due to increased working activities during the operational phase.

Mitigation measures to reduce potential impacts:

- All waste must be placed in bins during operational phase. Keeping the area litter free.
- Construction activities may only take place during normal working hours.

9.2.2.13 Socio-Economic Impacts

Increased socio-economic conditions due to job creation.

Mitigation measures to reduce potential impacts:

- Ensure that low-, medium- and high skilled workers use provided working opportunities.
- Low-, medium- and high skilled workers must be sourced locally.
- Were practically possible, previously disadvantaged individuals should be provided preference with regards to employment opportunities.
- Individuals must be trained and continuously developed

9.2.3 Decommissioning Phase

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.

9.3 RISK RATINGS OF POTENTIAL IMPACTS

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential environmental impacts for the proposed project both before and after implementation of the recommended mitigation measures.

9.3.1 Construction Phase *(These impacts were calculated by means of the natural surrounding areas as if construction is yet to take place. The reason being: to give an indication of what impact the construction phase had on the natural environment).*

Table 17: Environmental Risk and Significance Ratings for the Construction Phase

PLANNING, DESIGN AND CONSTRUCTION PHASE			
Potential Flora Impacts:			
Nature of impact: Direct impact on Flora as a result of vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	4	2	2
Duration:	5	5	5
Extent:	1	1	1
Irreplaceable:	1	1	1
Reversibility:	2	2	2
Probability:	5	5	5
Total SP:	65	55	55
Significance rating:	Medium (M)	Medium (M)	Medium (M)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> Restoration measures will be required to reinstate functionality in the disturbed soil and vegetation. Any accidental fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place. Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ. Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment. Alien and invasive species need to be eradicated and controlled. 		
Potential Fauna and Avifauna Impacts:			
Nature of impact: Direct impact on Fauna and Avifauna as a result of vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	

Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place. Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ. Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. Areas within and immediately surrounding the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment. Alien and invasive species need to be eradicated and controlled. 		
Potential Dust Impacts:			
Nature of impact: Dust nuisance generated during the development / preparation of the pivots.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	6	4	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	28	22	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> Dust Management measures must be implemented in order to manage and minimize undesired dust emissions. Access roads need to be well maintained and dust suppression need to be applied during windy days. Pivots need to be rehabilitated by planting buffalo grass while not in use. 		
Potential Noise Impacts:			

Nature of impact: Noise nuisance generated during the development / preparation of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • Limit working hours of noisy equipment to daylight hours. • Fit silencers to equipment. • Unless otherwise specified, normal working hours will apply (i.e. from 07:00 to 17:00 Mondays to Fridays). • Ensure that Employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music is permitted on site or in the camp. 		
Potential Cultural and Heritage Impacts:			
Nature of impact: Damage and destruction of vertebrate fossils during excavation activities.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	0
Duration:	2	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	2	1	1
Probability:	1	1	1
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • Should any heritage resources (including but not limited to fossils, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts or bone remains, structures and or built features, rock art and rock engravings) be exposed during excavations 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 		

	<p>the finds, and this must then be reported to the applicable heritage authority.</p> <ul style="list-style-type: none"> 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. Under no circumstances shall any heritage material be destroyed or removed from site. Excavations must be limited to the footprint area and be maintained in a narrow corridor. 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: <ul style="list-style-type: none"> All construction in the immediate 50 metre vicinity of the site must be ceased. 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) must not be attempted. The area in a 50 metre radius of the find must be barricaded with visible taping. Public access must be limited and the area must be placed under guard. 		
Potential Surface and Groundwater Contamination Impacts:			
Nature of impact: Surface and Groundwater Contamination during the development / preparation of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	0
Extent:	2	1	0
Irreplaceable:	1	1	0
Reversibility:	1	1	0
Probability:	1	1	0
Total SP:	7	4	0
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> Ensure that excavation areas have a predetermined stockpile area for excavated materials. Use overburden for rehabilitation. Any remaining overburden to be disposed of at a licensed waste site. Alternatively, 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. Material Safety Data Sheets (MSDS) must 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 any leakages. All spills must be cleaned as soon as they occur. A spill kit must be used and proof of clean up must be given to the ECO. Spillages 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. <ul style="list-style-type: none"> • Provide suitable and sufficient ablution facilities (1 for every 15 personnel on site and 1 for each gender). • Vehicles and machinery must be regularly serviced to avoid spillages. • Drip trays must be placed beneath all stationary construction equipment and beneath all generators present on site. 		
Potential Waste Management Impacts:			
Nature of impact: Waste impacts by means of waste storage and littering during the development / preparation of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • An adequate number of scavenger proof litter bins are to be placed throughout the site, dumping of waste on the site is prohibited. • Waste sorting and separation should form part of the environmental induction and awareness programme to encourage and educate personnel to recycle. • Keep all work sites including storage areas, offices and workshops neat and tidy. • All domestic waste is to be removed from site and disposed of at a registered solid waste landfill site. • Care should be taken to ensure that no waste fall off disposal vehicles on-route to the landfill site. If needed, a tarpaulin can be utilised. • The burning and burying of solid waste on site is prohibited. • Littering by construction workers shall not be permitted. • General waste shall be removed from site on a weekly basis to an approved landfill site. • Minimise waste by sorting waste into recyclable and non-recyclable materials. 		
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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	

Magnitude:	2	2	0
Duration:	2	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	2	1	1
Probability:	1	1	1
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, as would be expected over national holidays, weekends and school holiday periods. All vehicles should 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. Any damage to public roads is to be reported to the management authority and repaired to its original condition. Signage is to be placed on vehicles at all times. 		
Potential Fire Risk Impacts:			
Nature of impact: Increase risk of fires during the development / preparation of the pivots.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	0
Duration:	1	1	1
Extent:	2	1	1
Irreplaceable:	2	1	1
Reversibility:	2	1	1
Probability:	1	1	1
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> Ensure the work site and the contractor's camp is equipped with adequate firefighting equipment. All construction equipment must have at least one firefighting extinguisher. Workers must be adequately trained in the handling of firefighting equipment. No open fires are permitted anywhere on site due to the handling of gas on site. No fires will be permitted for heating or cooking purposes on site. Fuel and chemicals must be stored in an area that is acceptable for the client. No smoking will be allowed within close vicinity of the site. 		

Potential Soil Contamination Impacts:			
Nature of impact: Increased Soil contamination by means of hazardous substances.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	1	0	1
Probability:	2	1	1
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • No leaked oil or fuel tankers may contaminate soil • All tanks and pipes containing fuel or oil must be inspected on a regular basis • Spills outside the bund area must be treated with a spill kit • All significant leaks must be reported to the competent authority in terms of NEMA • UST must be fitted with leak detectors in order to alert when a leak is occurring. • Overfill and spillages during tanker refuelling and fuel dispensing should be prevented by the installation of automatic cut off devices. • Tanker delivery drivers must be present during delivery of fuel with the emergency cut off switch and a fire extinguisher • A closed coupling must be used when fuel is being transferred from the bulk delivery vehicle to the USTs to prevent fugitive emissions. • All personnel working with fuel must undergo spill kit training • The oil/water separator must be inspected on a regular basis and the inspection report must be provided to the ECO and relevant authority. • Following a leak or accidental spill, a remediation plan must be compiled and executed. • Fuel stock must be monitored on a daily basis in order to identify if the tank is leaking. 		
Potential Soil Erosion Impacts:			
Nature of impact: Increased Soil erosion due to construction activities.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	4	2	0
Duration:	1	1	1
Extent:	2	1	1
Irreplaceable:	2	1	1

Reversibility:	1	1	1
Probability:	2	1	1
Total SP:	20	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> During construction, un-channelled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw or hay bales, or bundles of cut vegetation sourced with the ECO's knowledge and consent, should be dug into the soil in contours to slow surface wash and capture eroded soil. The method may also be used where surface run-off becomes concentrated, All water flow must be controlled using storm water management techniques before discharge into the existing natural drainage line, Temporary cut off drains may be required to capture storm water and promote infiltration, All storm water management features must be constructed in a manner that will ensure the continued functioning of the emergent vegetation. Construction must coincide with the dry season. 		
Potential Visual Impacts:			
Nature of impact: Increased visual impact due to increased working activities on-site.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	1	0	1
Probability:	2	1	1
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> All waste must be placed in bins during operational phase. Keeping the area litter free. Construction activities may only take place during normal working hours. 		
Potential Socio-Economic Impacts:			
Nature of impact: Increased socio-economic conditions due to job creation	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	6	8	8

Duration:	1	1	1
Extent:	2	2	2
Irreplaceable:	2	2	2
Reversibility:	2	2	2
Probability:	4	5	4
Total SP:	52	75	60
Significance rating:	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> • Ensure that low-, medium- and high skilled workers use provided working opportunities. • Low-, medium- and high skilled workers must be sourced locally. • Were practically possible, previously disadvantaged individuals should be provided preference with regards to employment opportunities. • Individuals must be trained and continuously developed 		

9.3.2 Operational Phase

Table 18: Environmental Risk and Significance Ratings for the Operational Phase

OPERATIONAL PHASE			
Potential Flora Impacts:			
Nature of impact: Direct impact on flora as a result of continuous vegetation clearance.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	4	2	2
Duration:	5	5	5
Extent:	1	1	1
Irreplaceable:	1	1	1
Reversibility:	2	2	2
Probability:	5	5	5
Total SP:	65	55	55
Significance rating:	Medium (M)	Medium (M)	Medium (M)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> Any accidental fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place. Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ. Existing roads and farm tracks in close proximity to the proposed project area must be used during operation. Alien and invasive species need to be eradicated and controlled. 		
Potential Fauna and Avifauna Impacts:			
Nature of impact: Continuous impact on Fauna and Avifauna as a result of cleared vegetation / habitat loss.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1

Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> Natural veld situated in-between the proposed circular pivot lands must not be impacted upon and must be left in situ. Existing roads and farm tracks in close proximity to the proposed project area must be used during operation. No hunting of any animal is to take place on site. Special care are to be taken not to work near or disturb any vulture nests, especially during breeding seasons. 		
Potential Dust Impacts:			
Nature of impact: Dust nuisance generated during the operational phase of the project.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	6	4	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	28	22	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> Dust Management measures must be implemented in order to manage and minimize undesired dust emissions. Access roads need to be well maintained and dust suppression need to be applied during windy days. Pivots need to be rehabilitated by planting buffalo grass while not in use. 		
Potential Noise Impacts:			
Nature of impact: Noise nuisance generated during the operational phase of the pivots.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1

Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • Limit working hours of noisy equipment to daylight hours. • Fit silencers to equipment. • Unless otherwise specified, normal working hours will apply (i.e. from 07:00 to 17:00 Mondays to Fridays). • Ensure that Employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music is permitted on site or in the camp. 		
Potential Cultural and Heritage Impacts:			
Nature of impact: Damage and destruction of vertebrate fossils during the operational phase.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	0
Duration:	2	1	1
Extent:	1	1	1
Irreplaceable:	1	1	1
Reversibility:	1	1	1
Probability:	1	1	1
Total SP:	7	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • Should any heritage resources (including but not limited to fossils, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts or bone remains, structures and or built features, rock art and rock engravings) be exposed during excavations, all works 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. • 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. • Under no circumstances shall any heritage material be destroyed or removed from site. • Excavations must be limited to the footprint area and be maintained in a narrow corridor. • 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: <ul style="list-style-type: none"> • All construction in the immediate 50 metre vicinity of the site must be ceased. • The heritage practitioner must be informed as soon as possible. 		

	<ul style="list-style-type: none"> • In the event of obvious human remains SAPS must be notified. • Mitigation measures (such as refilling) must not be attempted. • The area in a 50 metre radius of the find must be barricaded with visible taping. • Public access must be limited and the area must be placed under guard. 		
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: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	0
Extent:	2	1	0
Irreplaceable:	1	1	0
Reversibility:	1	1	0
Probability:	1	1	0
Total SP:	7	4	0
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • When fertilisers / pesticides are used, ensure that all fertilisers / pesticides are environmentally friendly. • When fertilisers / pesticides are used, only use the correct amount as indicated by the parcels. Do not over use. • Material Safety Data Sheets (MSDS) must 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 any leakages. • All spills must be cleaned as soon as they occur. A spill kit must be used and proof of clean up must be given to the ECO. • Spillages 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. • Provide suitable and sufficient ablution facilities (1 for every 15 personnel on site and 1 for each gender). • Vehicles and machinery must be regularly serviced to avoid spillages. • Drip trays must be placed beneath all stationary equipment and beneath all generators present on site. 		
Potential Waste Management Impacts:			
Nature of impact: Waste impacts by means of waste storage and littering during the operational phase of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	

Magnitude:	2	2	2
Duration:	2	2	2
Extent:	2	2	1
Irreplaceable:	2	2	1
Reversibility:	2	1	2
Probability:	2	2	2
Total SP:	24	18	16
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • An adequate number of scavenger proof litter bins are to be placed throughout the site, dumping of waste on the site is prohibited. • Waste sorting and separation should form part of the environmental induction and awareness programme to encourage and educate personnel to recycle. • Keep all work sites including storage areas, offices and workshops neat and tidy. • All domestic waste is to be removed from site and disposed of at a registered solid waste landfill site. • Care should be taken to ensure that no waste fall off disposal vehicles on-route to the landfill site. If needed, a tarpaulin can be utilised. • The burning and burying of solid waste on site is prohibited. • Littering by workers shall not be permitted. • General waste shall be removed from site on a weekly basis to an approved landfill site. • Minimise waste by sorting waste into recyclable and non-recyclable materials. 		
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: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	0
Duration:	2	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	2	1	1
Probability:	1	1	1
Total SP:	9	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> • Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, as would be expected over national 		

	holidays, weekends and school holiday periods. <ul style="list-style-type: none"> All vehicles should 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. Any damage to public roads is to be reported to the management authority and repaired to its original condition. Signage is to be placed on vehicles at all times. 		
Potential Fire Risk Impacts:			
Nature of impact: Increase risk of fires during the operational phase of the pivots.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	2	0
Duration:	2	1	1
Extent:	1	1	1
Irreplaceable:	1	1	1
Reversibility:	1	1	1
Probability:	1	1	1
Total SP:	7	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> Ensure the work site is equipped with adequate firefighting equipment. All equipment must have at least one firefighting extinguisher. Workers must be adequately trained in the handling of firefighting equipment. No open fires are permitted anywhere on site. No fires will be permitted for heating or cooking purposes on site. Fuel and chemicals must be stored in an area that is acceptable for the client. Dedicated smoking areas are to be provided. 		
Potential Soil Contamination Impacts:			
Nature of impact: Increased Soil contamination by means of hazardous substances.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1

Reversibility:	1	0	1
Probability:	2	1	1
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> No leaked oil or fuel tankers may contaminate soil All tanks and pipes containing fuel or oil must be inspected on a regular basis Spills outside the bund area must be treated with a spill kit All significant leaks must be reported to the competent authority in terms of NEMA UST must be fitted with leak detectors in order to alert when a leak is occurring. Overfill and spillages during tanker refuelling and fuel dispensing should be prevented by the installation of automatic cut off devices. Tanker delivery drivers must be present during delivery of fuel with the emergency cut off switch and a fire extinguisher A closed coupling must be used when fuel is being transferred from the bulk delivery vehicle to the USTs to prevent fugitive emissions. All personnel working with fuel must undergo spill kit training Following a leak or accidental spill, a remediation plan must be compiled and executed. Fuel stock must be monitored on a daily basis in order to identify if the tank is leaking. 		
Potential Soil Erosion Impacts:			
Nature of impact: Increased Soil erosion due to operational activities.	Activity: Already Established Wheat and Maize Pivot areas		
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	4	2	0
Duration:	1	1	1
Extent:	2	1	1
Irreplaceable:	2	1	1
Reversibility:	1	1	1
Probability:	2	1	1
Total SP:	20	6	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Medium (M)	Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> During the operational phase, un-channelled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw or hay bales, or bundles of cut vegetation sourced with the ECO's knowledge and consent, should be dug into the soil in contours to slow surface wash and capture eroded soil. The method may also be used where surface run-off becomes concentrated, All water flow must be controlled using storm water management techniques before discharge into the existing natural drainage line, Temporary cut off drains may be required to capture storm water and promote infiltration, 		

	<ul style="list-style-type: none"> All storm water management features must be constructed in a manner that will ensure the continued functioning of the emergent vegetation. Construction must coincide with the dry season. 		
Potential Visual Impacts:			
Nature of impact: Increased visual impact due to increased working activities during the operational phase.		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	2	0	0
Duration:	1	1	1
Extent:	1	1	1
Irreplaceable:	2	1	1
Reversibility:	1	0	1
Probability:	2	1	1
Total SP:	14	3	4
Significance rating:	Low (L)	Low (L)	Low (L)
Cumulative impact:	Low (L)	Low (L)	Low (L)
Proposed Mitigation:	<ul style="list-style-type: none"> All waste must be placed in bins during operational phase. Keeping the area litter free. Construction activities may only take place during normal working hours. 		
Potential Socio-Economic Impacts:			
Nature of impact: Increased socio-economic conditions due to job creation		Activity: Already Established Wheat and Maize Pivot areas	
Evaluation Component:	Preferred Layout Alternative		No-Go Alternative
	Before Mitigation	After Mitigation	
Magnitude:	6	8	8
Duration:	1	1	1
Extent:	2	2	2
Irreplaceable:	2	2	2
Reversibility:	2	2	2
Probability:	4	5	4
Total SP:	52	75	60
Significance rating:	+ Medium (M)	+ Medium-high (MH)	Medium (M)
Cumulative impact:	+ Medium (M)	+ Medium (M)	Medium (M)
Proposed Mitigation:	<ul style="list-style-type: none"> Ensure that low-, medium- and high skilled workers use provided working opportunities. 		

	<ul style="list-style-type: none">• Low-, medium- and high skilled workers must be sourced locally.• Were practically possible, previously disadvantaged individuals should be provided preference with regards to employment opportunities.• Individuals must be trained and continuously developed
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9.3.3 Decommission Phase

Table 19: Environmental Risk and Significance Ratings for the Decommissioning Phase

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.

9.4 CUMULATIVE IMPACTS

There are various cultivated areas in the vicinity, specifically directly adjacent or in close proximity to the Orange River for water and irrigation purposes. The majority of the area is however still under natural veld conditions rendering the cumulative impacts of the project less significant.

The cumulative effects of most of the identified impacts are regarded as low - medium. The only impacts which could potentially cumulatively contribute to more significant combined effects are the transformation of the relevant vegetation type and CBA.

9.5 PREFERRED ALTERNATIVE CONCLUDING STATEMENT

In identifying, evaluating and comparing impacts associated with the proposed pivot establishment and considered alternatives as well as financial and logistic feasibility, it has been concluded that the already established project has a positive socio-economic impact on the local and surrounding areas. The negative impacts can be mitigated to an expectable level. Thus, the EAP can recommend an approval of the Impact Assessment report coupled with a Fine as this is a Section 24G rectification application.

10. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The processes of investigation which have led to the production of this report, harbours several **assumptions**, which include the following:

- All information provided by the applicant and his/her assistants to the environmental team was correct and valid at the time that it was provided;
- Strategic level investigations undertaken by the agricultural specialist upon instruction from the applicant prior to the commencement of the EIA process, determined that the development site represents a potentially suitable and technically acceptable location;
- The public received a fair and sufficient opportunity to participate in the impact assessment process, through the provision of adequate public participation timeframes stipulated in the Regulations;
- The need and desirability was based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints;
- The information provided by specialists is accurate and unbiased;
- The impact assessment process is a project-level framework and is limited to assessing the anticipated environmental impacts associated with the construction and operational phases of the proposed facility;
- Strategic level decision making is conducted through cooperative governance principles with the consideration of sustainable and responsible development principles underpinning all decision making.

Given that an EIA involves prediction, **uncertainty** forms an integral part of the process. Two types of uncertainty are associated with the EIA process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as final certainty will only be obtained upon implementation of the proposed development. Adequate research, experience and expertise may minimise this uncertainty;
- Uncertainty of values depicts the approach assumed during the impact assessment process, while final certainty will be determined at the time of decision making. Enhanced communication and widespread/comprehensive coordination can lower uncertainty;
- Uncertainty of related decision relates to the interpretation and decision making aspect of the EIA process, which shall be appeased once monitoring of the project phases is undertaken.

The significance/importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the interpretation of results and limit the occurrence and scale of uncertainty.

Gaps in knowledge can be attributed to:

The EIA process is being undertaken prior to the availing of certain information which would be derived from the final project design and layout. As such, technical aspects included herein are mainly derived through personal communication with the applicant and the project manager.

The potential impacts of the cultivation induced soil hydrology and fertility changes on the protected species individuals which are not removed from site is also uncertain to a degree. It is envisaged that an adequate buffer should minimise the risk of such changes potentially impacting on the longevity of these protected individuals.

The principle of human nature also provides for uncertainties with regards to the identified socio-economic impacts of the proposed development.

Eco0Con Environmental is an independent environmental consulting firm and as such, all processes and attributes of the EIA are addressed in a fair and unbiased/objective manner. It is believed that through the running of a transparent and participatory process, risks associated with assumptions, uncertainties and gaps in knowledge can be and have been acceptably reduced.

11. PROFESSIONAL OPINION OF THE EAP AND ENVIRONMENTAL IMPACT STATEMENT

11.1 PROFESSIONAL OPINION OF THE EAP

Based on all information that was captured in this report and after careful consideration of the findings and outcomes during the Impact Assessment Report, Eco-Con Environmental is of the opinion that the proposed project may be approved.

11.2 PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT

The key findings of the Impact Assessment can be summarised as follows:

The Receiving Environment

The surrounding area is mainly characterised by farming activities and natural veld. Although the proposed project area is of ecological significance due to the area being located in a CBA area 1 and 2, the area is already transformed and the potential impacts can be mitigated to acceptable levels. The proposed project area (prior to the development) was regarded as being of little economic or heritage significance/value according to the results of the various specialist reports, however, as a result of the development, the economic value of the area has been increased which benefits the local community.

Public Participation

To support public interest and inform the Impact Assessment process, a continual public consultation process will occur throughout the duration of the assessment processes. A diverse mix of authorities, stakeholders and I & AP's will be consulted during this time, representing the environment, social, economic and political sectors of local, regional and provincial bodies.

Comments will be responded to during various stages of the public participation process in the Impact Assessment will be formally addressed in project reports. It is considered that through the public participation conducted by the EAP, all relevant parties will have adequate opportunity to partake in this process and express opinions and concerns. All relevant concerns will be adequately addressed to ensure that all parties are in agreement with the proposed project.

12. CONCLUSION

In conclusion, although the area is located in a CBA area 1 and 2, however already transformed, no other environmental fatal flaws were identified during the Impact Assessment Phase. All impact can be mitigated to an expectable level. An approval of this impact assessment report is therefore recommended.

A period of 30 days was made available for public comment on the impact assessment Report. The availability of the impact assessment Report was announced through the placing of site notices at the relevant farm entrances; the publication of an advertisement in a free local newspaper and the distribution of written notifications to all identified stakeholders as well as registered I & AP's. In addition, site notices and hardcopies of the report were made available at the Thembelihle local Municipality. A downloadable version is available on the Eco-Con Environmental website: <http://www.eco-con.co.za/projects/> under the name Piet Louw Agricultural Development.

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