



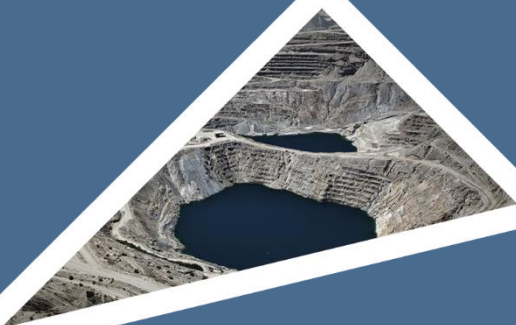
ENVIRONMENTAL
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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED TAAIBOSCHFONTEIN PIVOT EXPANSION EIA

DAEARDLR REFERENCE: NC/EIA/04/PIX/SIY/DOU1/2021





DOCUMENT DETAILS

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Appendix G: Water Use Licence Registration

Appendix H: Environmental Management Programme



List of Abbreviations

BA	:	Basic Assessment
BPG	:	Best Practice Guidelines
CARA	:	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	:	Critical Biodiversity Area
DAEARDLR	:	Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform
DEA	:	Department of Environmental Affairs
DFFE	:	Department of Forestry, Fisheries and the Environment
DHSWS	:	Department of Human Settlements, Water and Sanitation
DWAF	:	Department of Water Affairs and Forestry
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
ECA	:	Environmental Conservation Act (Act No. 73 of 1989)
EIA	:	Environmental Impact Assessment
EMPr	:	Environmental Management Programme Report
GIS	:	Geographical Information System
GLADA	:	Global Assessment of Land Degradation
HIA	:	Heritage Impact Assessment
I&APs	:	Interested and Affected Parties
IDP	:	Integrated Development Plan
IEM	:	Integrated Environmental Management
ISRIC	:	International Soil Reference and Information System
KPI	:	Key Performance Indicator
LED	:	Local Economic Development
LUS	:	Land Use Scheme
NDP	:	National Development Plan
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEM:AQA	:	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	:	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	:	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NFA	:	National Forests Act (Act No. 84 of 1998)
NHRA	:	National Heritage Resources Act (Act No. 25 of 1999)
NWA	:	National Water Act (Act No. 36 of 1998)
PDA	:	Palaeontological Desktop Assessment



PPP	:	Public Participation Process
SAHRA	:	South African Heritage Resources Agency
SAHRIS	:	South African Heritage Resources Information System
SANLC	:	South African National Land-Cover
SAPAD	:	South Africa Protected Areas Data
SDF	:	Spatial Development Framework
SEMA	:	Specific Environmental Management Act
SEMA	:	Specific Environmental Management Act
SPLUMA	:	Spatial Planning and Land Use Management Act
TOPS	:	Threatened or Protected Species
VTU	:	Vegetation Type Units



EXECUTIVE SUMMARY

Genade Boerdery (Pty) Ltd (the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required Environmental Authorisation (EA) application processes (including the statutory public participation) for the proposed expansion of farming activities, in the form of additional pivots, on portion 2 of the Farm Taaiboschfontein 168 (registration division: Kimberley), near Douglas in the Northern Cape. The project involves the clearance of approximately 456 hectares of indigenous vegetation for the purposes of creating new cultivation (pivot) areas for the growing of potatoes. The project includes six (6) pivots of 63 hectares each, two (2) pivots of 24 hectares each and a partial pivot of 30 hectares.

This EIA Phase Report is prepared in accordance with the requirements of Appendix 3 of the Environmental Impact Assessment Regulations, 2014, as part of the National Environmental Management Act (Act No. 107 of 1998 – NEMA).

PURPOSE OF THE EIA REPORT

The purpose of the EIA process is to:

- Identify the policies and legislation that are relevant to the activity;
- To motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking;
- Where appropriate, to identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process including cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identification of key issues;
- Undertaking of the impact assessment to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site, including further consultation; and
- To identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

PUBLIC PARTICIPATION PROCESS

A Public Participation (PP) Plan has been prepared in accordance with the requirements of the NEMA and the Directions issued by the Department of Forestry, Fisheries and the Environment (DFFE) (GN 650 of 5 June 2020) in terms of the Disaster Management Act (Act 57 of 2002). The purpose of the PP Plan is to obtain agreement from the relevant Competent Authority on the public engagement and participation for the abovementioned project. A copy of the plan is available in Appendix E.

The Public Participation Process for the proposed project has been undertaken in accordance with the requirements the NEMA in line with the principles of Integrated Environmental Management. The PPP commenced on the 29 September 2020 with an initial notification and call to register. The comments received from I&APs during the initial call to register and Scoping Phase and commenting period to date have been captured in the Public Participation Report (PPR) in Appendix C, and a summary of the issues raised and section of this report where issues are addressed is presented in Table 6 and Section 7 respectively.



Comments received during this EIA Report review period will be included in the finalised EIA Report to be submitted to the Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DAEALRRD).

This EIA report has been made available for public review and comment Friday 12 November and ending on Monday 13 December. Contact details for EIMS are provided below:

- Environmental Impact Management Services (Pty) Ltd (EIMS)
- P.O. Box 2083 Pinegowrie 2123
- Phone: 011 789 7170 / Fax: 086 571 9047
- Contact: Sinalo Matshona
- Email: taaiboschfontein@eims.co.za

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

An EIA assessment was undertaken to identify all the potential risks and impacts associated with each phase of the proposed pivot expansion activities, as well as potentially feasible alternatives. After considering the broad range of alternative types that exist (i.e. location, process, technology, and activity options), no other feasible alternatives other than the preferred and No-Go alternatives could be identified.

Background information review on the surrounding areas, the biodiversity and heritage/ palaeontological specialist assessment reports (Appendix D), as well as the DFFE National Web based Environmental Screening Tool Report (Appendix F) helped to guide the identification of potential impacts. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria (See Section 9 for the EIMS Impact Assessment Methodology) included the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

The most significant risks and impacts identified were those that remain high in terms of significance even post mitigation measures being considered. The visual impact of the proposed project was rated as having a medium negative significance and the socio-economic benefit was rated as having a medium positive impact. Additional impacts identified are listed below. All these impacts were rated as having low significance if mitigation measures are adhered to (See Section 9.2 for full list of identified impacts and the significance of each):

- Negative Impacts:
 - Anthropogenic disturbances, intentional and/or accidental killing of fauna.
 - Dust nuisance.
 - Erosion.
 - Fire damage.
 - Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA 2.
 - Impact on heritage resources.
 - Littering.
 - Loss of species of conservation concern.
 - Noise nuisance.
 - Oil/ fuel spillages causing soil and groundwater contamination.
- Positive Impacts:
 - Gain of fossil heritage (this is a positive impact if the mitigation measures are adhered to, as it will result in the preservation of fossils if any are found during construction); and
 - Socio-economic (job creation and contribution to food security).



Mitigation measures have been identified and may be further refined based on input from the competent authority and comments received during public consultation. The associated Environmental Management Programme (EMPr), identifies appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts.



1 INTRODUCTION

Genade Boerdery has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required application processes (including the statutory public participation), and to compile and submit the required documentation in support of application for EA in accordance with the NEMA- Listed activity/ies, namely:

- GNR 984: 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 purposed undertaken in accordance with a maintenance management plan.”
- GNR 985: 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 a maintenance management plan-
 - g. Northern Cape:
 - i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
 - ii. Within critical biodiversity areas identified in bioregional plans;
 - iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or
 - iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

The project will involve the clearance of ~450 hectares of indigenous vegetation for the purposes of creating new cultivation (pivot) areas. This is necessary to allow the farming operation to adequately rotate the potato cultivation every two years to prevent blight.

The proposed project is located on portion 2 of the Farm Taaiboschfontein 168 (registration division: Kimberly), located along the R357 between Kimberly and Douglas, in the Siyancuma Local Municipality, Pixley Ka Seme District Municipality. The site is located approximately 26 km north-east of the town Douglas and 77 km south-west of the town Kimberly. The centre point of the site is 28°59'01.90"S and 24°01'41.38"E.



1.1 REPORT STRUCTURE

This report has been compiled in accordance with the NEMA EIA Regulations, 2014, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 1 below.

Table 1: Report Structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 3 3(1)(a):	Details of – i. The EAP who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	Section 1.3 Appendix A
Appendix 3 3(1)(b):	The location of the activity, including: i. the 21-digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties on which the activity is to be undertaken;	Section 2
Appendix 3 3(1)(c):	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is – i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Section 2 Figure 1 Figure 8
Appendix 3 3(1)(d):	A description of the scope of the proposed activity, including i. all listed and specified activities triggered and being applied for; and ii. a description of the associated structures and infrastructure related to the development;	Section 3
Appendix 3 3(1)(e):	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 4
Appendix 3 3(1)(f):	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	Section 5
Appendix 3 3(1)(g):	A motivation for the preferred development footprint within the approved site;	Section 6.1
Appendix 3 3(1)(h):	A full description of the process followed to reach the proposed development footprint within the approved site, including: i. details of the development footprint alternatives considered;	Section 6 Section 7



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	<ul style="list-style-type: none"> ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts <ul style="list-style-type: none"> aa. can be reversed; bb. may cause irreplaceable loss of resources; and cc. can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. if no alternative development locations for the activity were investigated, the motivation for not considering such; and x. a concluding statement indicating the preferred alternative development location within the approved site; 	<p>Section 8</p> <p>Section 9</p> <p>Appendix C</p> <p>Appendix H</p>
Appendix 3 3(1)(i)	<p>A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including</p> <ul style="list-style-type: none"> i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii. an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	Section 9
Appendix 3 3(1)(j)	<p>An assessment of each identified potentially significant impact and risk, including</p> <ul style="list-style-type: none"> i. cumulative impacts; ii. the nature, significance and consequences of the impact and risk; iii. the extent and duration of the impact and risk; iv. the probability of the impact and risk occurring; v. the degree to which the impact and risk can be reversed; vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and vii. the degree to which the impact and risk can be mitigated; 	Section 9



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 3 3(1)(k):	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 8 Appendix D
Appendix 3 3(1)(l):	An environmental impact statement which contains <ul style="list-style-type: none"> i. a summary of the key findings of the environmental impact assessment; ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; 	Section 10 Section 11
Appendix 3 3(1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 9 Section 11
Appendix 3 3(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 6 Section 11
Appendix 3 3(1)(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 11.3
Appendix 3 3(1)(p)	Description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 12
Appendix 3 3(1)(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 11
Appendix 3 3(1)(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	The proposed activity includes operational aspects and therefore the validity period of the EA should be “indefinite”.
Appendix 3 3(1)(s)	An undertaking under oath or affirmation by the EAP in relation to: <ul style="list-style-type: none"> i. the correctness of the information provided in the reports; 	Section 13



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	<ul style="list-style-type: none"> ii. the inclusion of comments and inputs from stakeholders and I&APs; iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and iv. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; 	
Appendix 3 3(1)(t)	<p>Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;</p> <p><i>[Para. (t) substituted by GN 326/2017 and deleted by GN 517/2021]</i></p>	Financial provisions are not required for the proposed project.
Appendix 3 3(1)(u)	<p>An indication of any deviation from the approved scoping report, including the plan of study, including</p> <ul style="list-style-type: none"> i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and ii. a motivation for the deviation; 	No deviations from the approved scoping report exist.
Appendix 3 3(1)(v)	Any specific information that may be required by the competent authority; and	N/A
Appendix 3 3(1)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	N/A



1.2 DETAILS OF THE EAP

The contact details of the EIMS consultant who compiled this EIA Report are as follows:

- Name of the consultant: Cheyenne Muthukarapan
- Tel No.: 011 789 7170
- Fax No.: 086 571 9047
- E-mail address: taaiboschfontein@eims.co.za

1.3 EXPERTISE OF THE EAP

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP to assist with compiling the necessary reports and undertaking the statutory public participation processes, in support of the proposed Taaiboschfontein project. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, *inter alia*, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

The Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultant that is involved in the EIA process and the compilation of this EIA Report is presented in Appendix A.

1.3.1 SUMMARY OF THE EAP'S PAST EXPERIENCE

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 27 years' experience in conducting EIA's. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available.

Cheyenne Muthukarapan is a consultant at EIMS and has been involved in core aspects of numerous environmental impact assessment projects the past 4 years that she has been with the company. Her expertise lies in public consultation/participation processes and sustainability consulting. She has participated in numerous public/stakeholder consultations in relation to environmental impacts assessments, and the formulation of sustainable solutions to various environmental problems for a wide array of projects ranging from risk assessments, audits, EIAs and Basic Assessments for mining, gas exploration, wetland rehabilitation, road upgrades, etc.

Brian Whitfield is a senior project manager at EIMS and has been involved in numerous significant projects over the past 17 years. He holds a BSc (Botany and Zoology) and a BSc Honours degree in Botany from the University of the Witwatersrand. Brian is a registered Professional Natural Scientist with the South African Council for Natural Scientific Professions (400447/13). He has been extensively exposed to various sectors, including Energy, Mining, Oil and Gas, Water and Waste Infrastructure. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines. Brian's experience includes Site Assessments, Water and Waste licensing, Environmental Monitoring and Auditing, Due Diligence Assessments, Competent Persons Reporting, Environmental Impact Assessments, Environmental Management Plans as well as Strategic Environmental Assessments.



1.3.2 SPECIALIST CONSULTANTS

In terms of regulation 16(1)(b)(v) of the EIA Regulations, 2014, as amended, the National Web based Environmental Screening Tool Report is included in Appendix F. Specialist studies that were identified through use of the National Web based Environmental Screening Tool were:

- Landscape/visual Impact Assessment;
- Archaeological and Cultural Heritage Impact Assessment;
- Palaeontology Impact Assessment;
- Terrestrial Biodiversity Impact Assessment;
- Aquatic Biodiversity Impact Assessment;
- Avian Impact Assessment;
- Socio-Economic Impact Assessment;
- Plant Species Assessment; and
- Animal Species Assessment.

Certain of the above specialist studies as identified through the screening tool were deemed unnecessary by the EAP while Biodiversity, Heritage and Palaeontology were the only pre-identified specialist studies that were deemed essential by the EAP based on the nature of the proposed development, the receiving environment and the Scoping Phase assessment (including plan of study for impact assessment). A desktop study and an on-site investigation was conducted on the 19th of November 2020, which confirmed the redundancy of the remainder of the studies as identified by the tool.

The biodiversity, heritage and palaeontological specialist studies included the gathering of data relevant to identifying and assessing preliminary environmental impacts that may occur as a result of the proposed pivots. These preliminary impacts were assessed according to the EIMS pre-defined impact significance rating methodology (Section 9). The specialists have also included recommendations preliminary mitigation/management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. The specialist's declaration of independence is included in the specialist report presented in Appendix D.

2 DESCRIPTION OF THE PROPERTY

Table 2 provides a description of the property details and size of the proposed pivots footprint, as well as the distance to the nearest towns. Refer to Figure 1 for the locality of the proposed pivots.

Table 2: Locality details

Property	Farm Taaiboschfontein 168 Portion 2
21-digit Surveyor General Code	C03700000000016800002
Application Area (Ha)	The directly affected property (portion 2) comprises an area of 1713.0640 ha. The estimated combined area of the proposed pivots is approximately 456 ha.
Magisterial District	Ward 6 of the Siyancuma Local Municipality, Pixley Ka Seme District Municipality



**Distance
direction
nearest towns**

The proposed project is located on portion 2 of the Farm Taaiboschfontein 168 (registration division: Kimberly), located along the R357 from Kimberly to Douglas, in the Siyancuma Local Municipality, Pixley Ka Seme District Municipality. The site is located approximately 26km north-east of the town Douglas and 77km south-west of the town Kimberly. The centre point of the site is 28°59'1.90"S and 24°1'41.38"E.

2.1 PROPERTY OWNERSHIP

As stated above, the proposed pivots will be located on portion 2 of the farm Taaiboschfontein 168 located along the R357. This property is currently registered under the Vickie Trust which is owned by the applicant. Refer to Figure 1 for the locality of the proposed development of pivots.

2.2 SURROUNDING LAND USES

The area immediately surrounding the proposed pivots development footprint can be described as combination of natural indigenous vegetation and transformed cultivated areas (pivots) located along the Riet and Vaal Rivers. The existing pivots for the applicant are situated south of the proposed pivots, just north of the Riet River. The property is located along the R357 from the town of Douglas to Kimberly.

On a regional scale, the town of Douglas is the closest major town located 26 km to the west-south-west of the proposed pivots. Refer to Figure 2 for a map of the landcover of the area of the proposed pivots.

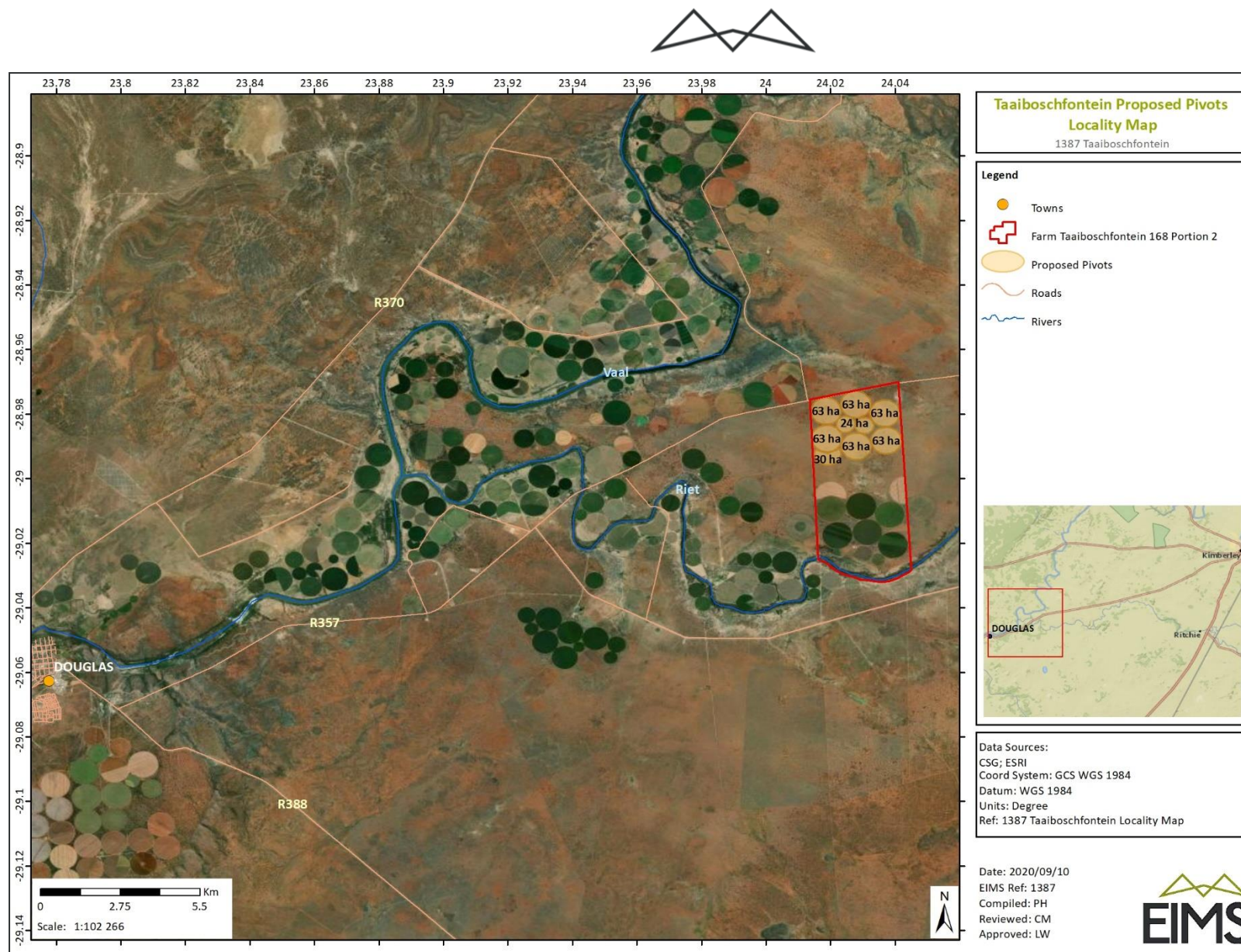


Figure 1: Aerial imagery indicating the proposed pivots site location.

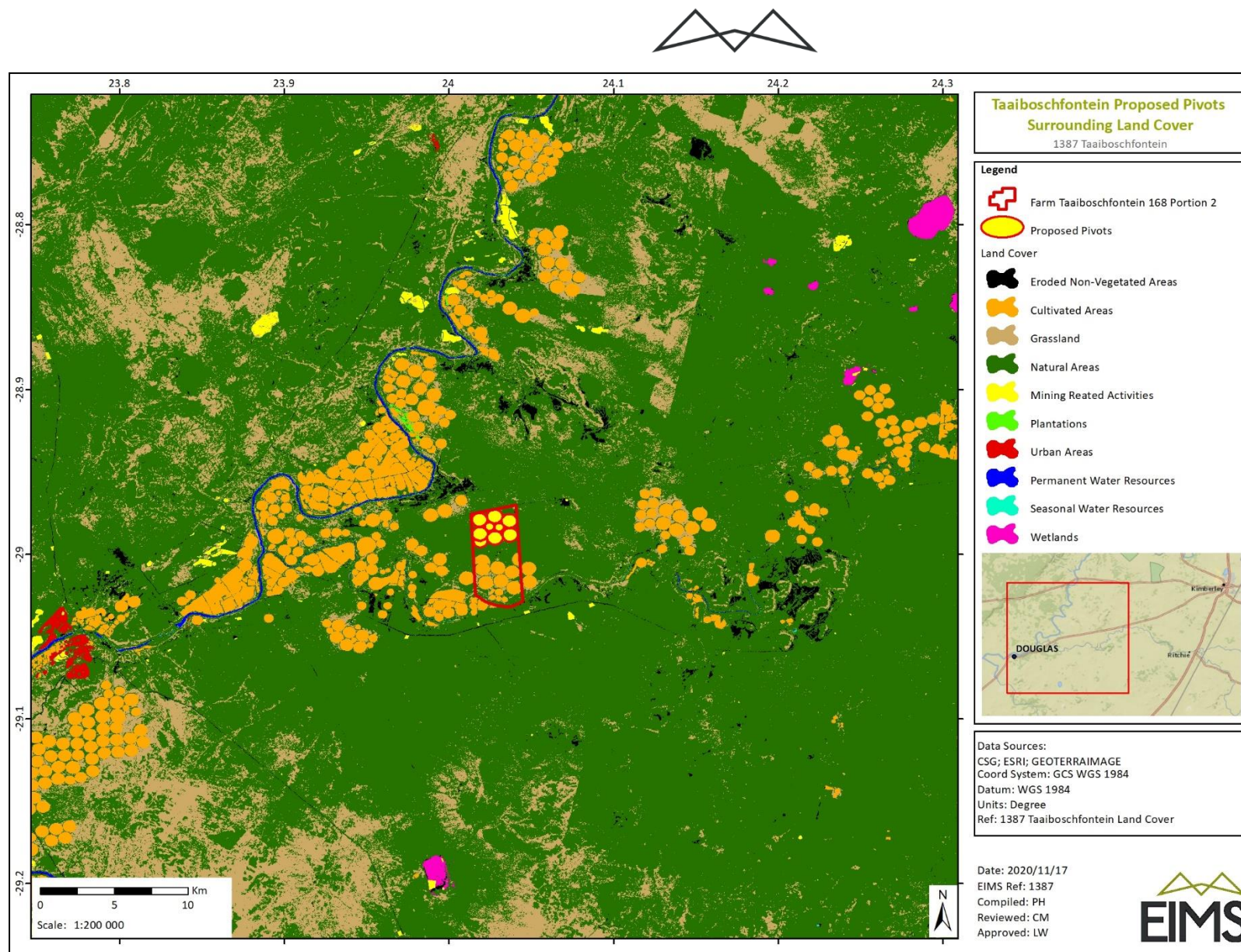


Figure 2: Land uses surrounding the proposed pivot area.



3 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

The section below provides a detailed description for the proposed pivots. The aim of the project description is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the preliminary impacts identified and assessed in this EIA Report, and for which mitigation measures have been, or will be designed.

3.1 PROJECT DESCRIPTION

The project involves the clearance of approximately 456 hectares of indigenous vegetation for the purposes of creating new cultivation (pivot) areas for the growing of potatoes. The farm currently contains existing centre pivots in the southern section. An example of a typical centre pivot irrigation structure is shown in Figure 3. The proposed project includes an additional six (6) pivots of 63 hectares each, two (2) pivots of 24 hectares each and a partial pivot of 30 hectares (Figure 8) which will be located in the northern section of the farm. Representative photographs of the proposed development area are presented in Figure 4, Figure 5 and Figure 6.

The project will include the implementation (construction) of 1 pivot annually. Each pivot will be operational for two consecutive years upon which the soil will be allowed to naturally revegetate. Cultivation will move on to the next pivot area and the cycle will repeat itself every 8 years for all pivots. Each pivot will be used to produce and harvest seed potatoes. It is necessary to allow the farming operation to adequately rotate the potato cultivation every two years to prevent blight (a potato fungal infection). Water for the pivots will be sourced from an existing approved water source (refer to Figure 7 for a photograph of the existing pump station) and pumped through underground PVC pipes.



Figure 3: Typical centre pivot irrigation farming (courtesy of https://en.wikipedia.org/wiki/Center_pivot_irrigation).



Figure 4: Vegetation typical of the open savannah within the planned development area.



Figure 5: *Senegalia mellifera* dominates the shrub layer in some areas along the northern boundary of the property.



Figure 6: The area adjacent to the river consists of open secondary grasslands. This area has historically been used as cultivation areas.



Figure 7: The riverine area where the existing pump station is located has been invaded by *Eucalyptus* spp.

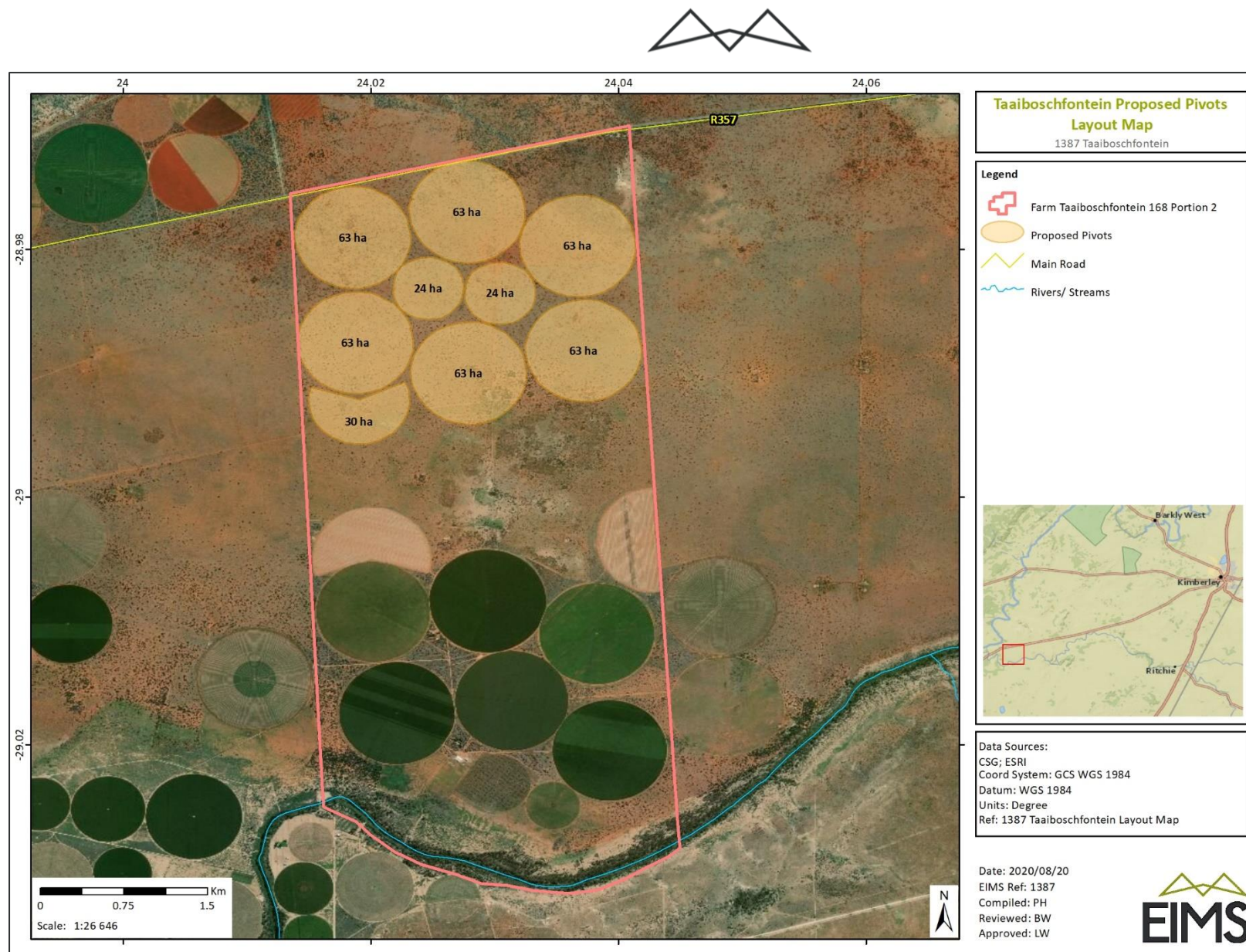


Figure 8: Layout map of the proposed pivot expansion project.



4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. A summary of the applicable legislation is provided in Table 3 below. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, in accordance with the requirements of the NEMA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed project. More detail on the legislative framework is presented below.

Table 3: Applicable legislation and guidelines overview

Applicable Legislation, Policies and Guidelines	Description of Legislation, Policy or Guideline	Relevance to the Proposed Project
Constitution of the Republic of South Africa (Act No. 108 of 1996)	The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act 108 of 1996) makes provisions for environmental issues and declares that: "Everyone has the right - a) to an environment that is not harmful to their health or well-being; and b) to have the environment protected, for the benefit of present and future c) generations, through reasonable legislative and other measures that: i. prevent pollution and ecological degradation; ii. promote conservation; and iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".	This EIA is conducted to fulfil the requirement of the Bill of Rights.
National Environmental Management Act (Act No. 107 of 1998 – NEMA); and the EIA Regulations, 2014, as amended	The NEMA (1998) requires that a project of this nature must undergo a Scoping and Environmental Impact Assessment (EIA) and an Environmental Management Programme (EMPr) must also be compiled. The EIA Regulations GN R. 984 (2014, as amended) in terms of the NEMA is applicable to this project.	The proposed project will trigger the following Listed Activities under the NEMA: <ul style="list-style-type: none"> • NEMA GN R. 984, Listing Notice 2, Activity 15 • NEMA GN R. 985, Listing Notice 3, Activity 12
National Water Act (Act No. 36 of 1998 – NWA)	The NWA recognises that water is a scarce and unevenly distributed	Water to be used on the farm was already listed with the Oranje Vaal



Applicable Legislation, Policies and Guidelines	Description of Legislation, Policy or Guideline	Relevance to the Proposed Project
	national resource which must be managed encompassing all aspects of water resources.	Water Users Association on 13 August 2020 for 1 686 300m ³ over 153.3 ha. Refer to Appendix G for the certificate. Should any exceedances of this water allocation be required, the applicant must lodge an amendment to the Water Users Association. The proximity of the proposed pivots to watercourses or wetlands must be discussed with the Department of Water and Sanitation (DWS) and relevant water use licence applied for should this be required.
National Heritage Resources Act, 1999 (Act No. 25 of 1999 - NHRA)	The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations.	Due to the extent of the project, it is possible that heritage resources and palaeontological features could occur within the project boundary area. This has therefore been assessed by the Palaeontological and Heritage specialists with the findings detailed in this report (Section 8.3 and Section 8.4 respectively).
National Environmental Management: Biodiversity Act (Act 10 of 2004 – NEM:BA)	NEM:BA provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. NEM:BA also deals with endangered, threatened and otherwise controlled species, under the Threatened or Protected Species (TOPS) Regulations.	The project will involve the clearance of 456 hectares of indigenous vegetation for the purposes of creating new cultivation (pivot) areas. Although no TOPS species were recorded by the specialist during the site visit, there remains a high probability that certain species may occur on site and therefore a TOPS permit must be obtained should any of these species be impacted upon.
National Forests Act (Act No. 84 of 1998 - NFA)	The National Forests Act provides for the protection of forests as well as specific tree species.	The Biodiversity Specialist identified 3 tree species protected under the NFA that occur within the study area (<i>Vachellia erioloba</i> , <i>Vachellia haematoxylon</i> and <i>Bosica albitrunca</i>). A Tree Permit in terms of the NFA must be obtained for prior to any damage of these tree species.
National Veld and Forest Fire Act (Act No. 101 of 1998 – NVFFA)	The purpose of this Act is to prevent and combat veld, forest and mountain fires.	The proposed project area is situated in the amongst natural indigenous vegetation and cultivated land. The necessary



Applicable Legislation, Policies and Guidelines	Description of Legislation, Policy or Guideline	Relevance to the Proposed Project
		precautionary measures have been included in the EMPr to address veld and fire management.
Conservation of Agricultural Resources Act (Act 43 of 1983):	The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species.	The proposed project area is situated in the amongst natural indigenous vegetation and cultivated land. It is important to ensure that the necessary precautionary measures are included in EMPr in order to conserve the soils and vegetation and to protect the proposed footprint area against combating weeds and invader species.
Northern Cape Nature Conservation Act, Act No 9. Of 2009	The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province.	The proposed project area is situated amongst natural indigenous vegetation and cultivated land. A permit may be required for site clearing and/ or for the destruction of any nationally or provincially listed protected species.
Northern Cape Provincial Spatial Development Framework (SDF) and Pixley Ka Seme District Municipality SDF	Spatial land-use directive which aims to promote environmental, economic, and social sustainability through sustainable development.	The proposed project aligns with the Northern Cape and Pixley Ka Seme District Municipality SDF.
Spatial Planning and Land Use management Act (Act 16 of 2013- SPLUMA)	SPLUMA aims to develop a new framework to govern planning permissions and approvals, sets parameters for new developments and provides for different lawful land uses in South Africa. SPLUMA is a framework law, which means that the law provides broad principles for a set of provincial laws that will regulate planning.	The farm is currently zoned as agricultural and the proposed project is in line with the land use zoning. Therefore the proposed project is in line with the objectives of the SPLUMA.

4.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed pivots is governed by many Acts, Regulations, Standards and Guidelines on an international, national, provincial and local level. Legislation applicable to the project includes (but is not limited to) those discussed below.

4.1.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The main aim of the NEMA is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIA's became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). NEMA was promulgated in 1998. Section 24(2) of NEMA empowers the



Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014, as well as April 2017. The EIA Regulations, 2014, as amended are applicable to this project.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that have been identified as applicable by the proposed development. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised, are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published the EIA Regulations, 2014, as amended pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity. The Regulations differentiate between a simpler Basic Assessment Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete Scoping and EIA process (activities listed in GN R. 984). In the case of the proposed farm expansion activities project, there are activities triggered under GN R. 984 and, as such, a Scoping and EIA process is necessary. Table 4 presents all the anticipated listed activities under the NEMA 2014 EIA Regulations (as amended) that are applicable to this project. An application was submitted to the DAEALRRD on 6 April 2021. An additional listed activity was identified and assessed during the EIA process. An amended application for environmental authorisation was submitted to the DAEALRRD with the EIA Report. Please refer to Appendix E for a copy of the amended application.

Table 4: Listed activities in terms of the NEMA EIA Regulations (2014) as amended

Activity	Activity Description	Applicability
Listing Notice 2 Activity 15	<p><u>The clearance of an area of 20 hectares or more of indigenous vegetation</u>, excluding where such clearance of indigenous vegetation is required for-</p> <ul style="list-style-type: none"> (i) The undertaking of a linear activity; or (ii) Maintenance purposed undertaken in accordance with a maintenance management plan." 	The proposed project involves the clearance of 456 hectares of indigenous vegetation for the establishment of pivot irrigation of potatoes. This clearance of indigenous vegetation is greater than the 20 hectare threshold of this listed activity and therefore an application for Environmental Authorisation (EA) through a Scoping and EIA process is required.
Listing Notice 3 Activity 12	<p><u>The clearance of an area of 300 square metres or more of indigenous vegetation</u> except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan-</p> <p>g. Northern Cape:</p> <ul style="list-style-type: none"> i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; 	The proposed project involves the clearance of 456-hectares of indigenous vegetation for the establishment of pivot irrigation of potatoes. The development footprint falls within a critical biodiversity area (CBA) and therefore any clearance of more than 300m ² of indigenous vegetation within a CBA would trigger this listed activity.



Activity	Activity Description	Applicability
	<ul style="list-style-type: none">ii. <u>Within critical biodiversity areas identified in bioregional plans;</u>iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; oriv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	

A Scoping and Environmental Impact Assessment (EIA) process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and EIA studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. Figure 9 below provides a graphic representation of all the components of a Scoping and EIA process.

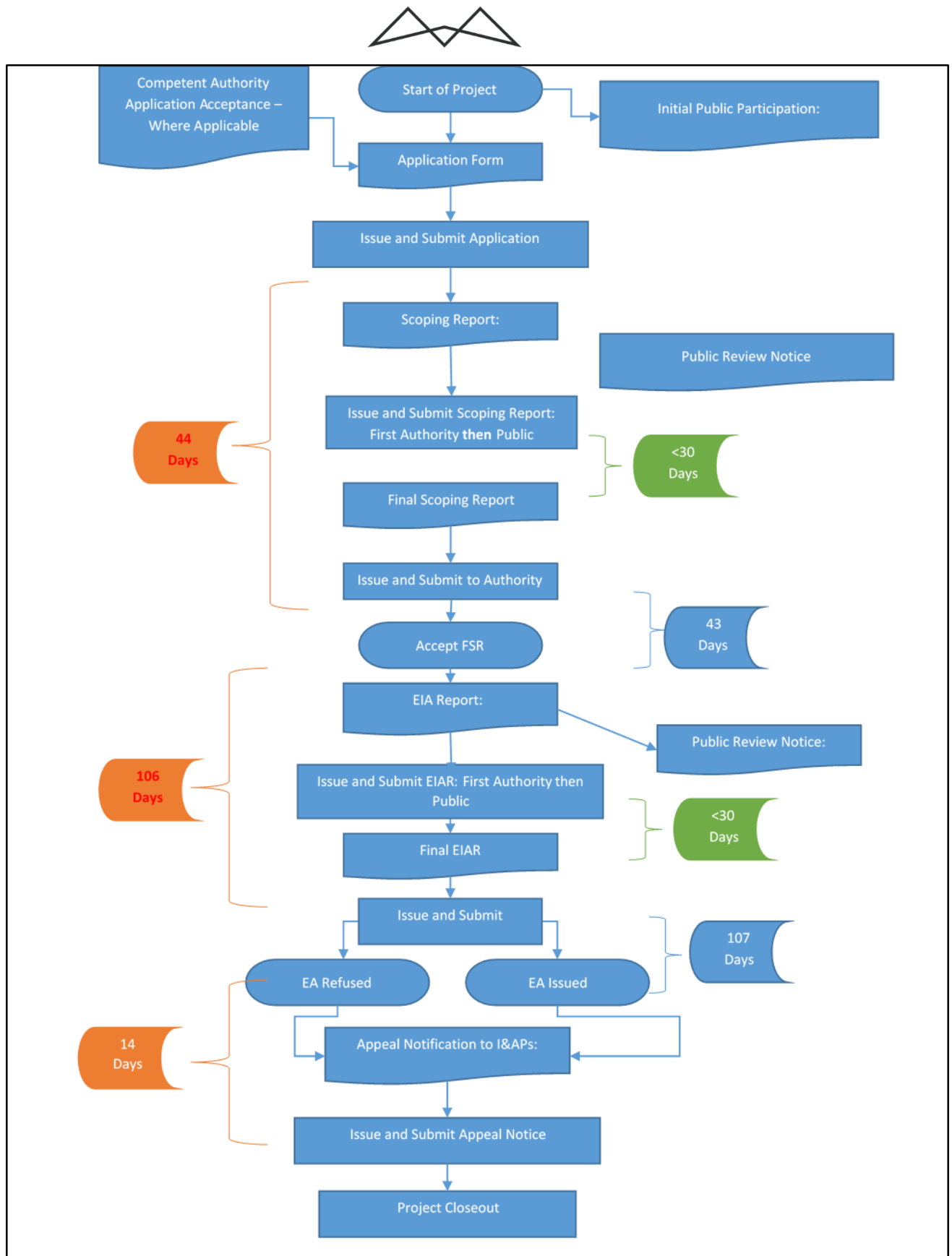


Figure 9: EIA process diagram



4.1.1 THE NATIONAL WATER ACT

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. A person may use water if the use is:

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

These water use processes are described in Figure 10 below.

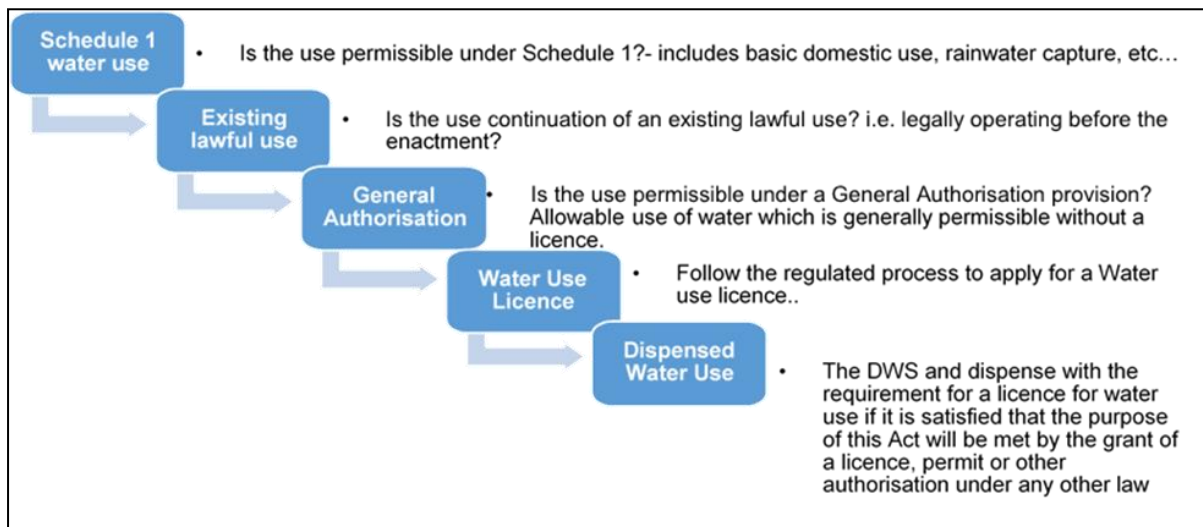


Figure 10: Authorisation processes for new water uses.

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the DHSWS. Water users are required to register certain water uses that took place on the date of registration, irrespective of whether the use was lawful or not. The water uses for which an authorisation or licence can be issued include:

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a watercourse;
- Engaging in a stream flow reduction activity contemplated in section 36;
- Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;
- Disposing of waste in a manner which may detrimentally impact on a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course or characteristics of a watercourse;
- Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and



- Using water for recreational purposes.

No Section 21(a) water use authorisation should be required for the proposed project as water to be used on the farm was already listed with the Oranje Riet Water Users Association on 13 August 2020 for 11 000 m³/ha (Refer to Appendix H for the certificate of enrolment). The proposed pivots do however fall within the regulated area of a watercourse (Section 21(c&i)) and therefore the applicant must engage the DWS to obtain the required water use licence or general authorisation registration.

4.1.2 THE NATIONAL HERITAGE RESOURCES ACT

The National Heritage Resources Act (NHRA) (Act 25 of 1999) stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...”. Heritage assessments are included as a component of Environmental Impacts Processes required by NEMA.

The NEMA 23(2)(b) states that integrated environmental management should, “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”.

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) of the NHRA and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations.

4.1.3 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT

The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes (LUS); and municipal planning tribunals. The proposed project aligns with the SPLUMA and the Pixley Ka Seme District Municipality SDF as the proposed pivots will be constructed within an intensive irrigation agricultural area.

4.1.4 NATIONAL DUST CONTROL REGULATIONS

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. The applicant must take cognisance of these regulations due to the removal of vegetation cover for crop production and the resultant potential to generate dust.

4.1.5 ENVIRONMENT CONSERVATION ACT

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance.

4.2 PERIOD FOR WHICH AUTHORIZATION IS REQUIRED

The authorisation will be required for the duration of the agricultural activities on-site (i.e. Long term).



5 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

This section will examine the need and desirability of the proposed pivots and the importance of the project for the applicant's continued operations and as a local economic stimulus. The proposed pivots will allow for favourable economic impacts on both the local and regional economy. The proposed pivots are consistent with the surrounding land use activities which is largely agricultural. Should the project proceed, an additional 200 temporary/ seasonal jobs are anticipated to be created over a period of 20 years.

Furthermore, the additional pivots will ensure the sustained continuity of the applicant's operations and guard the crops against disease. The proposed new pivot developments will allow for the implementation of one pivot annually. Each pivot will be operational for two consecutive years upon which natural revegetation of the soil will take place until the next use of the pivot area.

5.1 NEED AND DESIRABILITY ANALYSIS

The needs and desirability analysis component of the *"Guideline on need and desirability in terms of the Environmental Impact EIA Regulations (Notice 819 of 2014)"* includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage sites, opportunity costs, etc.). Table 5 below presents the needs and desirability analysis undertaken for the proposed pivot development.



Table 5: Needs and desirability analysis for the proposed pivot development.

Ref No.	Question	Analysis Discussion
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	<p>After running the National Web based Environmental Screening Tool (Appendix F), specialist studies that were identified included:</p> <ul style="list-style-type: none"> • Landscape/ Visual Impact Assessment; • Archaeological and Cultural Heritage Impact Assessment; • Palaeontology Impact Assessment; • Terrestrial Biodiversity Impact assessment; • Aquatic Biodiversity Impact Assessment; • Avian Impact Assessment; • Socio-economic Impact Assessment; • Plant Species Assessment; and • Animal Species Assessment. <p>After further desktop analysis of the proposed project area, as well as a site visit, only a biodiversity and heritage and palaeontological was considered necessary by the EAP and was conducted by the required specialists. The decision of required specialist studies was informed based on the location of the proposed project, and the nature of the activity. The proposed project area is natural vegetation and the surrounding land use activities is agricultural. The Vaal River and the Riet River runs north and south of the project area respectively. However, the proposed pivots are located more than 3 km from the nearest river.</p> <p>The proposed development aligns with the Siyancuma Local Municipality Local Economic Development Plan (LED), which highlights agriculture and geoprocessing as an opportunity for economic growth in the municipality.</p> <p>The specialist impact assessments involved the gathering of data relevant to identifying and assessing preliminary environmental impacts that may occur because of the proposed pivots. These preliminary impacts were assessed according to the EIMS pre-defined impact significance rating methodology (Section 9). The</p>



Ref No.	Question	Analysis Discussion
		<p>specialists have also recommended appropriate preliminary mitigation/ management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.</p> <p>The proposed development aligns with the Siyancuma Local Municipality Local Economic Development Plan (LED), which highlights agriculture and geoprocessing as an opportunity for economic growth in the municipality.</p>
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this EIA Report. Efforts will be made to avoid any identified impacts/ disturbance to sensitive environmental features. Efforts will be made to avoid any identified impacts/ disturbance to sensitive environmental constraints.
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to the alternatives considered for this project in Section 0, the baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this EIA Report.
1.4	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been	Waste impacts include the storage of waste and littering during the development of the pivots. Refer to Section 0 for alternatives considered and Section 9 for possible impact and mitigation measures relating to waste.



Ref No.	Question	Analysis Discussion
	explored to safely treat and/or dispose of unavoidable waste?	
1.5	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Heritage and Palaeontological specialist assessments were conducted to identify any possible impacts from the proposed activities and mitigation measures. Refer to Appendix D for copies of the specialist reports. The possible impacts and associated mitigation measures as identified by the specialist was also included as part of Section 9.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Soil is considered a non-renewable resource due to the extremely long period it takes for soil to form through natural erosion, etc. The CARA provides for the preservation of soil and based on the nature of the project and the rotational basis of the pivots, this could potentially preserve and protect the soil from nutrient depletion, etc.
1.7	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system considering carrying	No renewable resources are anticipated to be used and no impacts on renewable resources are expected as a part of the proposed activities.



Ref No.	Question	Analysis Discussion
	capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	It is not anticipated that the project will exacerbate the increased dependency of the natural resources. However, the proposed project will contribute towards to economic growth in the area.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The area for development of the proposed pivots mostly consists of natural vegetation. The proposed area for development is currently less economically active that if it were to be used for a monoculture in the name of food production. For this reason and considering that the major surrounding land-use is agriculture, the proposed pivots do constitute the best use of the natural resources/ area. The alternative will be for the area to remain undeveloped.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed pivots will be located on the same property as older pivots. While the proposed project will not reduce the dependency on the natural resource, the output of the proposed pivots will result in an increase in employment and food security.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The exact number and location of each protected plant species within the proposed development footprint is not known however the Biodiversity Specialist did identify the presence of, or high probability of occurrence of, certain protected plant species. The EMPr includes a requirement for a specialist walkthrough to identify



Ref No.	Question	Analysis Discussion
		<p>any protected species within the development footprint and to oversee the relocation of these plants, if required, prior to any developments.</p> <p>Additionally, chance finds with regards to cultural heritage and palaeontology is a possibility during the initial clearing and construction of the pivots and associated infrastructure. A chance find protocol was developed by the heritage/ palaeontology specialist.</p>
1.8.2	What is the level of risk associated with the limits of current knowledge?	In terms of location the level of risk with regards to soil composition is low due to the proposed project being within the vicinity of other successful pivot operations. The uncertainties mentioned in 1.8.1 above have been mitigated in the EMPr, which if followed, will attribute a low risk to any uncertainties.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A specialist Biodiversity impact assessment was undertaken to determine the impacts on ecology. Based on the findings of the specialist study, no fatal flaws were identified which would prohibit the clearance of indigenous vegetation for use in crop production. Suitable mitigation measures have been put forward for the identified impacts and this is considered adequate in terms of a risk-averse and cautious approach to the development.
1.9	How will the ecological impacts be resulting from this development impact on people's environmental right in terms following?	
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. In summary, because of the preferred location alternative, the proposed project will not negatively affect public amenity or have any high negative visual impacts, as the proposed pivots are within the applicant's property and aligns with surrounding land-use.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. In summary, the only positive impacts will be to the local economy as a result of job creation and contribution to food security.



Ref No.	Question	Analysis Discussion
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	<p>Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this EIA Report. No dependencies are expected to be negatively impacted on because the proposed development will be on the applicant's property. The pivots are not anticipated to negatively impact on any water sources that might be used by the surrounding communities. If any cultural or heritage resources are identified during development, a chance find procedure as described by the heritage specialist will be implemented to mitigate any negative impacts.</p> <p>The proposed project will provide 200 temporary/seasonal jobs over the next 20 years.</p>
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. The proposed project will result in the loss of natural vegetation however, the impact is anticipated to be low.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 0 for details of the alternatives considered, as well as this section of the EIA Report for the advantages and disadvantages of the proposed activity. The only viable alternative assessed for the proposed pivots is the no-go option.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. The proposed project will contribute to the loss of natural vegetation and could potentially impact on cultural resources if a chance find occurs. The proposed pivot development is consistent with the surrounding land use activities in the area. Because of this and the relatively small scale of the development in the broader local/regional context no significant negative cumulative impacts are expected.



Ref No.	Question	Analysis Discussion
2	Promoting justifiable economic and social development	
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following?	
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area,	<p>Siyancuma LM, part of the Pixley Ka Seme DM, has three major urban settlements: Douglas, Griekwastad and Campbell and a few rural areas. The rest of the municipality consists of mainly commercial and small farming areas (which aligns with the proposed project) as well as small private game parks. This municipality was classified as a financially distressed municipality, mainly due to the strain that Eskom is putting on its cash flow. The LM's Integrated Development Plan (IDP, 2020) states that the main themes to focus on are increasing economic growth, improving community self-reliance, achieving service excellence and sustainability.</p> <p>According to StatsSA (2001 and 2011) the total population for Siyancuma Local Municipality showed a negative growth rate of -5.6 % with the population decreasing from 39 275 to 37 076. The 2016 Community Survey showed a further negative population growth rate of -3.1 % from 2011 to 2016 during which the population decreased from 37 067 to 35 938. The age group between 20 and 34 (characterised as the economically active group) forms 27.7 % of the total population in this LM.</p> <p>The LM's population can be broken down into the following (Community Survey, 2016):</p> <ul style="list-style-type: none"> • Coloured – 67,80 % • African – 25,30 % • White – 6,69 % • Asian – 0,21 % <p>Irrigated agriculture is among the major contributing factors to the Northern Cape provincial GDP, with a total area of 140 000 ha that is under irrigation. This sector uses approximately 80% of the total water used in the province to produce nearly 50% of the gross agricultural product.</p> <p>Agriculture forms the key economic activity within the Pixley Ka Seme District Municipality. According to the Pixley Ka Seme District Municipality IDP (2017) the agricultural sector provides around 39% of the employment opportunities in the district, which represent a significant and important economic sector, especially in this area that has limited job opportunities. The mechanisation by farmers has however resulted in declining job</p>



Ref No.	Question	Analysis Discussion
		<p>opportunities in this sector. According to the Pixley Ka Seme District Growth and Development Strategy (2006) the Municipalities of Ubuntu, Siyathemba and Siyacuma contribute the most to this sector, with a total of 28,49 % contributed to the provincial Gross Geografic Product. Agriculture and agro-processing is one of the six critical sectors which was identified in the Growth and Development Strategy for unlocking economical potential.</p> <p>The town of Douglas (26 km southwest of the proposed project) is the economic hub of the municipality. This town has seen an influx of unskilled people from farms which is continuous. The agriculture, community, social and personal services sectors are the strongest economic sectors and biggest job providers in and around this town. The major employment agencies in the area include agricultural entities like GWK, the SLM and provincial government departments (IDP, 2020).</p>
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	<p>The LM has no Spatial Development Framework (SDF) or Land Use Scheme (LUS) to date. However, even though a small project, the proposed pivots align with the municipalities ideals as set out in the IDP as it will contribute to sustainable economic growth and job creation of unskilled people, which is much needed in the municipality. This is further exacerbated by the municipality's Key Performance Area 3- Local Economic Development and Tourism. Additionally, the project promotes self-reliance and fits in with one of the municipalities main themes, and Douglas's main job providing economic sectors, which is farming. The municipalities mission, among others, is to optimize all available resources and human skills to create an economically enabling environment.</p> <p>According to the Pixley Ka Seme DM SDF (2013-2018) the proposed project falls within a potential intensive irrigation agricultural area.</p>
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	<p>The preferred location for proposed pivots falls within a potential intensive irrigation agricultural area according to the Pixley Ka Seme DM SDF (2013-2018). The proposed project aligns with the surrounding land uses.</p>
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	<p>The LED strategy for Siyancuma LM focuses on 4 LED Pillars, each with supporting programmes, project and accompanying Key performance indicators (KPIs). Pillars 1 of the LED strategy focuses on Agriculture and Agro Processing Development. The proposed pivot project aligns with the programmes and projects identified under Pillar 1 of the LED. The project will support agricultural growth and will create job opportunities for the</p>



Ref No.	Question	Analysis Discussion
		local community as far as reasonably possible. Should the project proceed, an additional 200 temporary/seasonal jobs are anticipated to be created over a period of 20 years
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Job creation for local residents as far as reasonably possible. Should the project proceed, an additional 200 temporary/seasonal jobs are anticipated to be created over a period of 20 years. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed development aligns and compliments the LED Pillar 1: local economic development, which includes various projects that focuses on agriculture and agro-processing development, including potato processing and packaging.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to the public participation process undertaken to date in Section 7 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	The need for additional pivots will support the need for short term and long-term food security through the provision of seed potatoes. The proposed pivots will allow for favourable economic impacts on both the local and regional economy. Should the project proceed, an additional 200 temporary/ seasonal jobs are anticipated to be created over a period of 20 years. Furthermore, as per pillar 1 of the LED strategy, the proposed pivots will support the emerging potato farmers through the provision of seedlings and in turn will help increase the portion of crops that are beneficiated locally.
2.5	In terms of location, describe how the placement of the proposed development will:	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	The proposed project site located in the middle of agricultural land which is located approximately 26km north-east of the town Douglas and 77km south-west of the town Kimberly. Should the project proceed, an additional 200 jobs are anticipated to be created over a period of 20 years for the surrounding farming communities.



Ref No.	Question	Analysis Discussion
2.5.2	Reduce the need for transport of people and goods.	The proposed project will not have an increase on the need for transportation of goods and people as the proposed project will allow for the continuation of farming practices for the applicant.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	The proposed project will not have an increase in the use of public transport as the proposed project will allow for the continuation of farming practices for the applicant.
2.5.4	Compliment other uses in the area,	The proposed project is consistent with the other land uses in the area, which is agricultural farming.
2.5.5	Be in line with the planning for the area.	Refer to item 2.1.2 of this table (above).
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	Not applicable. The proposed pivots will be situated outside an urban area within an area classified as agricultural land.
2.5.7	Optimise the use of existing resources and infrastructure.	No existing infrastructure exists on the proposed development footprint however the farm contains existing pivots with associated infrastructure (e.g. irrigation piping, pumps etc.) which can be expanded upon.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement).	Refer to Section 0 of this EIA Report.
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	The proposed project will not have an impact n urban sprawl and compaction/densification as the project location is situated 26 km north-east of the town Douglas and 77 km south-west of the town Kimberly in an area zoned as agricultural land.



Ref No.	Question	Analysis Discussion
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs.	Refer to items 2.5.7 to 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes.	The proposed land use for the pivots is agricultural, which aligns with the nature of the development. Effort will be made towards being environmentally sustainable in the long term.
2.5.12	Consider special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.).	See item 1.7.3 of this table (above).
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	The proposed project will allow for contribution to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through employment opportunities contractors.
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area.	The proposed locality is natural vegetation in the middle of agricultural land. Therefore, no sense of history or heritage will be lost. The proposed pivots will fit in with the surroundings, having no negative impacts on the sense of place.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed project will have no impact on settlement patterns as the proposed project area is in an area zoned as agricultural land.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts	



Ref No.	Question	Analysis Discussion
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The assumptions and limitations are presented in Section 12 of this EIA report.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to.
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	As the proposed project is a new development a cautious approach has been applied. An extensive public participation process was undertaken to ensure that the local community and relevant authorities were notified of the proposed project.
2.7	How will the socio-economic impacts resulting from this development, impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. In summary the only negative effects identified will be that on the loss of natural vegetation.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. In summary, local employment will be prioritised.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. The proposed development will have a minimal impact on human-wellbeing and ecosystem services due to the location. Human livelihoods could however be positively impacted because of employment opportunities. There will be a negative impact on the ecology of the area as natural vegetation will need to be



Ref No.	Question	Analysis Discussion
	impacts (e.g. over utilisation of natural resources, etc.)?	cleared in order to develop the pivots. These impacts could be minimised if the proposed mitigation measures are carried out.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. Additionally, see item 2.8 of this table (above).
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. The preferred alternative is considered the best practicable environmental option as it is located in an area zoned as agricultural land and is adjacent to the existing pivots.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting a EIA and EIA process, with an adequate public participation process, the applicant ensures that equitable access to the environment has been considered. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.



Ref No.	Question	Analysis Discussion
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to the public participation process undertaken to date in Section 0 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Advertisements as well as site notices were distributed in and around the project area in English and Afrikaans to assist in understanding the project. The notices and advertisements included contact details for easy access to the public participation specialist if any additional information is required by anyone from the public. The public is encouraged to participate and provide input which will then be recorded and submitted with the relevant reports to the competent authority.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were considered, and that adequate recognition	



Ref No.	Question	Analysis Discussion
	were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	<p>Refer to the public participation process undertaken to date in Section 0 of this EIA Report. Public participation and consultation will continue during the EIA phase as described in Section 10.</p> <p>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report. The impacts have been further explored in the EIA phase and findings thereof presented in this EIA Report and EMPr.</p>
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Workers at the farm will be educated on a regular basis through toolbox talks on the environmental and health risks that may occur within their work environment, and adequate measures will be taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in as well as the requirements of their job.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	The project pivots are located approximately 26km north-east of the town Douglas and 77km south-west of the town Kimberly. It is anticipated that workers currently employed or to be employed will travel from the



Ref No.	Question	Analysis Discussion
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	surrounding towns. Should the project proceed, an additional 200 temporary/seasonal jobs are anticipated to be created over a period of 20 years for the surrounding farming communities.
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	What measures were taken to ensure:	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to the public participation process undertaken to date in Section 7 of this Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Report. Seed potatoes are sought in the agricultural industry and will contribute to food security on a national scale.



Ref No.	Question	Analysis Discussion
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Refer to the EMPr associated with this EIA.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to Section 0 for details of alternatives considered in this EIA Report.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this EIA Report.



6 PROJECT ALTERNATIVES

The identification of alternatives is a key aspect of the success of the environmental impact assessment. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess in the EIA phase. There are, however, some significant constraints that have to be considered when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which have been discussed as part of the evaluation of the alternatives for this project. Alternatives can typically be identified according to:

- Location alternatives (including design and layout);
- Process alternatives;
- Technology alternatives; and
- Activity alternatives (including the No-Go option).

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. As mentioned in Section 5.1 of this EIA Report, the need for the proposed project includes the following key drivers:

- The contribution of the proposed project to job creation and the stimulation of the local economy;
- The need for integrated and zoned land uses; and
- The contribution of the proposed pivots to food security.

Essentially, alternatives represent different means of meeting the general purpose and need of the proposed project through the identification of the most appropriate and feasible methods of development/ production, all of which are discussed below. Alternatives can further be distinguished into discrete or incremental alternatives. Discrete alternatives are overall development options, which are typically identified during the pre-feasibility, feasibility and or scoping phases of the EIA process (DEAT, 2004). Incremental alternatives typically arise during the EIA process and are usually suggested as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation and management measures and are not specifically identified as distinct alternatives. Incremental alternatives to be considered by the applicant include the type of irrigation system to be used and the method of sourcing power to the pivot to turn around its centre.

In this section the only discrete alternatives considered, as described in the sections that follow, was the **Preferred Alternative** and the **No-Go Alternative**, as no other feasible alternatives could be identified with regards to location, process, technology or the type of activity owing to the nature of the existing farming activities being undertaken by Genade Boerdery.

6.1 PREFERRED ALTERNATIVE

The preferred alternative will involve the expansion of agricultural activities on the farm Taaiboschfontein 168 (registration division: Kimberley) by introducing 9 new pivots that will require the clearance of approximately 456 ha of vegetation, primarily for the growing of seed potatoes. Of these, six pivots will be 63 ha each, two pivots will be 24 ha each and one pivot will be 30 ha in size. The new development will include the implementation of one pivot annually. Each pivot will be operational for two consecutive years upon which natural rehabilitation of the soil will be permitted to proceed until the next planting cycle. After 8 years the cycle will repeat itself. Refer to Figure 1 for a layout map of the proposed pivots.

Water to be used for the proposed pivots were already listed with the Oranje Vaal Water Users Association on 13 August 2020 for operations on portion 2 of the Farm Taaiboschfontein 168 for 11 000m³ per/ha.

No other feasible alternatives other than the No-Go alternative could be identified. The proposed project is located on the applicant's property close to other pivots. No significant negative environmental impacts are expected as a result of the proposed project. No other land-uses are considered more feasible within the



proposed project area due to the existing pivots on the farm as well as the surrounding farms containing pivot irrigation.

6.2 NO-GO ALTERNATIVE

The **no-go alternative** option means 'do nothing' or the option of not undertaking the proposed preferred activities, consequently leading to the continuation of the current land-use, which is leaving the location as a natural unused area. As such, the 'do nothing' alternative or keeping the current status quo of no activities occurring on-site, also provides the baseline against which the impacts of other alternatives should be compared.

7 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their opinions are taken into account, and a record included in the reports submitted to relevant authorities. The process aims to ensure that all stakeholders are provided an opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practise options;
- Compliance with national legislation;
- Establish and manage relationships with key stakeholder groups; and
- Encourage involvement and participation in the environmental study and authorisation / approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Provide an opportunity for I&APs to obtain clear, accurate and comprehensible information about the proposed activity, its alternatives or the decision and the environmental impacts thereof;
- Provide I&APs with an opportunity to indicate their viewpoints, issues and concerns regarding the activity, alternatives and / or the decision;
- Provide I&APs with the opportunity to suggest ways of avoiding, reducing or mitigating negative impacts of an activity and enhancing positive impacts;
- Enable the applicant to incorporate the needs, preferences and values of I&APs into the activity;
- Provide opportunities to avoid and resolve disputes and reconcile conflicting interests;
- Enhance transparency and accountability in decision-making;
- Identify all significant issues for the project; and
- Identify possible mitigation measures to minimise and / or prevent environmental impacts associated with the project.

The PPP for this project has been undertaken in accordance with the requirements of the NEMA, as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.



7.1 LEGAL COMPLIANCE

The PPP must comply with the National Environmental Management Act (Act No. 107 of 1998 – NEMA); that requires public participation as part of an application for authorisation or approval. The details of the Integrated PPP followed are provided below.

7.2 GENERAL APPROACH TO PUBLIC PARTICIPATION

The PPP for the proposed pivots has been undertaken in accordance with the requirements of the NEMA as well as in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.

7.3 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

The I&AP databases compiled for various past environmental authorisation processes in the vicinity of the proposed pivots have been utilised towards compiling a pre-notification register of key I&APs to be notified of the Environmental Authorisation Application. The I&AP database includes amongst others: landowners, communities, regulatory authorities and other specialist interest groups. Additional I&APs have been registered during the initial notification and call to register period. The I&APs database will continue to be updated throughout the duration of the EIA process. A full list of I&APs is included in Appendix C.

7.3.1 LIST OF AUTHORITIES IDENTIFIED AND NOTIFIED

The following Government Authorities were notified of the proposed project:

- Department of Water and Sanitation (Regional Office);
- National Department of Agriculture, Land Reform and Rural Development;
- National Department of Human Settlements, Water and Sanitation;
- Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform;
- Northern Cape Department of Cooperative Governance, Human Settlement and Traditional Affairs;
- Northern Cape Department of Social Development;
- Northern Cape Department of Roads Transport and Public Works
- Pixley Ka Seme District Municipality;
- Provincial Land Claims Commissioner
- Siyancuma Local Municipality;
- South African Civil Aviation Authority;
- South African Heritage Resource Agency (SAHRA); and
- South African National Roads Agency Limited (SANRAL).

7.3.2 OTHER KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

The following key stakeholders have been identified and notified of the proposed project:



- Irusma Boerdery CC;
- HF Mulke Trust;
- Almar Boerdery CC;
- Kaaldraai Trust;
- Youngberg Investments Pty Ltd;
- Tiaan Trust;
- Endangered Wildlife Trust (EWT);
- WESSA;
- Succulent Society of South Africa; and
- Vickie Trust

7.4 NOTIFICATION OF I&APS.

The PPP commenced on the 29th of September 2020 with an initial notification and call to register for a period of 30 days. I&APs were notified of the Initial call to register as presented below.

7.4.1 INITIAL NOTIFICATION OF I&APS

Registered letters, emails and facsimiles (faxes) were prepared and distributed to the identified relevant authorities, affected and adjacent landowners and legal occupiers, ward councillors and other pre-identified key stakeholders. The notification documents included the following information:

- The purpose of the proposed project;
- Details of the NEMA Regulations that are anticipated to be applicable and must be adhered to;
- List of anticipated activities to be authorised;
- Location and extent of activities to be authorised;
- Details of the affected properties (including a locality map or an indication of where the locality map may be viewed or obtained);
- Brief but sufficient detail of the intended operation to enable I&APs to assess/ surmise what impact the project will have on them or on the use of their land (if any);
- Initial call to register duration; and
- Contact details of the EAP.

7.4.2 SITE NOTICES AND POSTERS

Four site notices were placed along, within and surrounding the perimeter of the proposed project area and its surroundings on 2 October 2020. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

Please refer Appendix C for proof of site notice and poster placement.



7.4.3 NEWSPAPER ADVERTISEMENTS

One advertisement (English and Afrikaans) was placed on 24 September 2020 in the Noord-Kaap Bulletin newspaper with circulation in the vicinity of the project area. The details of the advertisements are presented below.

The newspaper advertisement included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

7.5 NOTIFICATION OF AVAILABILITY OF EIAREPORT

Notification regarding the availability of the Scoping Report for public review has been given in the following manner:

- Registered letters with details on where the Scoping Report is available from, as well as the duration of the public review comment period, were distributed to all registered I&APs (which includes key stakeholders, affected and surrounding landowners, and registered occupiers);
- Facsimile notifications with information similar to that in the registered letter described above, were distributed to all registered I&APs; and
- Email notifications with a letter attachment containing the information described above were also distributed to all registered I&APs.

The Scoping Report was made available for public review with the (Local Public Library) from 1 April 2021 until 5 May 2021, for a period of 30 days.

7.6 NOTIFICATION OF AVAILABILITY OF EIA REPORT

Notification regarding the availability of this EIA Report for public review has been given in the following manner:

- Registered letters with details on where the EIA Report is available from, as well as the duration of the public review comment period, were distributed to all registered I&APs (which includes key stakeholders, affected and surrounding landowners, and registered occupiers);
- Facsimile notifications with information similar to that in the registered letter described above, were distributed to all registered I&APs; and
- Email notifications with a letter attachment containing the information described above were also distributed to all registered I&APs.

The EIA Report was made available for public review at the Kimberly Public Library from Friday 12 November and ending on Monday 13 December as well as on the EIMS website (www.eims.co.za).

7.7 ISSUES AND RESPONSES.

Issues raised to date have been addressed in a transparent manner and the full details (such as the comment received, the name of the I&AP who commented, the issue raised and the main aspect of the raised issue, as well as the response provided to the I&AP) included in the Public Participation Report (Appendix C). A summary



of the key issues/ comments raised and an indication of where these issues are addressed in this EIA Report, is presented in Table 6.

Table 6: Summary of issues raised by I&APs

Issue/ Comment Raised	Aspect Affected	EAP Response/ Relevant Section in EIA Report
<p>Good afternoon,</p> <p>Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions.</p> <p>Please create an application on SAHRIS and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA.</p> <p>Once all documents including all appendices are uploaded to the case application, please ensure that the status of the case is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application.</p>	Heritage	No response required. EIMS will load the necessary documentation onto the SAHRIS website for comments from the SAHRA during the Scoping and EIA phase.

8 ENVIRONMENTAL ATTRIBUTES AND BASELINE

This section of the EIA Report provides a description of the environment that may be affected by the proposed pivots. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed project have been described. Baseline information sourced from various spatial datasets and the biodiversity and heritage/ palaeontological specialist studies have been utilised to prepare the environmental attributes baseline below.

8.1 CLIMATE

8.1.1 TEMPERATURE

The average monthly temperature was obtained from weatherbase.com (2021) for Kimberley, approximately 77 km northeast from the proposed project area, and is presented in Table 7 and Figure 11 below. The average monthly temperatures were calculated based on 18 years on record. Average temperatures ranged between 11°C during winter months in June and July to 25°C in the summer during January. According to the Siyancuma LM IDP (2020), temperatures during the day can vary between 1.7°C in winter and 34.8 °C in summer.

Table 7: Monthly average temperature in Kimberley (weatherbase.com, 2021).

Monthly Average Temperatures (°C) in Kimberley												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
25	24	22	18	14	11	11	13	17	20	22	24	18

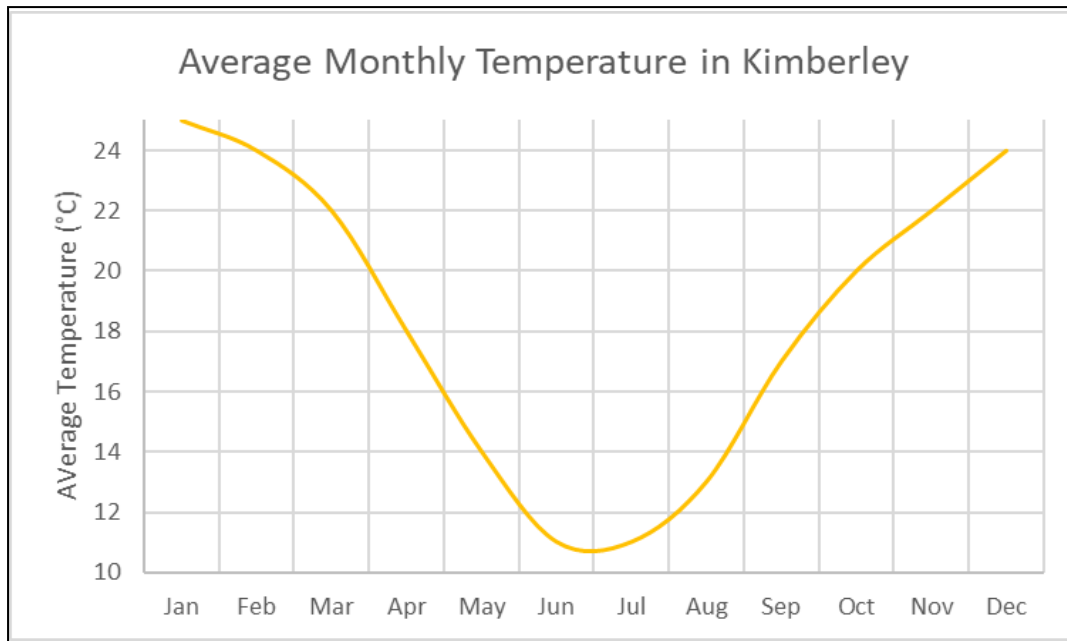


Figure 11: Monthly average temperature in Kimberley (weatherbase.com, 2021).

8.1.2 RAINFALL AND EVAPORATION

Rainfall data was collected from weatherbase.com (2021) and evaporation data was extracted from the Water Resources of South Africa 2005 Study (WR, 2005). Average monthly precipitation values for Kimberley were extracted from weatherbase.com (2021) (see Table 8 and Figure 12). According to the site, these averages were derived from 114 years on record. The study area falls within quaternary catchments C51M and C92B, and according to the Water Resources of South Africa Study (WR2005) the study area has an average annual evaporation of more than 2600 mm.

Table 8: Average monthly precipitation in Kimberley (weatherbase.com, 2021).

Average Monthly Precipitation (mm) in Kimberley												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
60	60	70	40	10	-	-	-	10	20	40	50	420

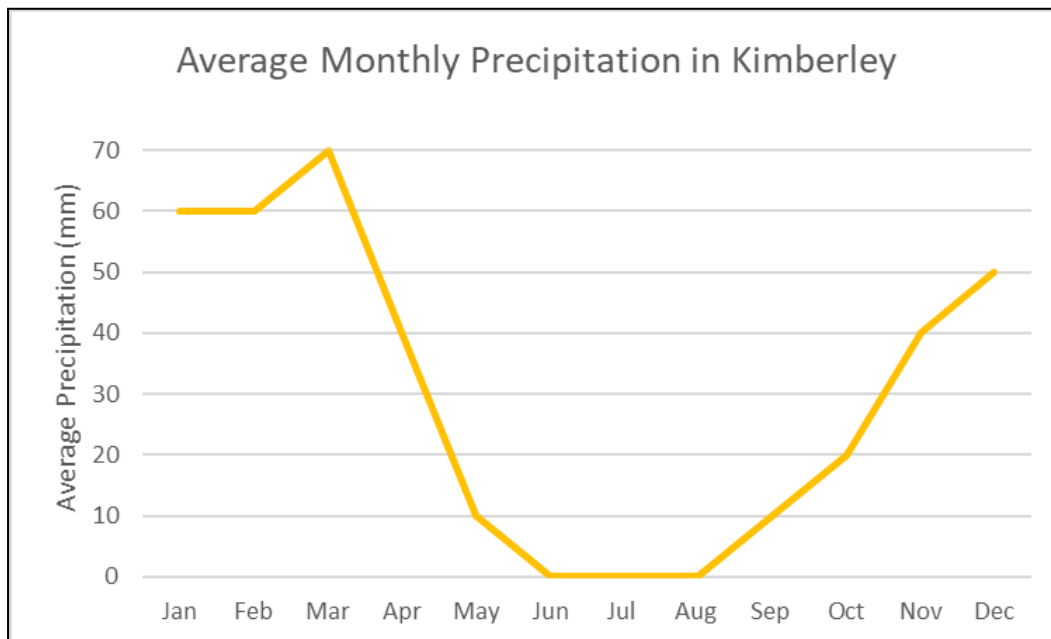


Figure 12: Average monthly precipitation in Kimberley (weatherbase.com, 2021).



8.2 TOPOGRAPHY

On a regional scale (50 km radius) the elevation ranges between approximately 980 and 1350 masl (Figure 14). The topography within the project area can be described as fairly flat (less than 10 % slope) with an elevation of 1050 masl. Some hills are located approximately 5 km northeast of the proposed project at 1140 masl and the Vaal river 2.4 km to the northwest of the proposed site at 1000 masl (Figure 14).

8.3 GEOLOGY AND PALAEONTOLOGY

Banzai Environmental was appointed as the specialists to conduct a Palaeontological Desktop Assessment (PDA) for the proposed pivot expansion project. The PDA was conducted to identify if fossils could be present within the area of the planned development and to evaluate the possible effect that construction can have on any palaeontological resources.

According to the specialist assessment done, the proposed pivot project is mantled by Late Cenozoic Superficial Sediments (see Figure 15 for a simplified geology map and for an extract of the 2824 Kimberley Geological Map). The Superficial deposits in the Douglas area consists of alluvial gravels, aeolian sands, calcretes of the Quaternary Gordonia Formation that overlies the older sediments. The Cenozoic Kalahari Group is the most widespread body of terrestrial sediments in southern Africa. The sands and calcretes of the Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006). The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters.

The Gordonia dune sands are dated as Late Pliocene/Early Pleistocene to Recent times by the Middle to Later Stone Age stone tools recovered from them (Dingle et al, 1983). The boundary of the Pliocene-Pleistocene has been extended back from 1.8 million years ago (MYA) to 2.588 MYA placing the Gordonia Formation almost entirely within the Pleistocene Epoch.

The fossil assemblages of the Kalahari are generally low in diversity and occur over a wide range but has a high Palaeontological Sensitivity. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn cores as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile skeletons have been uncovered where the depositional settings in the past were wetter.

According to the South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments is low, but locally high (see Figure 17 for Palaeontological sensitivity). The extension of the pivot irrigation on the Taaiboschfontein 168 farm was deemed appropriate and feasible by the specialist and will not lead to detrimental impacts on the palaeontological resources of the area. The specialist stated that construction and operation of the pivots may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

It was consequently recommended by the specialist that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the farm manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the farm manager must report to the South African Heritage Resources Agency (SAHRA).

8.4 HERITAGE

PGS Heritage (Pty) Ltd was appointed as the specialists to conduct a Heritage Impact Assessment (HIA) for the proposed pivot irrigation expansion project. Heritage resources are unique and non-renewable and as such, any impact on such resources must be seen as significant. Intensive field surveys of the study area were undertaken



on foot by comprising two field archaeologists on 20-22 September 2020. Despite an intensive walkthrough of the project area, no evidence for any archaeological or heritage sites could be identified.

8.5 SOIL

The study area falls within the land types Ia and Ae (ARC – Institute for Soil Climate & Water), a land-type being an area that is uniform with respect to terrain form, soil patterns and climate. The soils within the Ae land type are AC soils, which are red-yellow, well drained soils lacking a strong texture contrast, with a high base status. They are eutrophic soils ≥ 750 mm deep with $< 15\%$ clay. The soils within the Ia land type are classified as EE soils which are soils with a negligible to weak profile development, usually occurring on recent flood plains. They ≥ 750 mm deep with $< 15\%$ clay.

8.6 VEGETATION

Ecological Management Services were appointed as the specialists to conduct a biodiversity assessment for the proposed pivot expansion project. The specialist conducted both a desktop and field investigation.

Kimberley Thornveld is classified as Least Threatened only 2% of this vegetation is formerly conserved and 18% is considered transformed, mostly by agricultural cultivation. Threats include bush encroachment by *Senegalia mellifera* owing to overgrazing. The Upper Gariep Alluvial Vegetation is classified as Vulnerable, with only 2% conserved and more than 20% transformed through cultivation. The planned additional pivots fall only within the Kimberley Thornveld. Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large, protected areas. The focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy 2008 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for freshwater ecosystems. The project area does not fall within a NPAES focus area but is located approximately 25km north west of the Mokala National Park and its proposed expansion area for the eastern Kalahari bushveld.

The study area is not considered a threatened ecosystem in terms of NEM:BA and does not fall within a within a River FEPA (Fresh Water Ecosystem Priority Area), there are however two identified NFEPA wetlands within the study area, these are usually associated with pans that occur in this vegetation type. The study site and surrounding area does not fall within an Important Bird and Biodiversity Area (IBA). IBAs are sites of international significance for the conservation of the world's birds and other biodiversity.

The study site falls with a Critical Biodiversity Area 2 (CBA2). CBA2 are areas that have been selected as the best option for meeting biodiversity targets, based on complementarity, efficiency, connectivity and/or avoidance of conflict with other land or resources uses.

According to spatial data from Mucina and Rutherford (2006), the project area falls within SVk 4, Kimberley Thornveld (Figure 19). According to the National Biodiversity Assessment (SANBI, 2018) this vegetation type is poorly protected and is listed as least concern on the Red List of Ecosystems. The specialist assessment report describes Kimberley Thornveld as having a well-developed tree layer with *Vachellia erioloba*, *V. tortilis* and *V. karroo* and *Boscia albitrunca*. The shrub layer is also described as well-developed with occasional dense stands of *T. camphoratus* and *S. mellifera*. The grass layer is open with a lot of uncovered soil. Upper Gariep Alluvial vegetation is found on the flat alluvial terraces supporting a complex of riparian thickets, flooded grasslands, reed beds and ephemeral herb-lands populating mainly sandy banks.

The vegetation within the proposed development area is uniform and the terrain is flat. The proposed new pivots are located within the Kimberley Thornveld vegetation type. The area of the proposed pivot development consisted of an open savannah dominated by *Vachellia* spp. Two distinct layers were evident within the area, namely a grassy layer and a tree/shrub layer. The grass layer which was between 10 – 30cm high, was poorly developed and open patches exposing the red substrate were clearly evident in some areas. The tree/shrub layer was between 2m-4m and consists of species such as *Vachellia haematoxylon*, *Vachellia tortilis*, *Vachellia erioloba*, *Senegalia mellifera*, and *Lycium spp*. There was a low occurrence of karroid dwarf shrubs but species such as *Lasiosiphon polycephalus* and *Chrysocoma ciliata* were noted.



Two pans are located within the property, one is located within centre of the property and the other is located on the edge of the north eastern corner, very little of this pan is actually within the boundary of the property. The limestone layer is exposed in most of this habitat, and it consists of an open grassy area with trees/shrubs only occurring on the outer edges. The grass layer was cropped extremely short and large bare patches of exposed substrate occur. The central pan contains some infrastructure and has been significantly disturbed.

The southern section of the property contains pivots as well as open grassy areas which at one time were cultivated. The southern boundary of the property is along the Riet River, the riparian area of the river is easily distinguishable from the surrounding vegetation however it has been invaded by *Eucalyptus* spp.

VTU 3: Mixed *Vachellia* Savannah

This vegetation community contains a tree layer which is mainly comprised of *Vachellia erioloba* and *Vachellia tortilis*. Three vegetation strata are evident within this vegetation unit. There is a prominent tree layer between 2.5m – 5m, a shrub layer, between 1.5m – 2.5m and a grass layer with an average height of 50cm. *Vachellia erioloba*, and *Vachellia tortilis* are prominent within this vegetation type. The density of the trees varies across the landscape, with some areas forming a more open savannah, while other areas have dense pockets of trees and shrubs. Other species recorded included, *Asparagus glaucus*, *Zygophyllum lichtensteinianum*, *Lycium hirsutum*, *Helichrysum arenicola*, *Selago multispicata*, and *Melhaniania rehmannii*. Grass species within this vegetation community included, *Eragrostis lehmanniana*, *Schmidtia pappophoroides*, *Aristida congesta*, *Centropodia glauca*, *Enneapogon scoparius*, *Stipagrostis hirtigluma* *Stipagrostis uniplumis*, and *Tricholaena monachne*.

The biodiversity specialist consulted historical records of Red List plant species in order to determine the likelihood of any such species occurring in the study area and these were searched for in the field. Plant species observed as well as a list of threatened plant species previously recorded in the quarter degree grids in which the study area is situated which was obtained from the South African National Biodiversity Institute, are listed in Table 9 below.

Table 9: Protected species that possibly occur on-site.

Species	Legislation	Conservation Status	Potential of occurrence on-site
<i>Vachellia erioloba</i>	National Forests Act 1998	Protected	Recorded on property and within development footprint
<i>Vachellia haematoxylon</i>	National Forests Act 1998	Protected	Recorded on property and within development footprint
<i>Bosica albitrunca</i>	National Forests Act 1998; NCNA	Protected; Schedule 2	Recorded on property and within development footprint
<i>Titanopsis calcarea</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Plinthus karoicus</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Ruschia ruralis</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Bulbine abyssinica</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Aloe claviflora</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Ornithogalum nanodes</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint
<i>Nemesia pubescens</i>	NCNCA	Schedule 2	Not recorded during field survey, Low potential of occurrence within development footprint

In order to remove species listed in Schedule 1 & 2 of the NCNCA, during site clearing activities, an integrated permit application will have to be made to the Competent Authority to obtain the required permission to remove and/or translocate these species from site. In order to remove the protected trees a license application will have



to be made to the DFFE. The specialist further recommended that prior to clearing an additional walk through should be conducted.

The biodiversity specialist also identified certain alien invasive plant species. These are divided in categories in accordance with the Government Gazette Notice No. 40166 of July 2016. The specialist specifically identified category 1b and category 3 species (see Table 10), which are defined below.

Table 10: Alien invasive species that occur in or around the property.

Species	Common Name	Category
<i>Argemone mexicana</i>	Yellow flowered Mexican Poppy	1b
<i>Prosopis cf. glandulosa</i>	Mesquite	3
<i>Opuntia humifusa</i>	Prickly pear	1b
<i>Argemone ochroleuca</i>	White flowered Mexican poppy	1b
<i>Eucalyptus amaldulensis</i>	Red River Gum	1b

Category 1b (prohibited / exempted if in possession or under control): Listed Invasive Species

A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

Category 3 (prohibited): Listed Invasive Species

Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice. Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

8.7 FAUNAL SPECIES

A substantial section of the property has already been disturbed by agricultural activity which has resulted in some disturbance to the faunal population on site. Disturbances that alter the natural environment have two effects namely, it may cause the loss of certain species due to the destruction of habitat. It may also cause the influx of other species previously unable to colonise an area owing to lack of suitable habitat or because they have been excluded through competition. It was not possible to compile a complete list of species present on the property during the field survey owing to the limited time frame of the assessment. It is therefore important to note that many species that potentially occur on-site may not have been identified thus emphasis was placed on the habitat in order to determine potential occurrence of species. The potential of occurrence is also assessed for the immediate surrounding area as to establish the possibility of ecological linking corridors for certain species.

No red data terrapin, tortoises, snakes or lizards were identified as occurring in the quarter degree square, based on the distribution maps available in the South African Red Data Book for reptiles (Bates *et al.*, 2014) and The Southern African Reptile Conservation Assessment (SARCA). The conservation status was cross checked on the IUCN website to determine most recent status listing for these species.

Eight red data bird species have been recorded for the quarter degree square, five have a high potential to occur on site. Most of these species will utilise the site for foraging purposes, but they may not be totally dependent on the site. Table 11 lists these species and their potential for occurrence on-site.

Table 11: Bird species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on-site.

Common Name	Scientific Name	Potential for occurrence on-site and surrounding area
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Blue Crane	<i>Anthropoides paradiseus</i>	Very Low: Edge of distribution range, vegetation too dense.
Kori Bustard	<i>Ardeotis kori</i>	High: Recorded in the area. Suitable habitat occurs on site.
Greater Flamingo	<i>Phoenicopterus ruber</i>	Very Low: No large bodies of open water occur on the proposed development site.
Lanner Falcon	<i>Falco biarmicus</i>	High: Suitable foraging habitat occurs on site.
Lesser Flamingo	<i>Phoenicopterus minor</i>	Very Low: No large bodies of open water occur on the proposed development site.
Secretary Bird	<i>Asagittarius serpentarius</i>	High: Suitable habitat occurs on site.
African White Backed Vulture	<i>Gyps africanus</i>	High: Suitable habitat on the property, however no nests were recorded within the planned development area. The fact that the site is located near operating pivots reduces its suitability but does not exclude it as potential habitat.
Cape Vulture	<i>Gyps coprotheres</i>	High: Suitable habitat on the property. The fact that the site is located near operating pivots reduces its suitability but does not exclude it as potential habitat.

The biodiversity specialist extrapolated a list of all red data mammal species occurring in the quarter degree squares from the Red Data Book for Mammals (EWT, 2004) and the MammalMAP, the Mammal Atlas of Africa database. Based on an evaluation of the habitat requirements for these red data species (EWT, 2004; Skinner and Chimimba, 2005), the potential of these species occurring either on-site or within 500 m of the property boundary is provided in Table 12.

Table 12: Mammal species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on-site.

Common Name	Scientific Name	Potential for occurrence on-site and surrounding area
South African Hedgehog	<i>Atelerix frontalis</i>	High: Area has sufficient grassland and bushes thus suitable habitat is present.
Brown Hyena	<i>Hyaena brunnea</i>	Low: For the most part, the vegetation cover of the proposed development site is suitable however the substantial amount of agricultural activity and its proximity to human habitation make it unlikely that this animal will occur in the area.
Spotted-Necked Otter	<i>Lutra maculicollis</i>	Low: Although it is likely that it occurs around the river the proposed development site of the pivots is situated too far from the water margin.

8.8 BIODIVERSITY SITE SENSITIVITY

In terms of sensitivity of the region where the development is planned, the most important feature is that the project site falls within a CBA2. In terms of the Technical Guidelines for CBA Maps (June 2017), dryland and irrigated crop cultivation should not be allowed within a CBA2 area.

To understand the sensitivity of the area it is important to investigate why and how the area has been classified. The Northern Cape CBA map has been drawn up by means of a dual analysis which included a systematic target-based assessment using the actual extent of biodiversity features and a MARXAN analysis to identify areas of the landscape for meeting targets for broader features most efficiently.

The primary biodiversity features included in the MARXAN analysis were terrestrial vegetation types, however four additional criteria were applied when defining CBAs, namely ecosystem threat status (Critically Endangered and Endangered types), rarity, endemism and ecosystem process importance. The Upper Gariep Alluvial vegetation type is classified as vulnerable, but has been prioritised in the ecosystem process importance category as evidence gathered by the Competent Authority suggests that degradation of this vegetation type is just as intense as the Lower Gariep Alluvial (which is classified as endangered) and it is deemed to have significant process value for the maintenance of hydrological processes.



During the CBA mapping process, biodiversity features that needed to be included in the CBA map that were already precisely mapped were included as their actual extent (e.g. a wetland and its buffer) as a unit of assessment and a planning unit, however where these features were not available (i.e. had not been previously mapped or identified on the ground) a set of province-wide planning units were developed based on a hexagon grid, landcover and Protected Areas. The hexagons used were approximately 1600 ha in extent and had a 2.5km side. One of the reasons that such a large scale was used was because these larger units aimed to identify connected landscapes to secure areas for both fine-scale features such as wetlands, and broad units such as terrestrial ecosystem types. The large scale however can result in an inaccurate demarcation of an area, and thus some ground truthing operations are required to clarify the boundaries and validate these classifications of the CBA map.

According to the available literature the classification of the CBA2 is attributed to the presence of a threatened vegetation type (the Upper Gariep Alluvial vegetation type), its landscape connectivity and the buffer zone around protected areas and national protected areas expansion priorities, namely the Mokala National Park.

The Northern Cape CBA technical guidelines states that the buffer zone around National Parks is 10 km and that this 10 km area should be included in at least a CBA2 if intact. It should be noted that the study area falls outside of this 10 km buffer zone as it is located more than 20 km away from the Park. The area immediately surrounding the study site already contains a significant amount of irrigation land and therefore a large amount of transformation has already occurred and therefore can no longer be classified as being intact. In terms of sensitivity within the boundaries of the development site, areas of higher sensitivity include the pans and the riverine area. The central pan has already been disturbed as it contains some infrastructural development and some transformation has already occurred, lowering the significance of its conservation contribution. The riverine areas has unfortunately been subjected to some transformation most notably from the invasion of alien plants. The area of the pans and the riverine environment are however not within the development footprint for the expansion on the pivots and will not be directly affected by the proposed pivot development. There are a number of protected trees within the planned development area. These will be lost when the vegetation is cleared for the construction of the pivots. *Vachellia haematoxylon* is classified as a protected species under the National Forests Act of 1998 (Act 84 of 1998) and has a narrow distribution range. The *Vachellia erioloba* is also a protected species under the National Forests Act of 1998 (Act 84 of 1998). Larger trees are important as nesting and as perching sites but the groups of smaller trees provide a unique habitat acting as a nursery for other plant species and creating important habitats for faunal species.

The site sensitivity map includes areas of Low, Moderate, and High sensitivity. Moderate sensitivity areas are defined as those areas where the vegetation and habitats have had some disturbance but may include some potential habitat for red data species and/or the presence of some protected/red listed species. Areas identified as having a high sensitivity contain habitat for red data species, numerous threatened species or are listed as vulnerable or endangered and/or contains areas that have a low tolerance to disturbance. Areas of LOW sensitivity are already highly transformed and/or already contain development. Figure 13 shows the overlay of the areas of sensitivity with that of the planned expansion of the pivots.

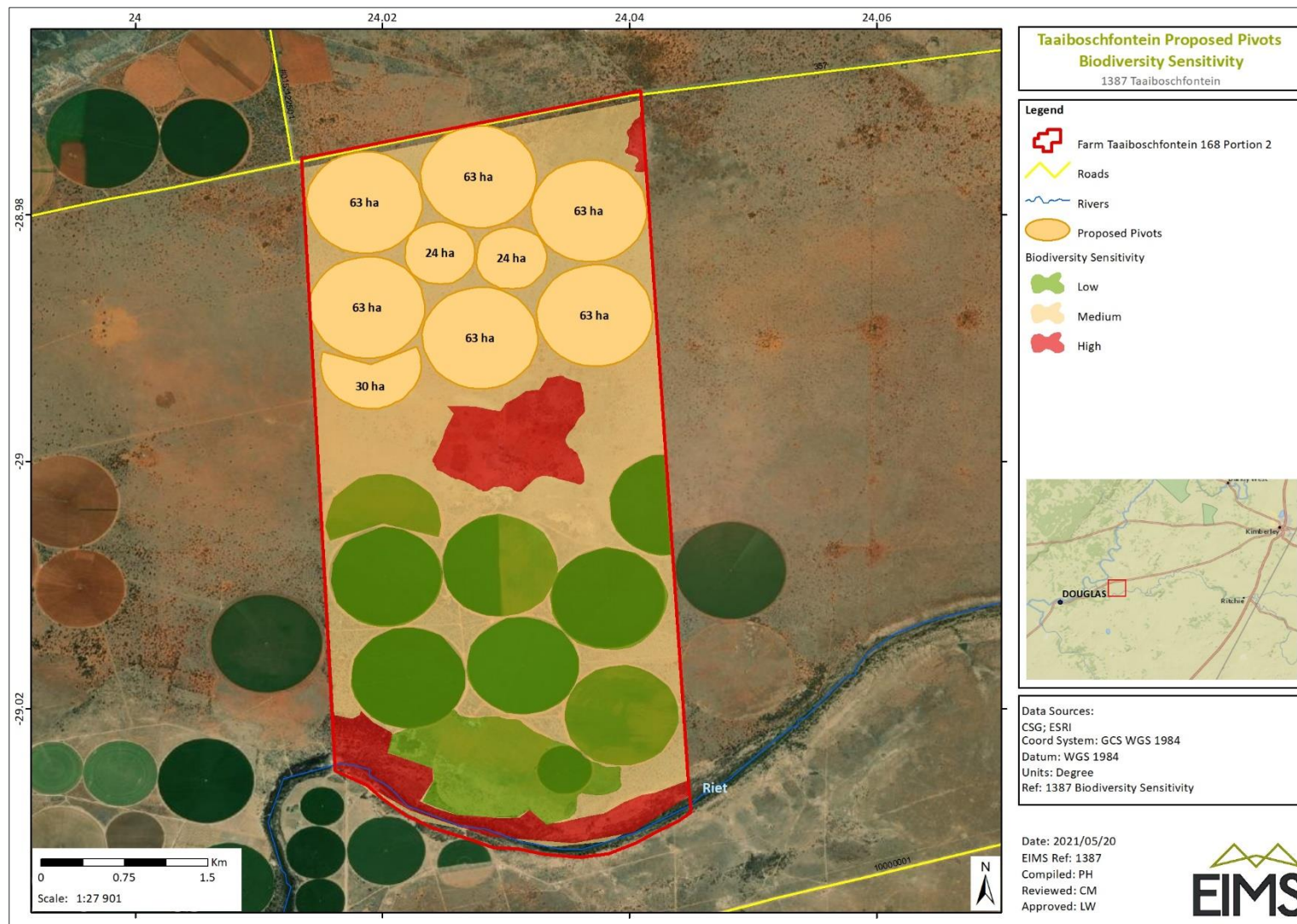


Figure 13: The site sensitivity map of the planned development area showing the planned layout of the new pivots.



8.9 SURROUNDING LAND USES

The current land use of the proposed pivot development area can be described as semi-natural, which is mostly made up of old lands where natural vegetation has re-established over the years. The proposed development is directly surrounded by natural areas to the north and east (semi-vegetated with bare patches in between), existing pivots. The R357 is adjacent to the proposed development to the south which connects Kimberley and Douglas. Just to the north of the proposed project is the Vaal River and to the south the Riet River. These rivers are surrounded by what is known as potential intensive irrigation agricultural areas, which comprises of mostly irrigation pivots.

On a regional scale, the town of Douglas is the closest major town located 26 km to the southeast of the proposed development. According to the South African Protected Areas Data (SAPAD, 2021) the Mokala National Park is located approximately 25 km to the southeast of the proposed project area along with the proposed Eastern Kalahari Bushveld expansion area. Both of these areas fall within a power corridor.

8.10 DEMOGRAPHICS AND EMPLOYMENT STATISTICS

Pixley Ka Seme DM is one of five district municipalities in the Northern Cape Province. Pixley Ka Seme is composed of eight local municipalities, of which Siyancuma LM is the one where the project is located. Siyancuma has three major urban settlements which Douglas, Griekwastad and Campbell and a few rural areas. The rest of the LM consists of mainly commercial and small farming areas (which aligns with the proposed project) as well as small private game parks. Siyancuma is situated to the southeastern regions of the Northern Cape and borders onto the Free State Province to the east, the ZF Mgcau and Frances Baard Districts to the north, Siyathemba and Thembelihle Districts to the south and the ZF Mgcau to the West. This LM covers an area of 16 753 km², accounting for 16 % of the Pixley Ka Seme DM geographical area. The main economic sectors for Siyancuma are agriculture and mining (municipalities.co.za, 2021).

According to StatsSA (2001 and 2011) the total population for Siyancuma Local Municipality showed a negative growth rate of -5.6 % with the population decreasing from 39 275 to 37 076. The 2016 Community Survey showed a further negative population growth rate of -3.1 % from 2011 to 2016 during which the population decreased from 37 067 to 35 938.

Douglas, 26 km southwest of the proposed project, is the economic hub of the LM. This town has seen a continuous influx of unskilled people from farms. According to the 2011 Census, the official unemployment rate in the Siyancuma LM was 28.2 %, and for youth (between the ages of 15 and 34) it was 35.2 %. The agriculture, community, social and personal services sectors are the strongest economic sectors and biggest job providers in and around this town. The major employment agencies in the area include agricultural entities like GWK, the SLM and provincial government departments (IDP, 2020)

According to the Stats SA community Survey (2016), the Coloured population group account for the largest portion of the population at 67.8 % of the LM total, with the remaining made up of Black African (25.3 %), Indian/Asian (0.21 %) and White (6.7 %). The total population within the LM is 35 941. The most prominent language spoken at home (Census, 2011) is Afrikaans (88.9 %) followed by Setswana (5.1 %) and then English (1.3 %). The sex ratio in the municipality was calculated at 100.4 during the 2011 Census.

During 2011 (Census, 2011) in the Siyancuma LM there were 11 064 economically active people (those who are either employed or looking for work) of which 28.2 % were unemployed. 5 800 people in the area could be described as economically active youth (15- 34 years) of which 35.2 % were unemployed.

Agriculture forms the key economic activity within the Pixley Ka Seme District Municipality. According to the Pixley Ka Seme District Municipality IDP (2017) the agricultural sector provides around 39% of the employment opportunities in the district, which represent a significant and important economic sector, especially in this area that has limited job opportunities. The mechanisation by farmers has however resulted in declining job opportunities in this sector. According to the Pixley Ka Seme District Growth and Development Strategy (2006) the Municipalities of Ubuntu, Siyathemba and Siyancuma contribute the most to this sector, with a total of 28,49 % contributed to the provincial Gross Geographic Product. Agriculture and Agro-processing is one of the six critical sectors which was identified in the Growth and Development Strategy for unlocking economical



potential. Irrigated agriculture is among the major contributing factors to the Northern Cape provincial GDP, with a total area of 140 000 ha that is under irrigation.

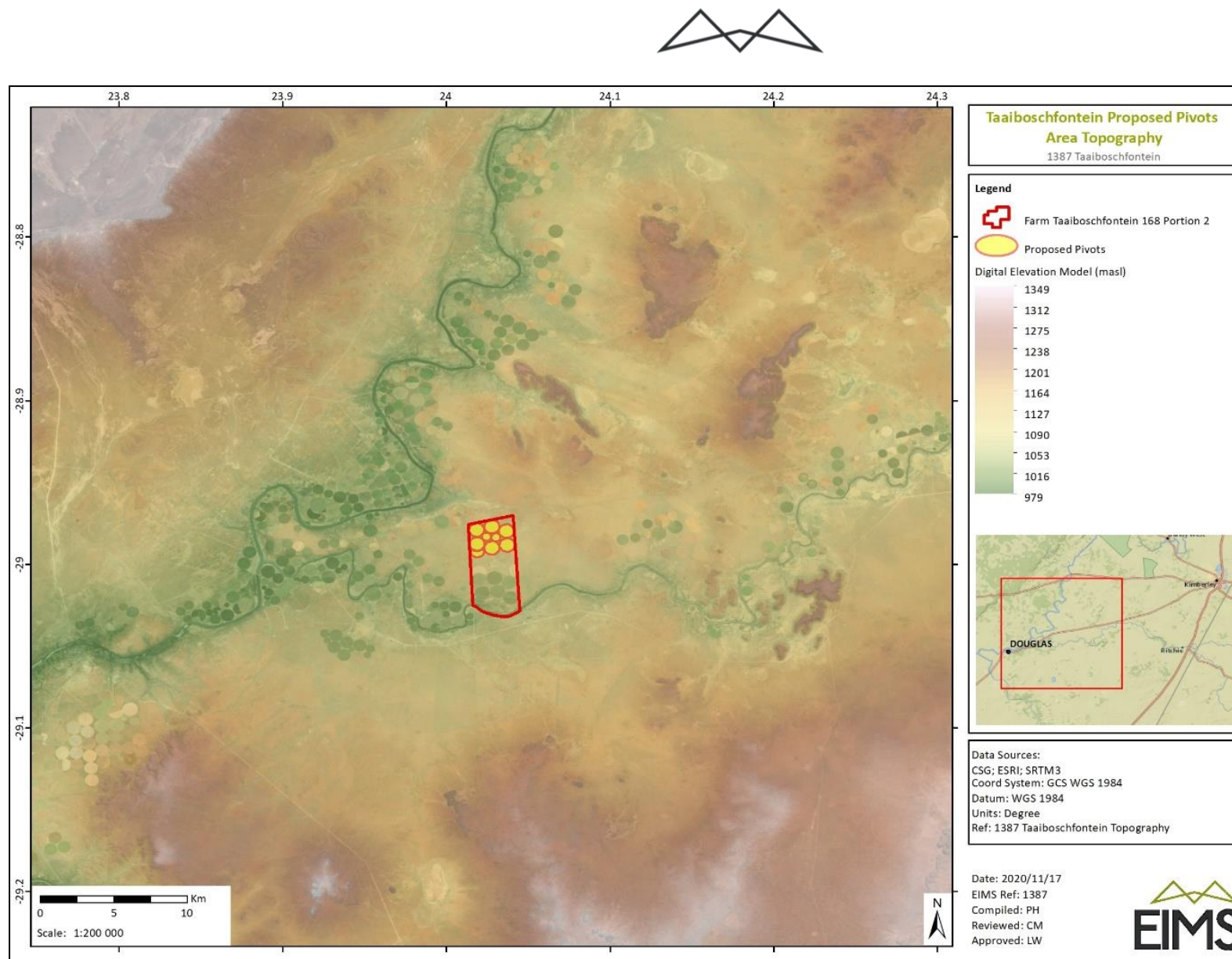


Figure 14: Regional topography.

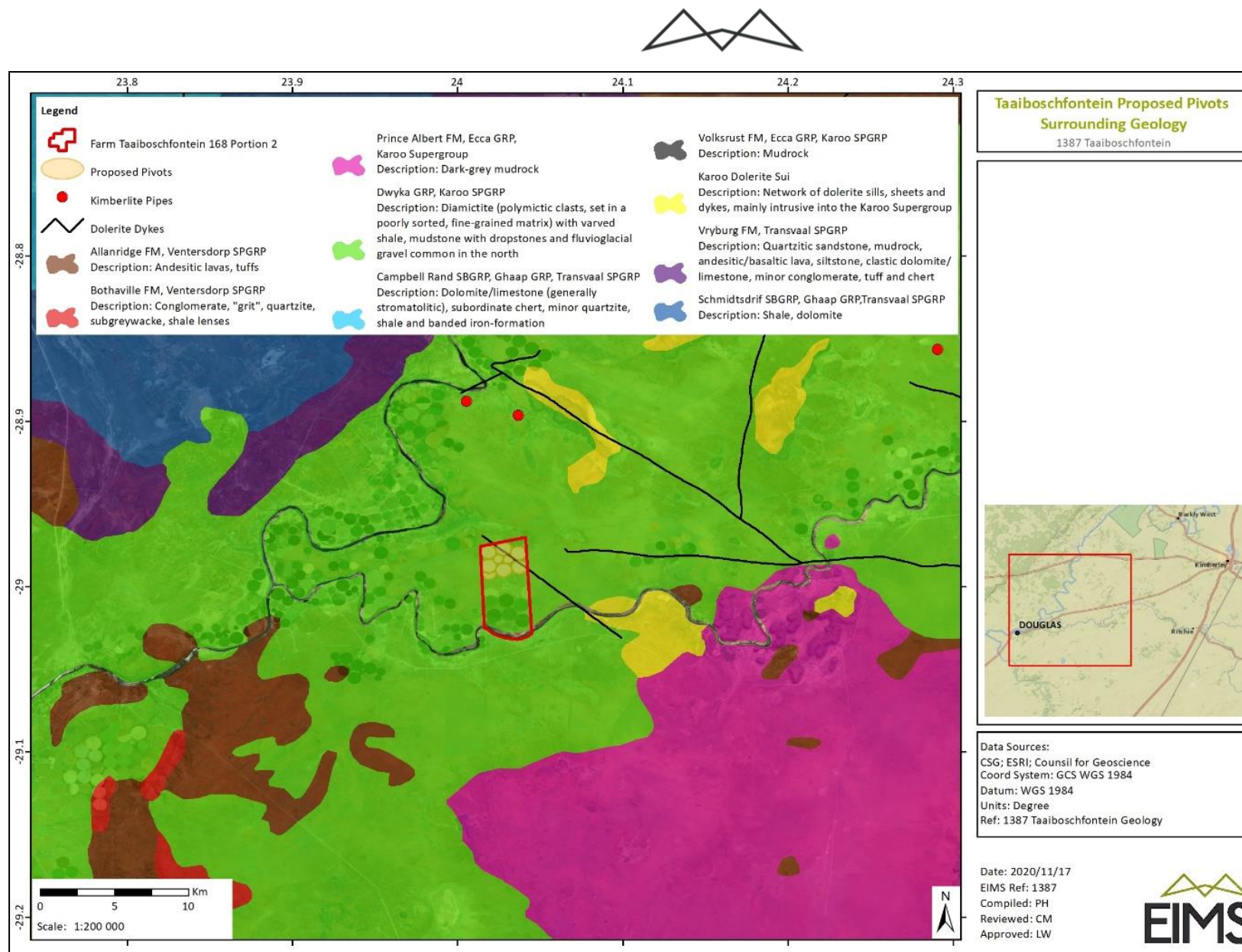


Figure 15: Project area simplified geology.

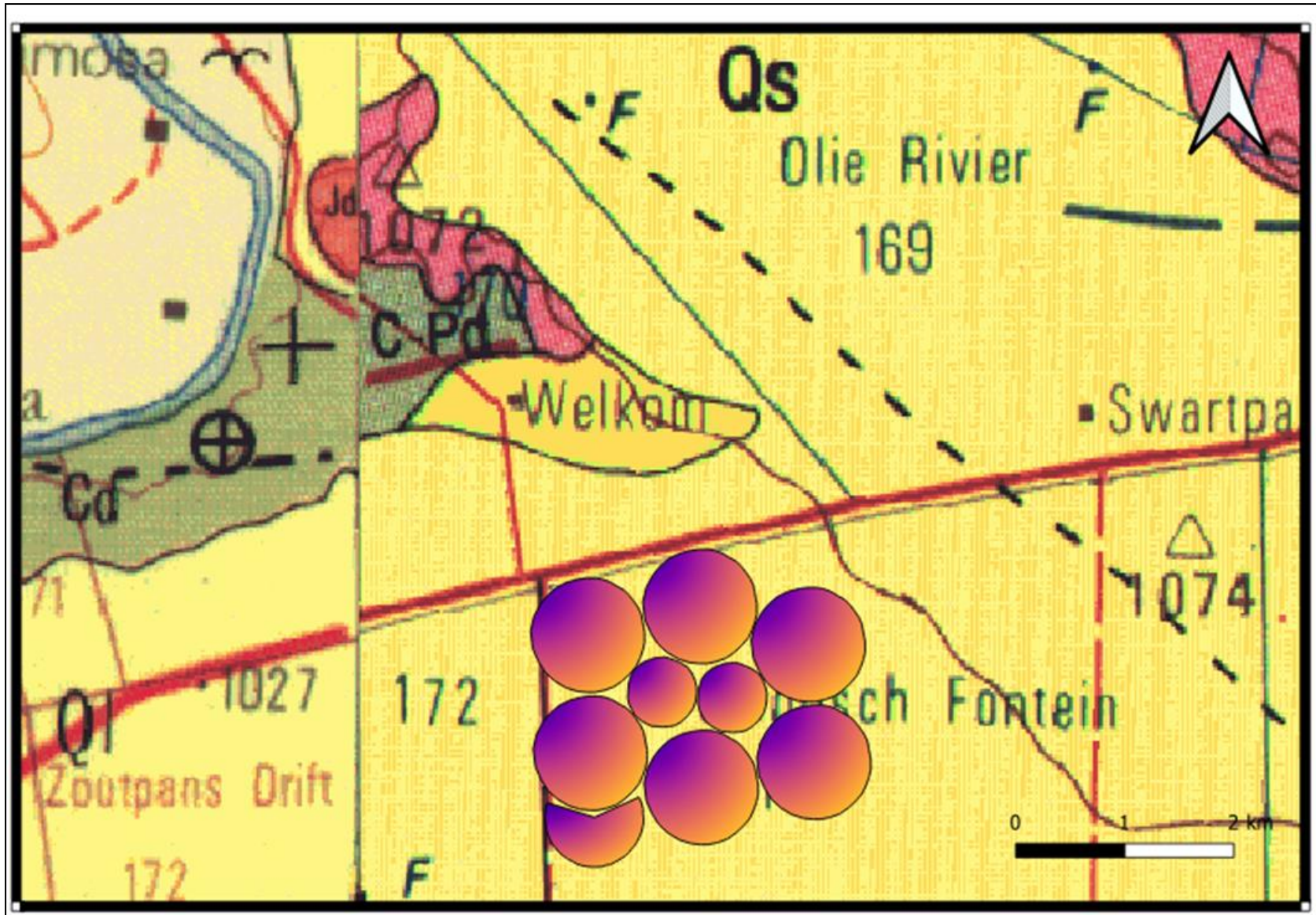


Figure 16: Extract of the 2824 Kimberley Geological Map.

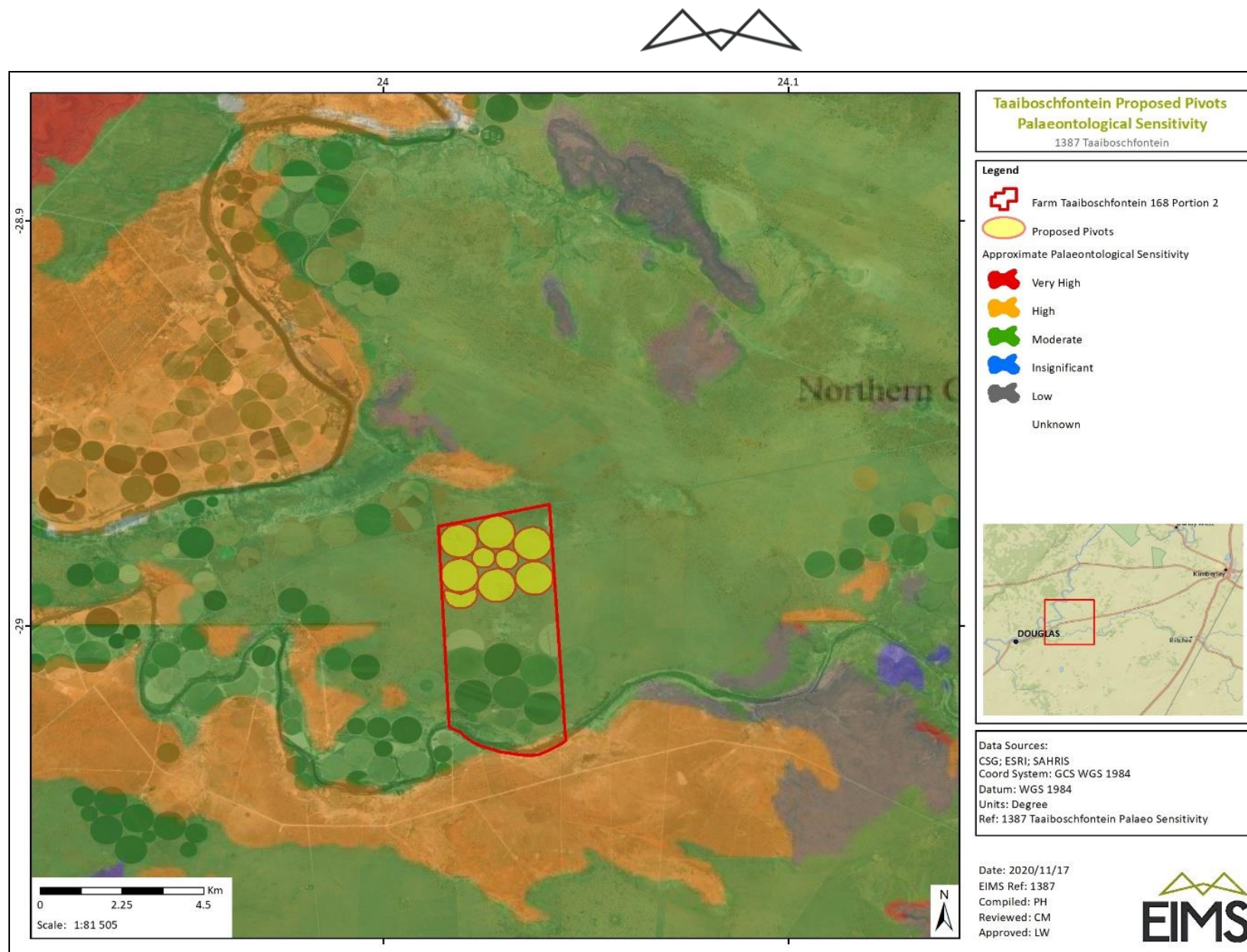


Figure 17: Palaeontological sensitivity of the project area.

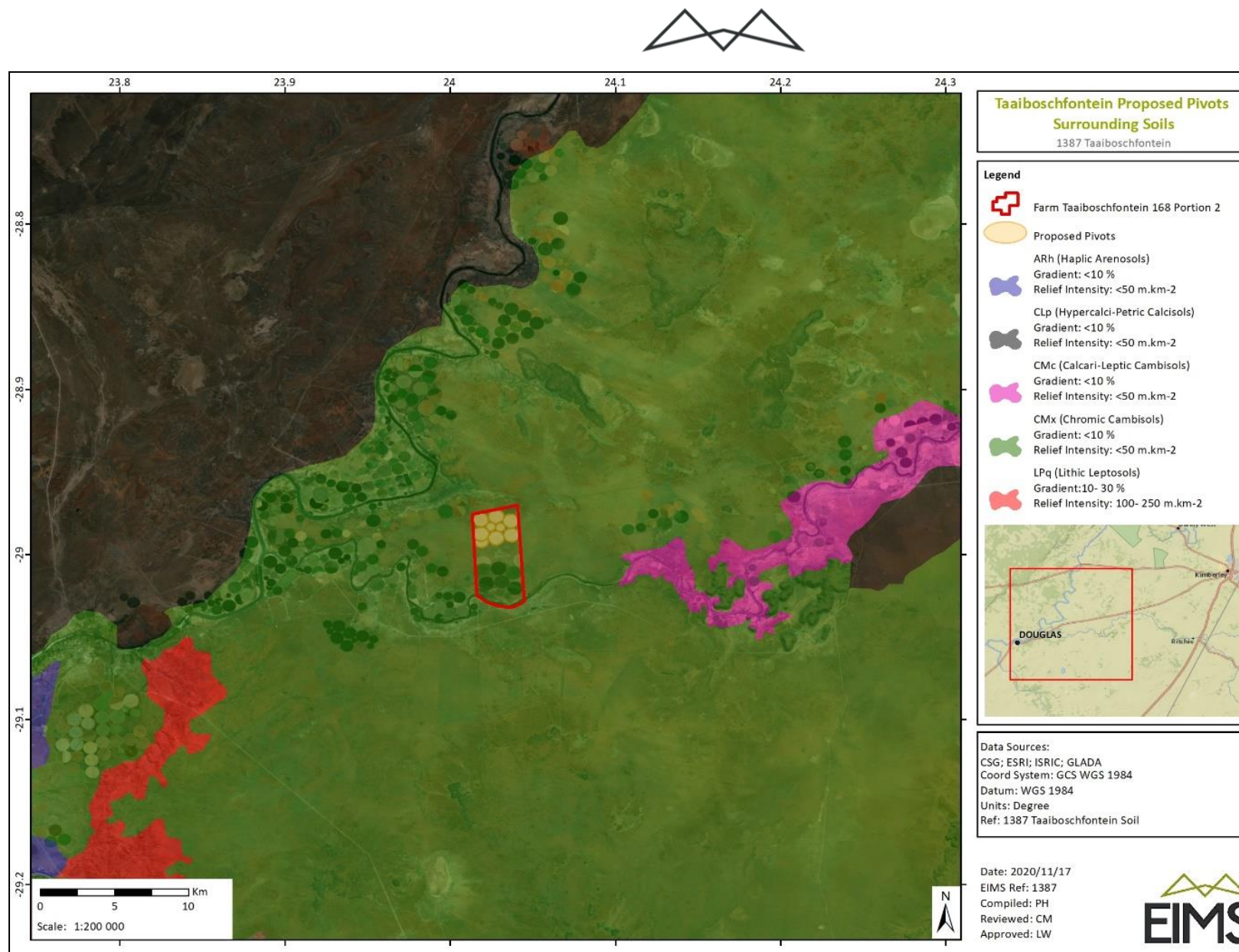


Figure 18: Soil types covering the study area.

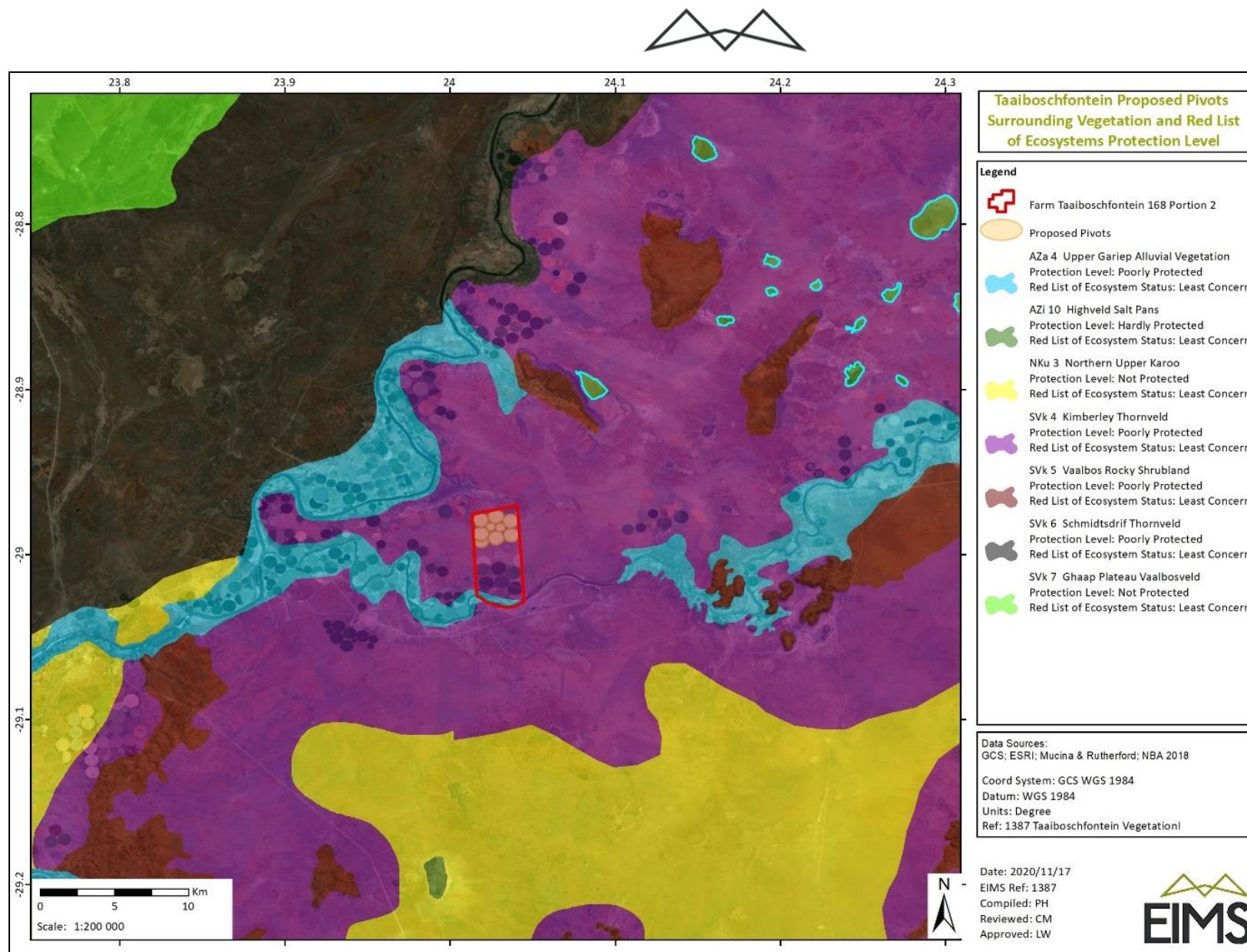


Figure 19: Study area vegetation.

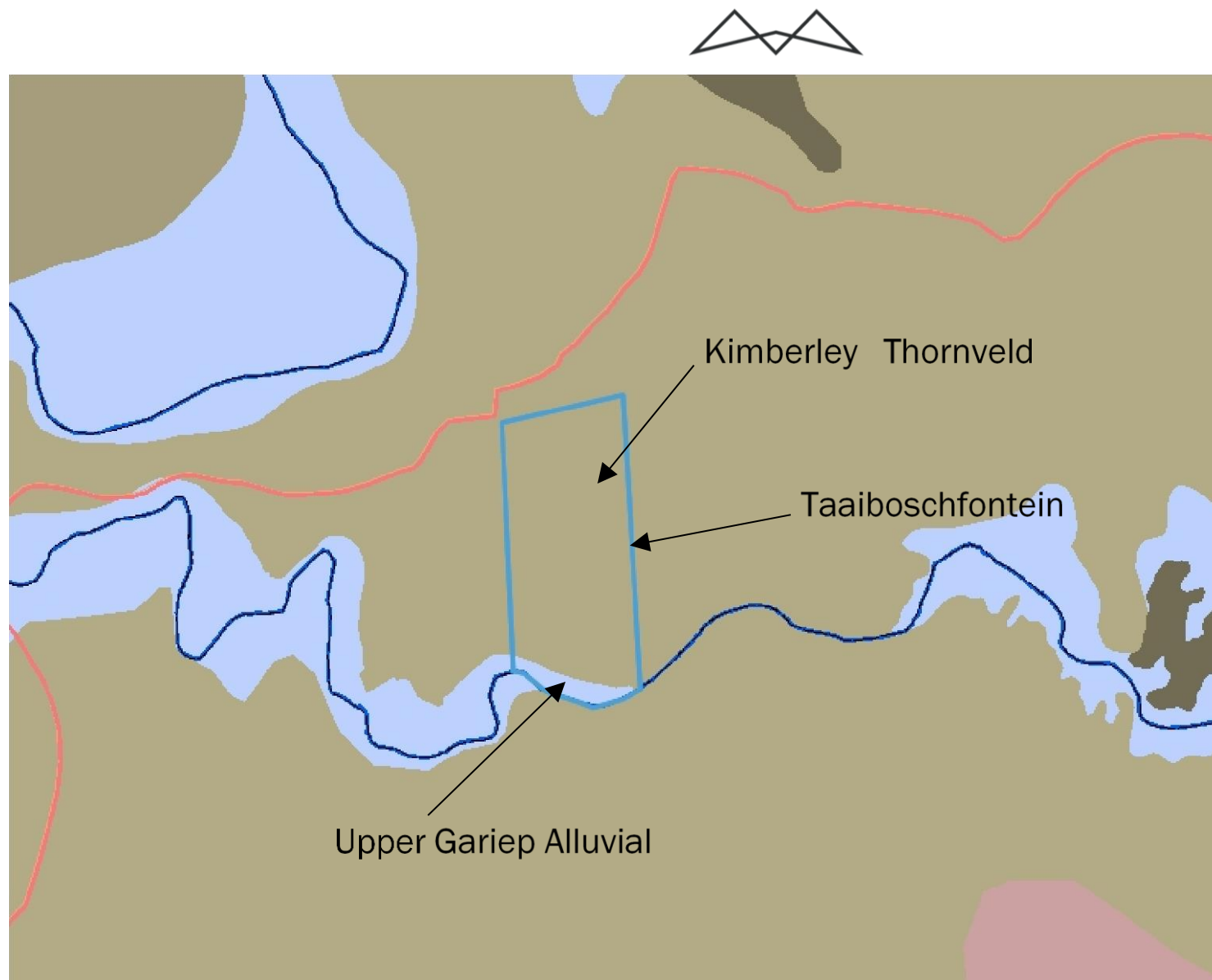


Figure 20: Specialist identified vegetation type units.

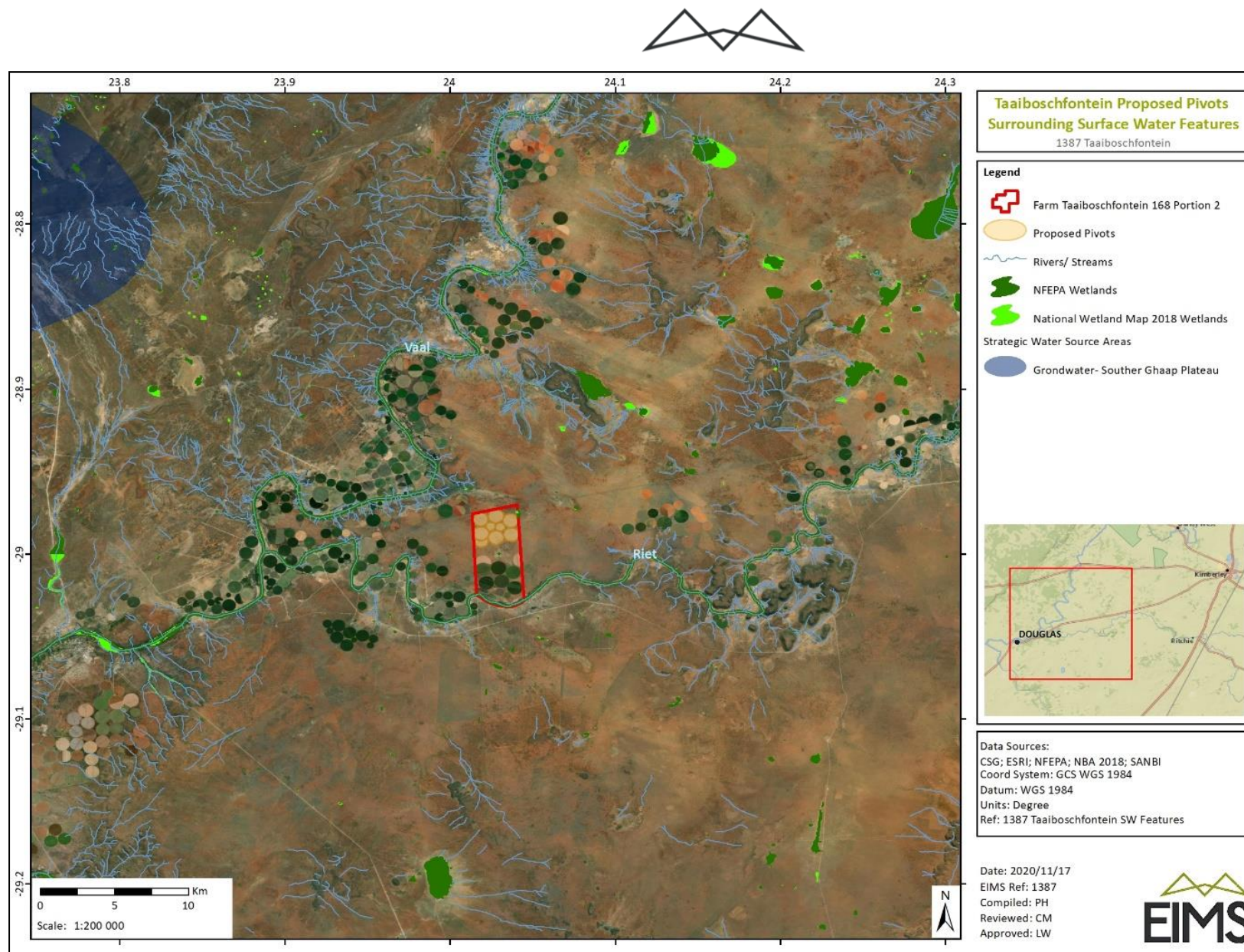


Figure 21: Surface Water Features Surrounding the proposed project area.

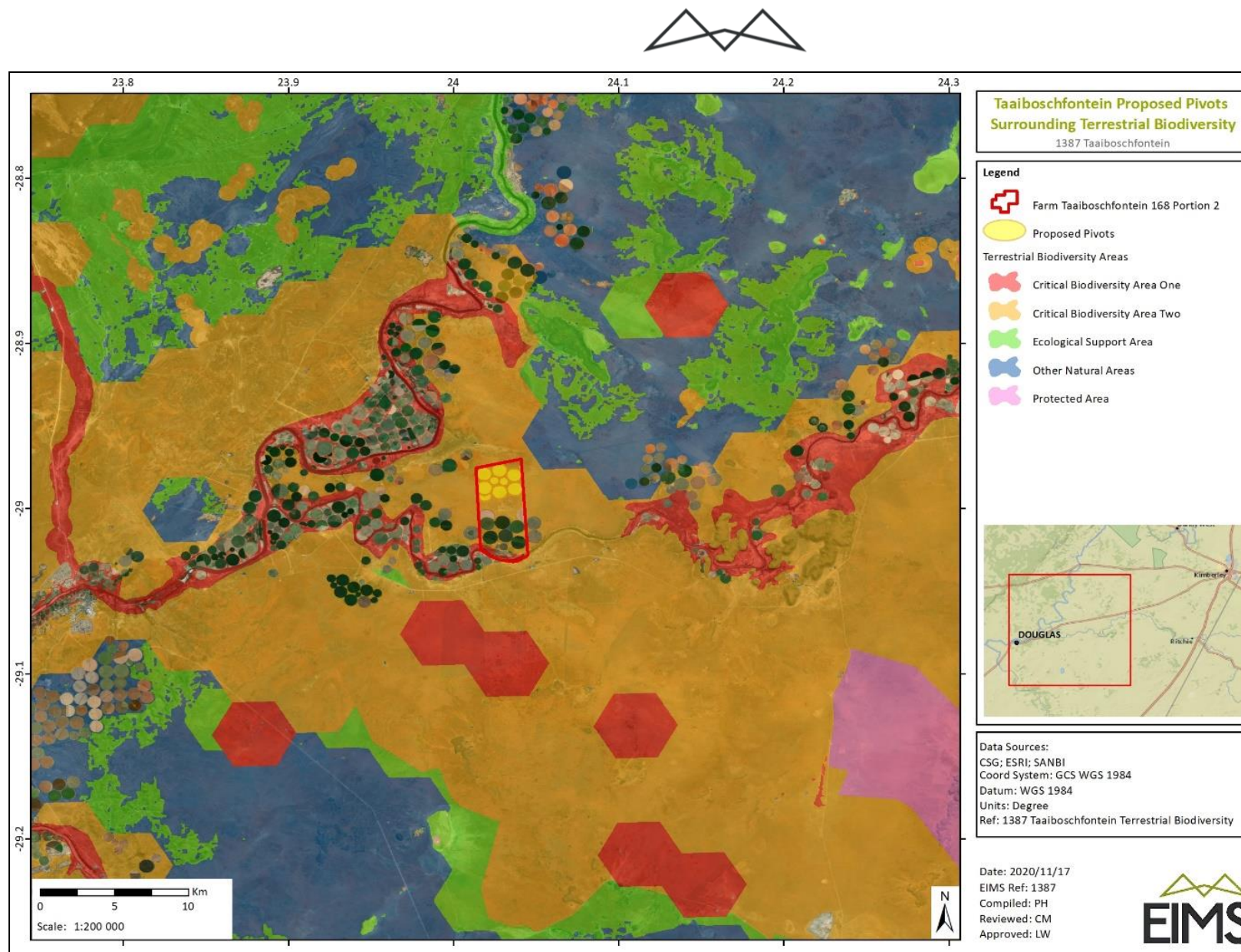


Figure 22: Terrestrial Biodiversity Areas.

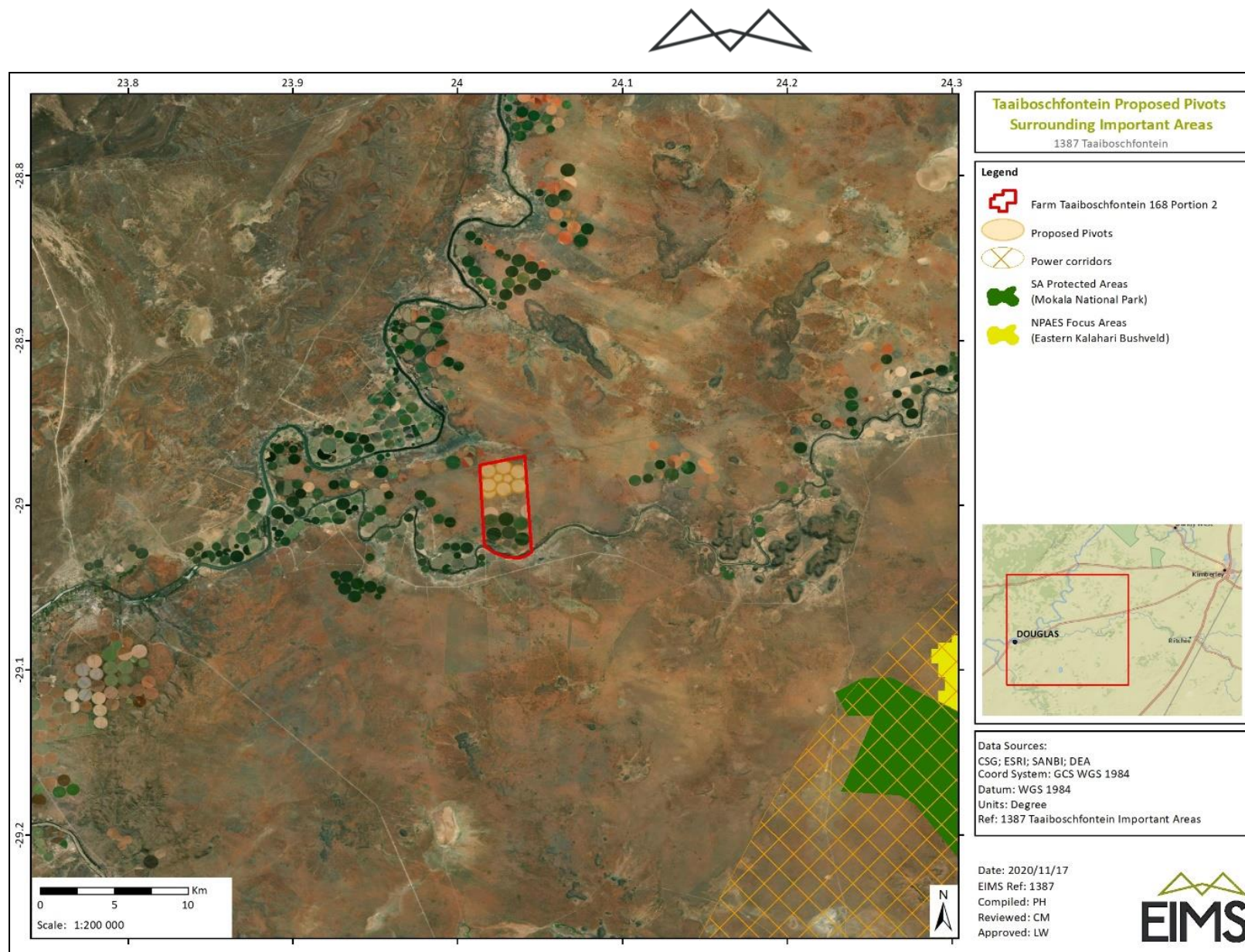


Figure 23: Important areas surrounding the proposed project site.



9 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and do a preliminary assessment on the potential environmental impacts associated with the proposed pivot development. This impact assessment has been used to guide the identification and selection of preferred alternatives, and management and mitigation measures, applicable to the proposed activities. The preliminary assessment will also serve to focus the subsequent EIA phase on the key issues and impacts.

9.1 PROCEDURE

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. The ER is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment has been applied to all identified alternatives.

9.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E + D + M + R) * N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 13 below.

Table 13: Criteria for Determining Impact Consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary)
	3	Local (i.e. the area within 5 km of the site)
	4	Regional (i.e. extends between 5 and 50 km from the site)
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)



	3	Medium term (6-15 years)
	4	Long term (15-65 years), the impact will cease after the operational life span of the project)
	5	Permanent (>65 years), no mitigation measure of natural process will reduce the impact after construction)
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way, moderate improvement for +ve impacts)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, high improvement for +ve impacts)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 14.

Table 14: Probability Scoring.

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER = C \times P$$



Table 15: Determination of Environmental Risk.

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Probability				

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 4.

Table 16: Environmental Risk Scores.

ER Score	Description
<9	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
≥9 ≤17	Medium (i.e. where the impact could have a significant environmental risk/ reward),
>17	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact ER has been determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

9.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) has been applied to each impact ER (post mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF has been applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 17: Criteria for Determining Prioritisation.

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.



	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5. The impact priority is therefore determined as follows:

$$\text{Priority} = CI + LR$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 18).

Table 18: Determination of Prioritisation Factor.

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 19: Final Environmental Significance Rating.

Significance Rating	Description
<-17	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
≥-17, ≤-9	Medium negative (i.e. where the impact could influence the decision to develop in the area).
>-9, < 0	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).



0	No impact
>0, <9	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥9, ≤17	Medium positive (i.e. where the impact could influence the decision to develop in the area).
>17	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact has been used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants has been applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

9.2 IDENTIFICATION OF IMPACTS

Potential environmental impacts were identified during the Scoping phase. These impacts were identified by the EAP, the appointed specialist, as well as information received from the public. Section 9 provides the list of impacts identified during scoping, some of which have been further assessed in the EIA phase. Moreover Section 9 presents the combined details of the preliminary impact assessment calculations undertaken towards determining the pre- and post-mitigation impact significance, as well as the final significance scores.

Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested. When considering cumulative impacts, it is vitally important to bear in mind the scale at which different impacts occur. There is not much potential for a cumulative effect at a broad scale because of the proposed project, however, finer scale effects could occur in the area surrounding the activity.

9.2.1 PLANNING PHASE IMPACTS

No planning phase impacts are expected due to the nature of the proposed project. Site clearance and development of the pivots will occur during the construction phase.

9.2.2 CONSTRUCTION PHASE IMPACTS

9.2.2.1 HABITAT FRAGMENTATION, LOSS OF NATURAL VEGETATION AND ALIEN INVASION IN A CBA 2

Vegetation clearing will occur as a result of the development of irrigation pivots. This loss of natural vegetation will cause additional fragmentation and habitat disturbance in the landscape. The disturbance destroys primary vegetation. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics and faunal populations in the area. This area is situated in a CBA 2, the management objective of these areas is to maintain a natural or near natural ecological condition. Clearing of surface areas has the effect of creating unnatural open spaces through the vegetation and the matrix of the landscape. For the smaller species, it limits movement and restricts access to foraging sites. This results in reduced population density of prey species (invertebrates and / or smaller birds and / or smaller mammals and / or herpetofauna) which then reduces the food availability for predators' invertebrates and / or larger birds and / or larger mammals and / or herpetofauna). The changes in the vegetation structure also alter the availability of suitable cover for many faunal species. There is however a tarred road on the northern boundary of the property and a gravel road on the western boundary as well as pivots on the southern section, these structures already fragment the habitat and limit movement of smaller faunal species. Clearance of primary vegetation allows secondary pioneer species or invasive plants to enter and re-colonise disturbed areas, thus increasing the possibility of Alien species invading. Many alien species proliferate in disturbance areas such as the periphery of the irrigation lands. Invasive species affect our natural biodiversity in a number of ways. They may compete



directly with natural species for food or space, may compete indirectly by changing the food web or physical environment, or hybridize with indigenous species. Rare species with limited ranges and restricted habitat requirements are often particularly vulnerable to the influence of these alien invaders. Invasive plants have claimed about 8 percent or 10 million hectares of land suitable for agricultural use in South Africa. These invasive alien plants utilise about seven percent of South Africa's water bulk every year. This impact was rated as high negative before mitigation and medium negative after implementation of mitigation measures.

(i) Mitigation measures

- Vegetation clearing should be restricted to areas of the pivot only. The significance of the loss of habitat may be mitigated slightly if there are areas with suitable ecological corridors this may be possible by ensuring that no disturbance occurs in the areas outside the development area and between the pivots. Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA

(ii) Cumulative Impacts

- Some cumulative impacts are expected because of habitat fragmentation, loss of natural vegetation and alien invasion in this CBA2 area due to the relatively small development footprint in the larger context of the CBA area.

(iii) Irreplaceable loss of Resources

- The disturbance to the biodiversity will be perpetuated throughout the life of the project however the disturbance would not result in the permanent loss of any resources within the local or regional context.

9.2.2.2 LOSS OF SPECIES OF CONSERVATION CONCERN

The clearing of vegetation will result in the loss of some protected flora. The cumulative impact of vegetation clearing and the subsequent loss of these trees for irrigation development in this area increases the significance of this impact as more of the vegetation type is transformed, however the development will not result in a loss of the resource from the area. The loss of suitable habitat for RDB faunal species which would result in these animals moving off the property into the surrounding areas. The reduction of suitable habitat from an area is always a cause for concern, and although suitable habitat may still be available it does impact on the number of these species that an area can carry. This impact was rated as medium negative before and after implementation of mitigation measures.

(i) Mitigation measures

- A search and rescue operation should be performed prior to clearing, it is however not a feasible or practical option regarding the protected trees, so it is important to ensure that trees between the pivots remain undisturbed. A permit is required if any protected trees need to be cut or removed within the development footprint.

(ii) Cumulative Impacts

- Some cumulative impacts are expected because of the possible loss of species of conservation concern however in the regional/national context, this loss is not anticipated to result in a significant decline in species numbers.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected because of the possible loss of species of conservation concern.

9.2.2.3 ANTHROPOGENIC DISTURBANCES, INTENTIONAL AND/OR ACCIDENTAL KILLING OF FAUNA

Anthropogenic disturbances include aspects such as, vibrations caused by machinery & vehicles. These aspects will impact on invertebrate species more than any other faunal species. These anthropogenic disturbances impact on the way invertebrates forage. For example; some invertebrates use vibrations caused by their prey to locate and catch them. Vibrations caused by construction equipment will make this impossible. Smaller fauna will inevitably be killed during land clearing activities as these activities will destroy their habitat. In addition to



unintentional killing of fauna, some faunal species, particularly herpetofaunal species, are often intentionally killed as they are thought to be dangerous. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. As the intentional killing of herpetofauna is considered a result of ignorance, this can be ameliorated through education. The labour force involved should be educated regarding the conservation importance of herpetofauna (especially snakes).

(ii) Cumulative Impacts

- No cumulative impacts are expected as a result of anthropogenic disturbances, intentional and/or accidental killing of fauna.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected because of anthropogenic disturbances.

9.2.2.4 IMPACT ON HERITAGE RESOURCES

Despite an intensive walkthrough of the footprint area, no evidence for any significant archaeological or heritage sites could be identified. As a result, a low impact is expected from the proposed development on heritage. The project will encompass the removal of vegetation and the digging of trenches for the establishment of the irrigation pivots.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however, foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Implement chance find procedures in case where possible heritage finds are uncovered.
 - The following Chance Find Protocol should be followed if fossils are uncovered during excavation:
 - i. If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.
 - ii. The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the farm manager. The farm manager or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
 - iii. A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the



discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.

- iv. Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- v. Upon receipt of the preliminary report, the Heritage Agency will inform the farm manager (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- vi. The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sandbags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- vii. In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossil finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- viii. Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of the loss of fossil heritage.

(iii) Irreplaceable loss of Resources

- Impacts on fossil heritage are irreversible. Scientifically, all well-documented reports of fossils uncovered during construction would be a positive impact. A negative impact can be limited by the application of adequate mitigation measures, in this case the chance find protocol. If mitigation is properly undertaken the project will fall within the beneficial category.

9.2.2.5 NOISE NUISANCE

Heavy vehicles will be required for the removal of vegetation and ripping of the soil layer within the development footprint. This impact is not anticipated to be significant as there are no nearby receptors to any noise nuisance. This impact was rated as low negative before and after implementation of mitigation measures. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that all vehicles used during construction are serviced and in a good working condition.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of noise impacts.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of noise impacts.

9.2.2.6 FIRE DAMAGE

The possibility of fire is a serious threat within the site area given the vegetation types and climate within the region. Fire should be prevented at all costs as it could spread easily and has the capability of quickly spreading to neighbouring areas. This impact was rated as medium negative before mitigation and was reduced to low negative after implementation of the proposed mitigation measures. This impact was rated as medium negative before mitigation and was reduced to low negative after implementation of the proposed mitigation measures.

(i) Mitigation measures



- Ensure that construction vehicles are equipped with the necessary firefighting equipment, specifically fire extinguishers.
- Workers must be adequately trained in the handling of firefighting equipment.
- No open fires will be permitted on-site.
- No smoking will be allowed within close vicinity of the site.
- It is recommended that fire breaks be created around each pivot.

(ii) Cumulative Impacts

- If a fire is accidentally started and not managed promptly, it has the capability to quickly spread and cause major damage within the surrounding area. Damages can be caused to the environment, neighbouring crops, and nearby infrastructure.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of fire.

9.2.2.7 DUST NUISANCE

Dust will be generated during the construction phase because of vegetation removal and soil ripping/ tillage. This is not anticipated to be a significant impact as there are no nearby receptors. This impact was rated as low negative before and after implementation of mitigation measures. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that access roads to the development footprint are well maintained.
- Construction vehicles should not exceed 30 km/h on access roads or in-field.
- Construction should preferably take place on non-windy days.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of dust impacts during construction.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of dust impacts during decommissioning.

9.2.2.8 DEGRADATION OF WATER RESOURCES

There is a non-perennial surface water resource located to the north east of the proposed pivots. This feature remains dry for the majority of the year and surface water ponding or collection only occurs following rains and thereafter dries up again. It is not anticipated that any direct impact on this feature will occur as long as the proposed mitigation measures are implemented. This impact was rated as low negative with or without mitigation measures during the construction phase due to the short duration of the impact.

(i) Mitigation measures

- Ensure that no activities occur within the non-perennial surface water features at any time.
- Obtain confirmation from the DWS as to whether any water uses need to be authorised in relation to the proximity of the project on the adjacent surface water features.

(ii) Cumulative Impacts

- No cumulative impacts are expected on any surface water features during construction.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected.



9.2.2.9 OIL/ FUEL SPILLAGES CAUSING SOIL AND GROUNDWATER CONTAMINATION

Any leaks on construction vehicles or tractors or accidental spillages can seep into and contaminate soil and possibly the groundwater. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that all vehicles used during construction are serviced and in a good working condition.
- Ensure that every construction vehicle has a spill prevention kit, to be used for accidental spillages of oil or fuel.
- No storage of oil or fuel is allowed on-site. Any storage, if necessary, should be within a designated area and no direct contact between the storage containers and the ground is allowed.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of spillages during construction. It is not anticipated that large quantities of oil/ fuel will be required as part of construction. Only small amounts of oil/ fuel can spill because of leaks on construction vehicles. These could be easily managed.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of spillages.

9.2.2.10 LITTERING

Littering is a possibility during the construction phase. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- A dedicated waste bin must be made available in a suitable location during construction, which should be emptied regularly.
- Littering in the environment is not allowed.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of littering impacts.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of littering.

9.2.2.11 SOCIO-ECONOMIC IMPACTS

The proposed project will create employment opportunities and contribute to food security. Each of the 9 additional new pivots will be used to produce and harvest seed potatoes. The proposed project will create 200 temporary/seasonal job opportunities for the next 20 years (2021 – 2041). The crops will also be sold locally. This impact was rated as medium positive before and after implementation of improvement measures.

(i) Improvement measures

- The socio-economic impact can be improved by employing a work force from the local community as far as reasonably possible.
- Utilise existing community structures if available, to act as a communication link between the local community and the applicant for informing the local community of job opportunities and informing the Applicant of possible contractors in the local community.
- Opportunities should first be given to previously disadvantaged individuals where practically possible.
- Employees should be trained and continuously developed.



- It is proposed that the product also be sold locally if viable, to contribute to local food security.
- (ii) Cumulative Impacts
 - Every employment opportunity can positively contribute to certain livelihoods in the community through income generation. Overall, any job opportunities will contribute to reducing unemployment.
- (iii) Irreplaceable loss of Resources
 - No irreplaceable loss of resources is expected because of socio-economic impacts.

9.2.2.12 VISUAL IMPACT

No mitigation measures exist with regards to a visual impact for the proposed project. The impact is not expected to be significant as one of the major surrounding land uses in the area is pivot irrigation, however, the visual aesthetic of the directly affected footprint area will be different than its current. This impact was rated as medium negative and there are no mitigation measures proposed.

- (i) Mitigation measures
 - None.
- (ii) Cumulative Impacts
 - No cumulative impacts are expected because of visual impacts.
- (iii) Irreplaceable loss of Resources
 - No irreplaceable loss of resources is expected because of visual impacts.

9.2.2.13 EROSION

Topographically the area is flat, which will prevent major erosion and water runoff during rainfall events. This impact was rated as low negative before and after implementation of mitigation measures.

- (i) Mitigation measures
 - It is recommended that construction take place during the dry season as far as possible.
 - Possible water flow during rainfall events must be controlled, using preferred storm water management techniques, before discharge into natural existing drainage lines.
- (ii) Cumulative Impacts
 - No cumulative impacts are expected because of erosion.
- (iii) Irreplaceable loss of Resources
 - No irreplaceable loss of resources is expected because of erosion.

9.2.3 OPERATIONAL PHASE IMPACTS

9.2.3.1 HABITAT FRAGMENTATION, LOSS OF NATURAL VEGETATION AND ALIEN INVASION IN A CBA 2

Vegetation clearing will occur as a result of the development of irrigation pivots. This loss of natural vegetation will cause additional fragmentation and habitat disturbance in the landscape. The disturbance destroys primary vegetation. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics and faunal populations in the area. This area is situated in a CBA 2, the management objective of these areas is to maintain a natural or near natural ecological condition. Clearing of surface areas has the effect of creating unnatural open spaces through the vegetation and the matrix of the landscape. For the smaller species, it limits movement and restricts access to foraging sites. This results in reduced population density of prey species (invertebrates and / or smaller birds and / or smaller mammals and / or herpetofauna) which then reduces the food availability for predators invertebrates and / or larger birds and / or larger mammals and / or herpetofauna). The changes in the vegetation structure also alter the availability of suitable cover for



many faunal species. There is however a tarred road on the northern boundary of the property and a gravel road on the western boundary as well as pivots on the southern section, these structures already fragment the habitat and limit movement of smaller faunal species. Clearance of primary vegetation allows secondary pioneer species or invasive plants to enter and re-colonise disturbed areas, thus increasing the possibility of Alien species invading. Many alien species proliferate in disturbance areas such as the periphery of the irrigation lands. Invasive species affect our natural biodiversity in a number of ways. They may compete directly with natural species for food or space, may compete indirectly by changing the food web or physical environment, or hybridize with indigenous species. Rare species with limited ranges and restricted habitat requirements are often particularly vulnerable to the influence of these alien invaders. Invasive plants have claimed about 8 percent or 10 million hectares of land suitable for agricultural use in South Africa. These invasive alien plants steal about seven percent of South Africa's water bulk every year. This impact was rated as low negative before and after implementation of mitigation measures.

- (i) Mitigation measures
- (ii) Vegetation clearing should be restricted to areas of the pivot only. The significance of the loss of habitat may be mitigated slightly if there are areas with suitable ecological corridors this may be possible by ensuring that no disturbance occurs in the areas outside the development area and between the pivots. Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA.
- (iii) Cumulative Impacts
- (iv) No cumulative impacts are expected because of habitat fragmentation, loss of natural vegetation and alien invasion in this CBA2 area.
- (v) Irreplaceable loss of Resources
 - In terms of irreplaceable loss, the construction phase will entail the initial clearing of the land the disturbance to the biodiversity will be perpetuated throughout the life of the project.

9.2.3.2 ANTHROPOGENIC DISTURBANCES, INTENTIONAL AND/OR ACCIDENTAL KILLING OF FAUNA

Anthropogenic disturbances include aspects such as, vibrations caused by machinery & vehicles. These aspects will impact on invertebrate species more than any other faunal species. These anthropogenic disturbances impact on the way invertebrates forage. For example; some invertebrates use vibrations caused by their prey to locate and catch them. Vibrations caused by construction equipment will make this impossible. Smaller fauna will inevitably be killed during land clearing activities as these activities will destroy their habitat. In addition to unintentional killing of fauna, some faunal species, particularly herpetofaunal species, are often intentionally killed as they are thought to be dangerous. This impact was rated as low negative before and after implementation of mitigation measures.

- (i) Mitigation measures
 - There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. As the intentional killing of herpetofauna (especially snakes) is considered a result of ignorance, this can be ameliorated through education. The labour force involved should be educated regarding the conservation importance of herpetofauna.
- (ii) Cumulative Impacts
 - No cumulative impacts are expected because of anthropogenic disturbances, intentional and/or accidental killing of fauna.
- (iii) Irreplaceable loss of Resources
 - No irreplaceable loss of resources is expected because of anthropogenic disturbances, intentional and/or accidental killing of fauna.



9.2.3.3 NOISE NUISANCE

Heavy operation vehicles will be required for ripping/ ploughing/ tilling of the soil layer, seed sowing, fertilizing, and harvesting within the development footprint. This impact is not anticipated to be significant as there are no nearby receptors to any noise nuisance. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that all vehicles used during operation are serviced and in a good working condition.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of noise impacts.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of noise impacts.

9.2.3.4 FIRE DAMAGE

The possibility of fire is a serious threat within the site area given the vegetation types and climate within the region. Fire should be prevented at all costs as it could spread easily and has the capability of quickly spreading to neighbouring areas. This impact was rated as medium negative before mitigation and was reduced to low negative after implementation of the proposed mitigation measures.

(i) Mitigation measures

- Ensure that operation vehicles are equipped with the necessary firefighting equipment, specifically fire extinguishers.
- Workers must be adequately trained in the handling of firefighting equipment.
- No open fires will be permitted on-site.
- It is recommended that if fire breaks were created around each pivot, that they be maintained and regularly cleared of any vegetation.

(ii) Cumulative Impacts

- If a fire is accidentally started and not managed promptly, it has the capability to quickly spread and cause major damage within the surrounding area. Damages can be caused to the environment, neighbouring crops, and nearby infrastructure.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of fire.

9.2.3.5 DUST NUISANCE

Dust will be generated during the operation phase because of frequent movement of heavy vehicles over the development footprint. This is not anticipated to be a significant impact as there are no nearby sensitive receptors. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that access roads to the development footprint are well maintained.
- Production phase vehicles should not exceed 30 km/h on access roads or in-field.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of dust impacts during construction.

(iii) Irreplaceable loss of Resources



- No irreplaceable loss of resources is expected because of dust impacts during decommissioning.

9.2.3.6 **DEGRADATION OF WATER RESOURCES**

There is a non-perennial surface water resource located to the north east of the proposed pivots. This feature remains dry for the majority of the year and surface water ponding or collection only occurs following rains and thereafter dries up again. It is not anticipated that any direct impact on this feature will occur as long as the proposed mitigation measures are implemented. This impact was rated as medium negative without mitigation and low negative following implementation of mitigation measures during the operational phase due to the short duration of the impact.

(iv) Mitigation measures

- Ensure that no activities occur within the non-perennial surface water features at any time.
- Obtain confirmation from the DWS as to whether any water uses need to be authorised in relation to the proximity of the project on the adjacent surface water features.

(v) Cumulative Impacts

- No cumulative impacts are expected on any surface water features during operational phase.

(vi) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected.

9.2.3.7 **OIL/ FUEL SPILLAGES CAUSING SOIL AND GROUNDWATER CONTAMINATION**

Any leaks on production phase vehicles or accidental spillages can seep into and contaminate soil and possibly the groundwater. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Ensure that all vehicles used are serviced and in a good working condition.
- Ensure that every vehicle used on-site has a spill prevention kit, to be used for accidental spillages of oil or fuel.
- No storage of oil or fuel is allowed on-site. Any storage, if necessary, should be within a designated area and no direct contact between the storage containers and the ground is allowed.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of spillages during operation. It is not anticipated that large quantities of oil/ fuel will be required as part of operation. Only small amounts of oil/ fuel can spill because of leaks on vehicles. These could be easily managed.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of spillages.

9.2.3.8 **LITTERING**

Littering is a possibility during the operational phase. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- A dedicated waste bin must be made available in a suitable location during construction, which should be emptied after every day of use or when full.
- Littering in the environment is not allowed.

(ii) Cumulative Impacts



- No cumulative impacts are expected because of littering impacts.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of littering.

9.2.3.9 SOCIO-ECONOMIC IMPACTS

The proposed project will create employment opportunities and contribute to food security. The crops will be sold locally. This impact was rated as medium positive before and after implementation of improvement measures.

(i) Improvement measures

- The socio-economic impact can be improved by employing a work force from the local community as far as reasonably possible.
- Utilise existing community structures if available, to act as a communication link between the local community and the applicant for informing the local community of job opportunities and informing the Applicant of possible contractors in the local community.
- Opportunities should first be given to previously disadvantaged individuals where practically possible.
- Employees should be trained and continuously developed.
- It is proposed that the product also be sold locally, if viable, to contribute to local food security.

(ii) Cumulative Impacts

- Every employment opportunity can positively contribute to certain livelihoods in the community through income generation. Overall, any job opportunities will contribute to reducing unemployment.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of socio-economic impacts.

9.2.3.10 VISUAL IMPACT

This impact was rated as medium negative. No mitigation measures exist with regards to a visual impact. The impact is not expected to be significant as one of the major surrounding land uses in the area is pivot irrigation, however, the visual aesthetic of the directly affected footprint area will be different than its current, semi-vegetated natural state. This impact was rated as medium negative and there are no mitigation measures proposed.

(i) Mitigation measures

- None.

(ii) Cumulative Impacts

- No cumulative impacts are expected because of a visual impact.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of a visual impact.

9.2.3.11 EROSION

Topographically the area is flat, which will prevent major erosion and water runoff during rainfall events. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Possible water flow during rainfall events must be controlled, using preferred storm water management techniques, before discharge into natural existing drainage lines.



(ii) Cumulative Impacts

- No cumulative impacts are expected because of erosion.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss of resources is expected because of erosion.

9.2.4 DECOMMISSIONING, REHABILITATION AND CLOSURE PHASE IMPACTS

Decommissioning of a pivot is not a high impact process. It will entail removal of the centre pivot system and active or passive rehabilitation with natural species to ensure adequate ground cover and species composition. The applicant is responsible for ensuring that alien/ invasive species do not occur within the footprint and will have to remove these from time-to-time as they occur on the site while the land naturally rehabilitates. Alternatively, the farmer may remove the pivot system and still grow crops without artificial irrigation.

9.2.5 NO-GO ALTERNATIVE

The no-go alternative option means 'do nothing' or the option of not undertaking the proposed pivot construction project or any of its activities, consequently leading to the continuation of the current land-use, which is leaving the location as a natural semi-vegetated area. As such, the 'do nothing' alternative or keeping the current status quo with no activities occurring on-site also provides the baseline against which the impacts of the preferred alternative was compared. The no go alternative would imply that no expanded farming activities are undertaken and, as such, the negative impacts as stated above, would not materialise. However, conversely, this will negate the potential positive impacts associated with the proposed expanded farming activities, such as creation of additional employment opportunities and/or benefits to food security in South Africa as a whole.

9.2.6 OVERALL PREFERRED ALTERNATIVE

The proposed activities on site are preferred, considering that no other alternatives other than the preferred activities and the No-Go alternative could be identified. No other alternative seemed reasonable or feasible for the proposed project and site location. The reasoning is that the proposed activities, construction of new pivots, align with the surrounding land uses and current farming activities being undertaken by the applicant. The location of the proposed activities is ideally situated as it is on the applicant's property, mostly on previously cultivated lands (minimising the negative impact), and it falls within the potential intensive irrigation agriculture area. The preferred alternative will also have significant positive socio-economic impacts for its scale in creating employment opportunities and contributing to food security.

No highly significant/ detrimental negative impacts were identified with regards to the preferred alternative. All impacts and associated risks can be minimised to acceptable levels if the mitigation measures are adhered to.

9.3 SUMMARY OF PRELIMINARY IMPACTS

A summary of all the identified preliminary impact, their associated phase, as well as their impact calculations and significance are presented in Table 20 below. The No-Go alternative is also included in this table.



Table 20: Significance rating of identified impacts

IMPACT DESCRIPTION			Pre-Mitigation								Post Mitigation								Priority Factor Criteria				
Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score		
Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA 2	Alternative 1	Construction	-1	3	4	4	3	5	-17,5	-1	3	4	3	3	4	-13	High	2	2	1,25	-16,25		
Loss of species of conservation concern	Alternative 1	Construction	-1	1	4	4	3	5	-15	-1	1	4	3	3	4	-11	High	2	1	1,13	-12,375		
Anthropogenic disturbances, intentional and/or accidental killing of fauna	Alternative 1	Construction	-1	1	3	2	2	3	-6	-1	1	3	1	2	2	-3,5	Medium	2	1	1,13	-3,9375		
Impact on heritage resources	Alternative 1	Construction	-1	1	5	2	5	2	-6,5	-1	1	5	1	1	1	-2	Low	1	1	1,00	-2		
Noise nuisance	Alternative 1	Construction	-1	1	4	3	2	2	-5	-1	1	4	1	2	1	-2	Medium	1	1	1,00	-2		
Fire damage	Alternative 1	Construction	-1	3	2	4	4	4	-13	-1	2	2	2	2	2	-4	Medium	1	1	1,00	-4		
Dust nuisance	Alternative 1	Construction	-1	3	4	2	2	3	-8,25	-1	2	4	1	2	2	-4,5	Medium	1	1	1,00	-4,5		
Degradation of watercourse resources	Alternative 1	Construction	-1	3	2	2	3	2	-5	-1	1	2	1	2	1	-1,5	Medium	1	1	1,00	-1,5		
Oil/ fuel spillages causing soil and groundwater contamination	Alternative 1	Construction	-1	1	2	3	3	2	-4,5	-1	1	2	2	2	2	-3,5	Medium	1	1	1,00	-3,5		
Littering	Alternative 1	Construction	-1	2	4	2	2	2	-5	-1	1	4	1	1	1	-1,75	Medium	1	1	1,00	-1,75		
Socio-economic impacts	Alternative 1	Construction	1	4	4	2	1	5	13,75	1	4	4	3	1	5	15	Medium	1	1	1,00	15		
Visual impact	Alternative 1	Construction	-1	1	4	1	2	5	-10	-1	1	4	1	2	5	-10	Medium	1	1	1,00	-10		
Erosion	Alternative 1	Construction	-1	1	4	3	2	2	-5	-1	1	4	2	2	2	-4,5	Medium	1	1	1,00	-4,5		
Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA 2	Alternative 1	Operation	-1	3	4	4	3	5	-17,5	-1	3	4	3	3	4	-13	High	2	2	1,25	-16,25		
Anthropogenic disturbances, intentional and/or accidental killing of fauna	Alternative 1	Operation	-1	1	3	2	2	3	-6	-1	1	3	1	2	2	-3,5	Medium	2	1	1,13	-3,9375		
Noise nuisance	Alternative 1	Operation	-1	1	4	3	2	2	-5	-1	1	4	1	2	1	-2	Medium	1	1	1,00	-2		
Fire damage	Alternative 1	Operation	-1	3	2	4	4	4	-13	-1	2	2	2	2	2	-4	Medium	1	1	1,00	-4		
Dust nuisance	Alternative 1	Operation	-1	3	4	2	2	3	-8,25	-1	2	4	1	2	2	-4,5	Medium	1	1	1,00	-4,5		
Degradation of watercourse resources	Alternative 1	Operation	-1	3	4	3	3	3	-9,75	-1	1	4	1	2	1	-2	Medium	1	1	1,00	-2		
Oil/ fuel spillages causing soil and groundwater contamination	Alternative 1	Operation	-1	1	2	3	3	2	-4,5	-1	1	2	2	2	2	-3,5	Medium	1	1	1,00	-3,5		
Littering	Alternative 1	Operation	-1	2	3	2	2	2	-4,5	-1	1	3	1	1	1	-1,5	Medium	1	1	1,00	-1,5		
Socio-economic impacts	Alternative 1	Operation	1	4	4	2	1	5	13,75	1	4	4	3	1	5	15	Medium	1	1	1,00	15		
Visual impact	Alternative 1	Operation	-1	1	4	1	2	5	-10	-1	1	4	1	2	5	-10	Medium	1	1	1,00	-10		
Erosion	Alternative 1	Operation	-1	1	4	3	2	2	-5	-1	1	4	2	2	2	-4,5	Medium	1	1	1,00	-4,5		
Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA 2	Alternative 1	Rehab and closure	-1	1	4	2	2	3	-6,75	-1	1	4	2	2	2	-4,5	High	1	1	1,00	-4,5		
No development option	No-Go		-1	1	1	1	1	3	-3	-1	1	1	1	1	3	-3	Medium	1	1	1,00	-3		



10 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is determined by specialists' input within each respective field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of low, medium and highly sensitive areas within and surrounding the proposed calcination plant area. It should be noted, however, that only a biodiversity specialist study was deemed necessary for the proposed project. Therefore, the sensitivity map will only consist of information as received from the specialist, see Figure 24 for the sensitivity map. In addition, a composite map, consisting of desktop information on different environmental attributes, including the specialist identified sensitive areas and proposed pivots was created, see Figure 25 for the composite map.

The sensitivity mapping approach allows for the proposed pivot activities to be undertaken whilst protecting identified sensitive environmental areas/ features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. Table 21 below provides a breakdown of the sensitivity rating as represented on Figure 24, the sensitivity map.

The sensitivity map identifies the proposed pivots 1 and 2 within a low sensitive biodiversity area, and the half pivot, pivot 3, within a medium biodiversity sensitive area. No water courses were identified within 500 m of the proposed footprint area. A high palaeontological sensitivity exists just north of the proposed pivots according to the Palaeo Sensitivity Map from SAHRIS, however all pivots were identified within a moderate palaeontological sensitive area.

Table 21: Sensitivity rating and weighting

Sensitivity Rating	Description
Least concern	The inherent feature status and sensitivity is already degraded or contain no inherent sensitivities. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.
Low/Poor	The proposed development will not have a significant effect on the inherent feature status and sensitivity.
Medium	The proposed development will moderately negatively influence the current status of the feature.
High	The proposed development will have a significantly negative influence on the current status of the feature.

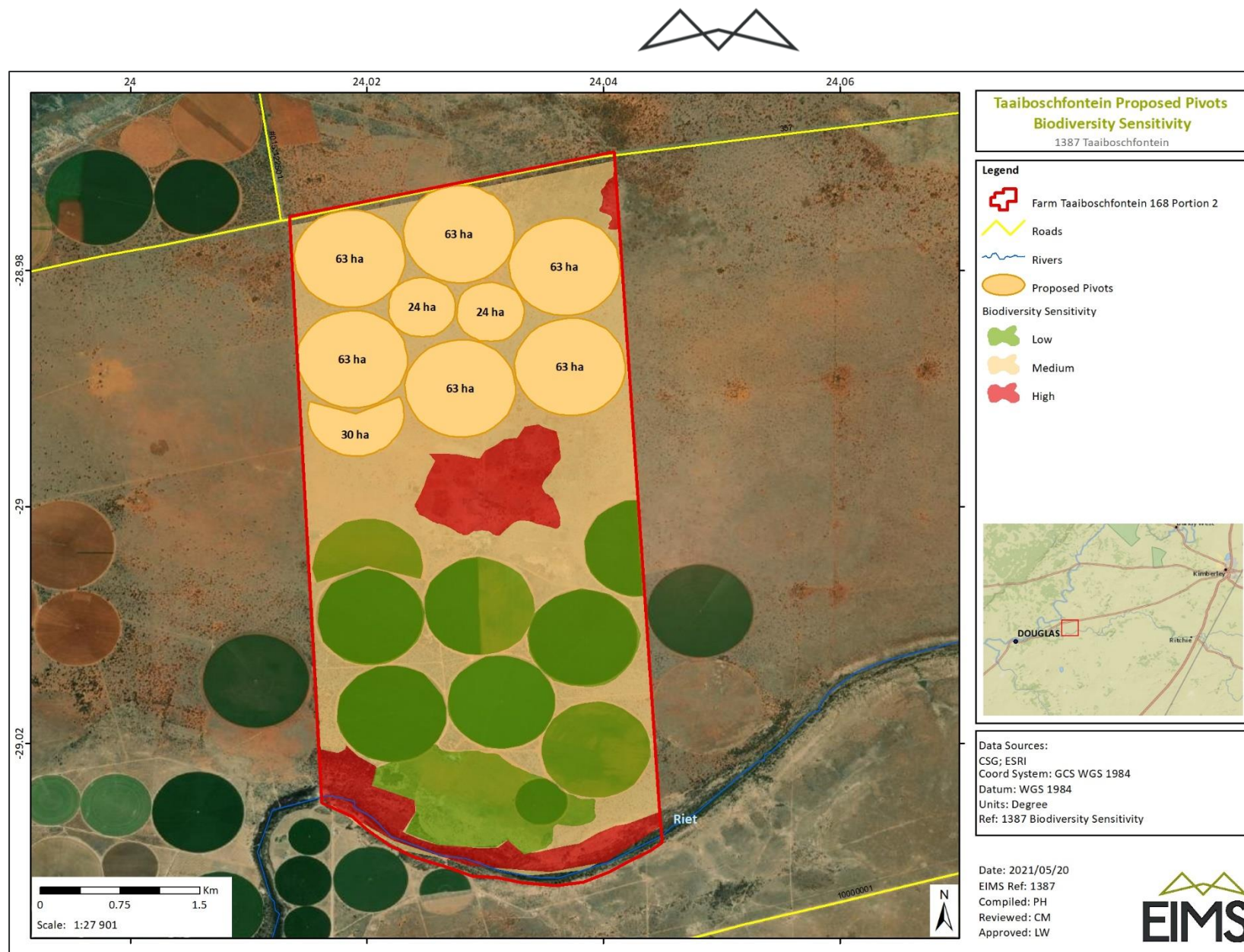


Figure 24: Biodiversity specialist sensitivity map.

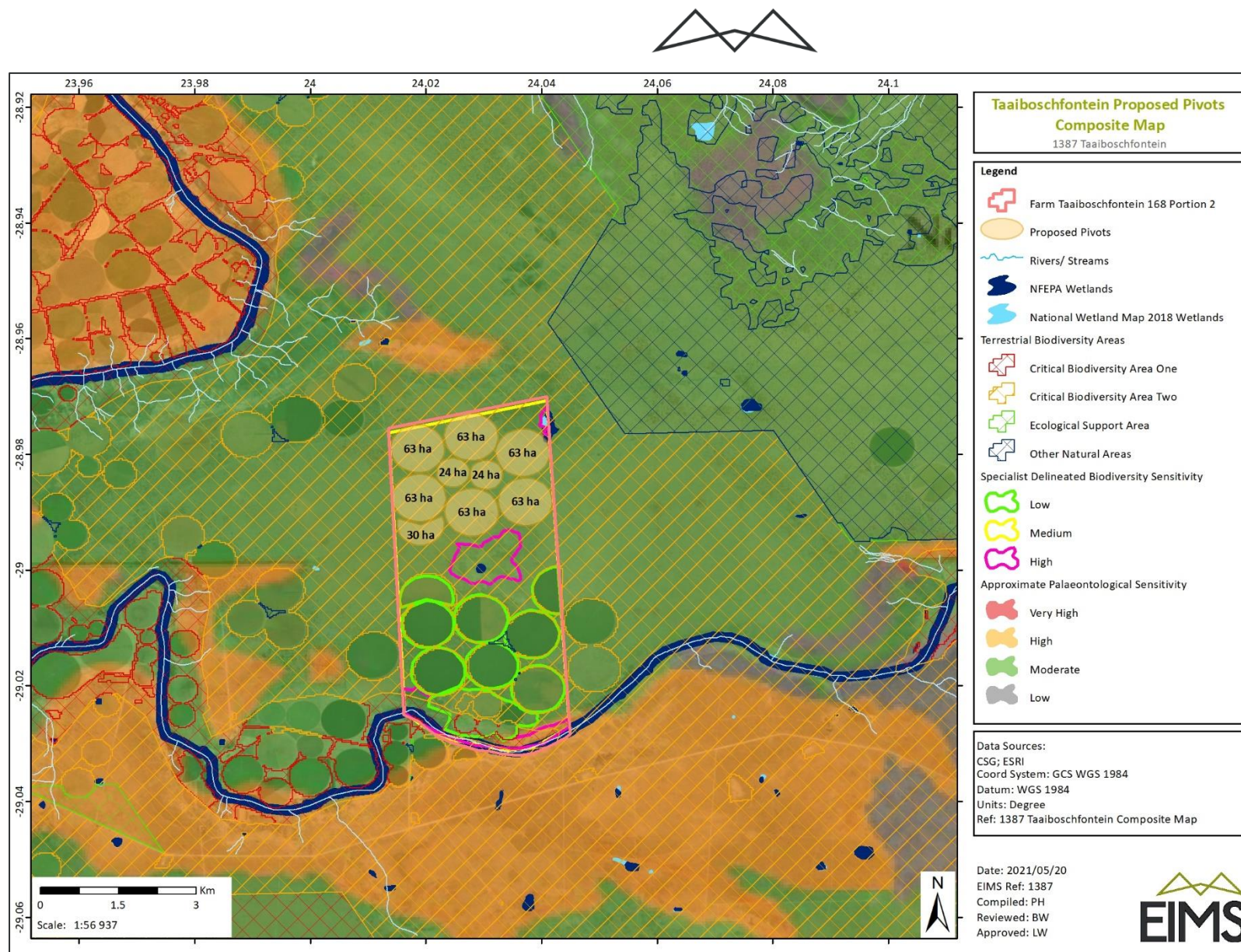


Figure 25: Composite Map



11 CONCLUSION AND RECOMMENDATIONS

An EIA was undertaken to identify all the potential risks and impacts associated with each phase of the proposed pivot expansion activities as well as potentially feasible alternatives. Background information review on the surrounding areas, the biodiversity and heritage/ palaeontological specialist assessment reports (Appendix D) as well as the National Web based Environmental Screening Tool Report (Appendix F) helped to guide the identification of potential impacts. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria included the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

Only the Heritage, Palaeontological and Biodiversity specialist assessments were deemed necessary by the EAP and were conducted by the relevant specialists. These were the only specialist studies considered because of the proposed location and type of activities which form part of the pivot expansion project. A desktop study and an on-site investigation was conducted on the 19th of November 2020, which confirmed the redundancy of additional specialists' studies to be done. No perennial watercourses exist within or closely surround the proposed footprint area while a non-perennial water feature occurs north east of the proposed pivots. Most of the footprint will fall on old lands (previously cultivated land that was allowed to reform into a semi-natural state) and the proposed activity, pivot irrigation, will visually fit in with the surrounding area because of the presence of other pivots in the project's vicinity.

There are a number of protected trees within the planned development area. These will be lost when the vegetation is cleared for the construction of the pivots. *Vachellia haematoxylon* is classified as a protected species under the National Forests Act of 1998 (Act 84 of 1998) and has a narrow distribution range. The *Vachellia erioloba* is also a protected species under the National Forests Act of 1998 (Act 84 of 1998). Larger trees are important as nesting and as perching sites but the groups of smaller trees provide a unique habitat acting as a nursery for other plant species and creating important habitats for faunal species.

The visual impact of the proposed project was rated as having a medium negative significance and the socio-economic benefit was rated as having a medium positive impact. All additional impacts identified, were rated as having low significance if the relevant mitigation measures are adhered to. The associated EMP identifies appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts.

11.1 PREFERRED ALTERNATIVES

The only discrete alternatives considered was the Preferred Alternative and the No-Go Alternative, as no other feasible alternatives could be identified with regards to location, process, technology or the type of activity owing to the nature of the existing farming activities being undertaken by Genade Boerdery.

With regards to incremental alternatives, one centre pivot system will be rotated between the proposed pivots. Because of the small scope of the proposed pivot project, different power supply options to the pivot system (electricity from the grid, batteries or solar) may not have a significant difference in environmental impact, however the different alternative options for sourcing power will have different costs implications to the applicant. Therefore, it is advised that the applicant should use their own discretion on choosing a power source to operate the pivot.

11.2 ENVIRONMENTAL IMPACT STATEMENT

The findings of this EIA Report as well as the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. It is the opinion of the EIA project team that the significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Based on the nature and extent of the proposed pivots and the predicted impacts as a result of the construction and operational phases of the proposed pivots, the findings of the EIA, and the understanding of the mostly low - medium post-mitigation significance level of potential environmental impacts,



it is the opinion of the EAP that the environmental impacts associated with the application for the proposed project can be mitigated to an acceptable level and the project should be authorized.

11.3 RECOMMENDATIONS FOR INCLUSION IN ENVIRONMENTAL AUTHORIZATION

The following key recommendations are made:

- The EMPr should be adhered to during all phases of the project.
- An independent Environmental Control Officer (ECO) is NOT recommended for this project due to the nature thereof. It is however recommended that the farm manager (or suitable representative) is tasked with overseeing compliance with the EA and EMPr and this representative must take responsibility for non-compliance should they occur.
- A threatened or protected species permit and/or a permit in terms of the National Forest Act must be obtained prior to rescue and relocation or destruction of any protected species.
- The water allocation and use on the farm must be metered and the results recorded monthly for record purposes.
- Clearance must be limited to the proposed pivot footprints as presented in the EIA report.
- No impact on nearby surface water features may occur without approval from the Department of Water and Sanitation (DWS).
- Alien and invasive species must be adequately controlled and disposed of (where relevant).



12 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

Certain assumptions, limitations, and uncertainties are associated with the EIA Phase. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- The EIA process and report is based on the technical information and process description provided by the client;
- The description of the baseline environment has been obtained from specialist studies and a desktop analysis; and
- It is assumed that the information provided in the specialist studies is accurate.



13 UNDERTAKINGS

13.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I **Cheyenne Muthukarapan** herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report.

Signature of the EAP

Date: 24 February 2021

13.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **Cheyenne Muthukarapan** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP

Date: 24 February 2021



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