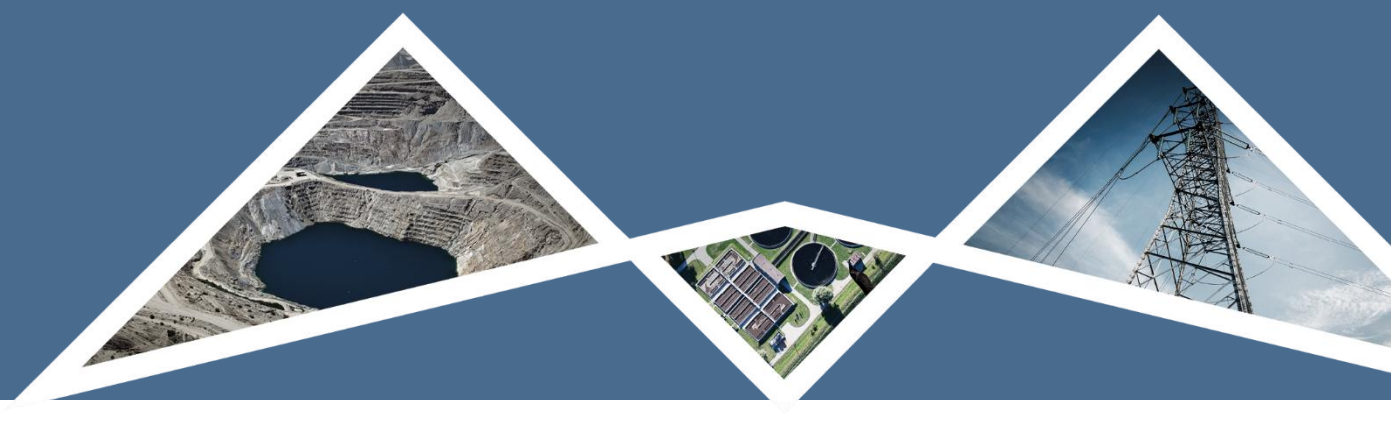
EIMS | ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

T 011 789 7170 E info@eims.co.za W www.eims.co.za

SCOPING REPORT FOR PUBLIC REVIEW

GENADE BOERDERY MIDDELPLAATS PIVOT EIA



DOCUMENT DETAILS

EIMS REFERENCE:	1683
DOCUMENT TITLE:	Scoping Report: Genade Boerdery Middelplaats EIA

DOCUMENT CONTROL

	NAME	SIGNATURE	DATE
COMPILED:	Jolene Webber	Sent Electronically	2025/05/29
CHECKED:	Monica Niehof	Sent Electronically	2025/05/29
AUTHORIZED:	Liam Whitlow	Sent Electronically	2025/05/29

REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2025/05/16	ORIGINAL DOCUMENT	Scoping Report for Public Review – Internal Review
2025/05/29	REVISION 1	Scoping Report for Public Review

Table of Contents

List of Abbreviations vi
Executive Summary .....
1 Introduction 1
1.1 Report Structure 4
1.2 Details of the EAP 8
1.3 Specialist Studies 9
1.4 Description and Scope of Proposed Project 9
1.4.1 Project Description 9
1.4.2 Project Locality 9
1.4.3 Project Timeline 10
2 Listed and Specified Activities 12
3 Policy and Legislative Context 13
3.1 National Legislation 13
3.1.1 Constitution of the Republic of South Africa 13
3.1.2 National Environmental Management Act (NEMA) 13
3.1.3 NEMA Environmental Impact Assessment Regulations, 2014 as Amended 17
3.1.4 National Environmental Management: Protected Areas Act 18
3.1.5 National Environmental Management: Biodiversity Act (NEM:BA) 18
3.1.6 The National Environmental Management Waste Act (NEMWA) 20
3.1.7 The National Water Act (NWA) 21
3.1.8 National Heritage Resources Act (NHRA) 25
3.1.9 Environment Conservation Act (ECA) 25
3.1.10 The Conservation of Agricultural Resources Act (CARA) 26
3.1.11 National Forests Act (NFA) 27
3.1.12 National Veld and Forest Fire Act 27
3.1.13 Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 27
3.1.14 The Spatial Planning and Land Use Management Act (SPLUMA) 27
3.1.15 National Dust Control Regulations 27
3.1.16 Noise Control Regulations (NCR) 28
3.1.17 Occupational Health and Safety Act 28
3.2 Provincial Policy and Planning Context 28
3.2.1 Northern Cape Nature Conservation Act (NCNCA) 28
3.2.2 Northern Cape Biodiversity Spatial Plan 29
3.3 Municipal Policy and Planning Context 29
4 Needs and Desirability of Proposed Project 30
5 Project Alternatives 44
5.1 Location Alternatives 44

5.1.1 Development Location Alternatives 44
5.1.2 Design or Layout Alternatives 44
5.2 Scheduling Alternatives 44
5.3 Process Alternatives 45
5.4 Technology Alternatives 45
5.5 Activity Alternatives 45
5.6 No Go Alternative 45
6 Stakeholder engagement 46
6.1 Pre-consultation With the Competent Authority 46
6.2 General Approach to Scoping and Public Participation 46
6.2.1 List of Organs of State Identified and Notified 47
6.2.2 Other Key I&APs Identified and Notified 48
6.2.3 Initial Notification of I&APs 48
6.2.4 Notification of Availability of scoping report 49
6.2.5 Issues and Responses 49
7 Environmental Baseline Attributes 51
7.1 Climate 51
7.2 Topography 52
7.3 Geology and Soils 53
7.4 Terrestrial Biodiversity 55
7.4.1 Baseline Findings of the Biodiversity Assessment - Flora 57
7.4.2 Baseline Findings of the Biodiversity Assessment – Fauna 59
7.4.3 Alien/Invasive Species 64
7.4.4 Terrestrial Biodiversity Site Sensitivity 64
7.5 Surface Water and Aquatic Biodiversity 65
7.6 Heritage 66
7.6.1 Site-Specific Background 66
7.6.2 Summary of Findings 68
7.7 Palaeontology 71
7.8 Socio-Economic Environment 73
7.8.1 Frances Baard District Municipality 73
7.8.2 Sol Plaatje Local Municipality 74
7.8.3 Land Use 75
8 Environmental Impact Assessment 77
8.1 Impact Assessment Methodology 77
8.1.1 Determination of Significance 77
8.1.2 Impact Prioritization 80
8.2 Impacts and Mitigation 82

8.2.1 Planning Phase Impacts 82
8.2.2 Construction Phase Impacts 82
8.2.3 Operational Phase Impacts 92
8.2.4 Decommissioning and Rehabilitation Phase Impacts 99
8.3 Summary of Preliminary Impacts 101
9 Plan of Study for Environmental Impact Assessment 104
9.1 Project Alternatives 104
9.2 Scope of Assessment 104
9.3 Specialist Assessments 104
9.4 Impact Assessment Methodology 104
9.4.1 Proposed Method for Assessing Significance 105
9.5 Authority Consultation 105
9.6 Stakeholder Engagement 105
9.7 Tasks to be Undertaken During EIA Phase 105
9.8 Impacts and Mitigations Assessment 106
10 Assumptions, Limitations and Uncertainties 107
11 Undertakings 108
11.1 Undertaking Regarding Correctness of Information 108
11.2 Undertaking Regarding Level of Agreement 108
12 References 109
13 Appendices 110

List of Figures

Figure 1: Locality Map. 2
Figure 2: Pivot Layout Map. 3
Figure 3: Photographic examples of the initial planting cycle from vegetation clearance, irrigation and growing period of potato seed to the rain-fed grazing grass stage. 10
Figure 4: EIA process diagram. 14
Figure 5: Authorisation processes for new water uses. 22
Figure 6: Surface Water Features Map. 24
Figure 7: Average maximum day and minimum night temperatures in Kimberley (Weather & Climate, 2025). 51
Figure 8: The mean monthly precipitation over the year, including rain, hail and snow (Weather & Climate, 2025). 52
Figure 9: Relative humidity over the year (Weather & Climate, 2025). 52
Figure 10: Topography Map. 53
Figure 11: Simplified Geology Map. 54
Figure 12: Simplified Soil Map. 55

Figure 13: Vegetation Status Map. 56
Figure 14: Listing Notice 3 Applicability Map. 57
Figure 15: Terrestrial Biodiversity Site Sensitivity Map (EMS, 2025). 65
Figure 16: Some key examples of handaxes found near the Kathu Townlands. The examples are banded ironstone (A and B), and Quartzite (C) (After Walker et al., 2014). 67
Figure 17: Examples of small flakes and cores. (A) Large flake off of the edge of the core consistent with biface shaping removal, (B) Large flake with dorsal scars (C) Blade (D–F) Small flakes (G-H) Discoidal cores (After Walker et al., 2014). 67
Figure 18: A photograph taken of engraved motifs forming part of the petroglyphs identified at Driekopseiland near Kimberley, Northern Cape (After Morris, 2022). 68
Figure 19: Map of the different finds and sites of interest identified during the field survey. 69
Figure 20: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicating the High (orange) and Moderate (green) Palaeontological Sensitivity of the study area (Banzai Environmental, 2025). 72
Figure 21: FBDM Gender and age distribution (Stats SA Census, 2022). 73
Figure 22: FBDM demographic (Stats SA Census, 2022). 73
Figure 23: FBDM employment status (Frances Baard District Municipality, 2021). 74
Figure 24: SPLM gender and age distribution (Stats SA Census, 2022). 75
Figure 25: SPLM demographic (Stats SA Census, 2022). 75
Figure 26: SPLM employment status (Sol Plaatje Local Municipality, 2022). 75
Figure 27: Land Cover Map. 76

List of Tables

Table 1: Report structure. 4
Table 2: EAP details. 8
Table 3: List of specialist studies to inform this EIA application. 9
Table 4: Project Locality Details. 9
Table 5: Anticipated clearance and planting schedule. 10
Table 6: NEMA listed activities relevant to proposed project. 12
Table 7: Screening Tool environmental sensitivities 15
Table 8: SSVR findings and motivation. 16
Table 10: Potential and recorded Protected Plant species on site (EMS, 2025). 58
Table 11: Protected Reptile species (EMS, 2025). 60
Table 12: Protected Amphibians (EMS, 2025). 60
Table 13: Bird species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on the site (EMS, 2025). 61
Table 14: Mammal species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on the site (EMS, 2025). 62
Table 15: Alien invasive species that occur in and around the property (EMS, 2025). 64

Table 16: Summary of different finds and sites identified. 69
Table 17: Criteria for Determining Impact Consequence 77
Table 18: Probability/ Likelihood Scoring 79
Table 19: Determination of Significance 79
Table 20: Significance Scores 79
Table 21: Criteria for Determining Prioritisation 80
Table 22: Determination of Prioritisation Factor 81
Table 23: Final Environmental Significance Rating 81
Table 24: Identified Preliminary Impacts. 102

Appendices

Appendix A: EAP Curriculum Vitae

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Copy of EA application form

Appendix E: DFFE Screening Tool and Site Screening Verification Report

Appendix F: Specialist Reports

LIST OF ABBREVIATIONS

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
CR	Critically Endangered
DAERL	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIMS	Environmental Impact Management Services (Pty) Ltd
EMPr	Environmental Management Programme
EN	Endangered
FBDM	Frances Baard District Municipality
FEPA	Freshwater Ecosystem Priority Area
GDP	Gross Domestic Product
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
I&APs	Interested and Affected Parties
IBA	Important Bird Areas
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPM	Integrated Pest Management
IUCN	International Union for Conservation of Nature
LC	Least Concern
LSA	Later Stone Age
MAP	Mean Annual Precipitation
MEC	Member of the Executive Council
MP	Moderately Protected
MPRDA	Mineral and Petroleum Resources Development Act
NC BSP	Northern Cape Biodiversity Spatial Plan
NCNCA	Northern Cape Nature Conservation Act (No. 9 of 2009)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

NEMA	National Environmental Management Act (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (Act 25 of 1999)
NP	Not Protected
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
OHSA	Occupational Health and Safety Act (Act 85 of 1993)
PDA	Palaeontological Desktop Assessment
PP	Poorly Protected
PPP	Public Participation Process
RDB	Red Data Book
RLE	Red List of Ecosystems
S&EIA	Scoping and Environmental Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SDF	Spatial Development Framework
SPLM	Sol Plaatje Local Municipality
SPLUMA	Spatial Planning and Land Use Management Act (Act 16 of 2013)
SWSA	Strategic Water Source Area
TOPS	Threatened or Protected Species
VOC	Volatile Organic Compound
VU	Vulnerable
WMA	Water Management Area
WP	Well Protected
WWW	World Wide Web

EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT OVERVIEW

Genade Boerdery (Pty) Ltd (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the necessary authorisation processes, including compiling the necessary reports and undertaking the statutory consultation processes, in support of the application for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA) Listed activity:
    - GNR 984 (2014, as amended) Activity 15:

      "The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-

      (i) the undertaking of a linear activity; or

      (ii) maintenance purposes undertaken in accordance with a maintenance management plan."

Genade Boerdery wishes to create 8 new cultivation (pivot) areas for the cultivation of potatoes. The development of these pivots will occur in phases over the course of 5 years. The crops will be rotated to prevent blight and allow for conservation of the soil. Once the planting cycle for a pivot area is completed, the area will be reseeded with grazing grasses for cattle. Seven of the new cultivation areas will each cover 60 hectares and one will cover 50 hectares, resulting in a total of ~470 hectares of indigenous vegetation clearance by the end of the five-year period. Irrigation requirements will be met using the applicant's licensed water use (File Number 27/2/C92B/250J5466/104KBY/0-35) which authorizes the taking of water from the Vaal River system for irrigation of up to 60 hectares. No additional water resources will be required as only one crop area will be planted at a time.

The proposed project is located on the farm Middel Plaats South No. 104, Sol Plaatje Local Municipality, Northern Cape. The site is approximately 8 km south of Schmidstdrif. The centre point of the site is located at approximately 28°47'8.10"S, 24° 4'29.24"E.

PURPOSE OF THE SCOPING REPORT

The purpose of the scoping 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 alternatives 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;
- To identify the key issues to be addressed in the assessment phase;
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required, as well as the extent of further consultation to be undertaken 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; 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

The Public Participation Process (PPP) for the proposed project has been undertaken in accordance with the requirements the NEMA in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on the 17th of March 2025 with an initial call to register notification. The comments received from Interested & Affected Parties (I&APs) during the initial call to register and commenting period to date have been captured in the Public Participation Report in **Appendix C**.

Comments received during this Scoping Report review period will also be collated and added to the Public Participation Report and updated accordingly for inclusion in the finalised Scoping Report to be submitted to the Competent Authority (CA). Should the CA accept the Scoping Report, an EIA Report including and Environmental Management Programme (EMPr) will then be compiled and presented for public comment as part of this EIA process during which time further stakeholder engagement will take place.

This Scoping Report will be made available for public review and comment for a period of at least 30 days from the 4th of June 2025 until the 7th of July 2025, and a hard copy of the report will be available at the Kimberley Public Library during the public review period. Electronic copies are available on the EIMS website (www.eims.co.za/public-participation/).

Contact details 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: Alex Msipa
- Email: middelplaats@eims.co.za

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

A scoping assessment was undertaken to identify all the potential risks and impacts associated with each phase of the proposed pivot development activities as well as potentially feasible alternatives. Each of the identified risks and impacts identified for the project were assessed. The assessment criteria (see **Section 8.1** for the EIMS Impact Assessment Methodology) include the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

After considering the broad range of alternative types (i.e., location, process, technology, and activity options), no other feasible alternatives other than site layout and incremental alternatives could be identified. 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. The evaluation of site layout alternatives for agricultural pivot developments typically examines various spatial configurations to optimize irrigation efficiency and land utilization. These alternatives will be further considered during the EIA phase.

Various impacts have been identified in relation to the proposed project and these have been subjected to a scoping level impact assessment. No negative impacts were determined to have a high final significance at this stage. The following negative and positive preliminary impacts were determined to have a potentially medium to low negative and low negative / medium to high positive final significance (respectively) (see **Section 8.2** for full list of identified impacts and the significance of each):

- **Negative Impacts:**
    - Biodiversity Impacts – Habitat fragmentation, loss of natural vegetation and alien invasion; Loss of species of conservation concern; Anthropogenic disturbances, intentional and/or accidental killing of fauna.
    - Heritage Impacts – Impact on Heritage Resources – Destruction or disturbance of identified stone tool sites and finds (stone tool sites); Destruction or disturbance of undiscovered below-ground heritage features (unidentified below-ground heritage features).
    - Palaeontology Impacts – Loss of Fossil Heritage.
    - Impact on Soil.
    - Impact on Water.
    - Impact on Air (dust nuisance and emissions).
    - Visual Impacts.
    - Noise Impacts.
    - Fire Damage.
- **Positive Impacts:**
    - Socio-Economic Impacts – job creation, local economic support, contribution to food security.

The most significant risks and impacts identified prior to implementing mitigation measures include those that have high negative (impacts on soil), however, effective implementation of mitigation measures, robust and proactive soil management practices, can reduce the significance of the impact on soil to a low negative final significance. Other impacts with medium to high negative pre-mitigation significance (loss of fossil heritage; Habitat fragmentation, Loss of Natural vegetation and Alien invasion; Loss of Species of Conservation Concern; Destruction or disturbance of identified stone tool sites and finds; Noise Nuisance; Impact on Air) were reduced to low negative and medium to low negative final significance. The visual impact of the proposed operation was rated as having a medium to low negative pre-mitigation and final significance. See **Section 8.2** for full list of identified impacts and the significance of each.

The identified potential impacts will be further assessed during the EIA phase of the project. Potential mitigation measures have been identified and will be refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist input during the EIA phase of the project. The associated Environmental Management Programme (EMPr) will identify appropriate mitigation mechanisms for avoidance and minimisation and/or management of the negative impacts and enhancement of the positive impacts.

1 INTRODUCTION

Genade Boerdery (Pty) Ltd (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the necessary authorisation processes, including compiling the necessary reports and undertaking the statutory consultation processes, in support of the application for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA) Listed activity:
    - GNR 984 (2014, as amended) Activity 15:

      "The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-

      (i) the undertaking of a linear activity; or

      (ii) maintenance purposes undertaken in accordance with a maintenance management plan."

Genade Boerdery wishes to create 8 new cultivation (pivot) areas for the cultivation of potatoes. The development of these pivots will occur in phases over the course of 5 years. The crops will be rotated to prevent blight and allow for conservation of the soil. Once the planting cycle for a pivot area is completed, the area will be reseeded with grazing grasses for cattle. Seven of the new cultivation areas will each cover 60 hectares and one will cover 50 hectares, resulting in a total of ~470 hectares of indigenous vegetation clearance by the end of the five-year period. Irrigation requirements will be met using the applicant's licensed water use (File Number 27/2/C92B/250J5466/104KBY/0-35) which authorizes the taking of water from the Vaal River system for irrigation of up to 60 hectares. No additional water resources will be required as only one crop area will be planted at a time.

The proposed project is located on the farm Middel Plaats South No. 104, Sol Plaatje Local Municipality, Northern Cape. The site is approximately 8km south of Schmidtsdrif. The centre point of the site is approximately 28°47'8.10"S, 24° 4'29.24"E. Please refer to project locality map (**Figure 1**) and pivot layout map (**Figure 2**).

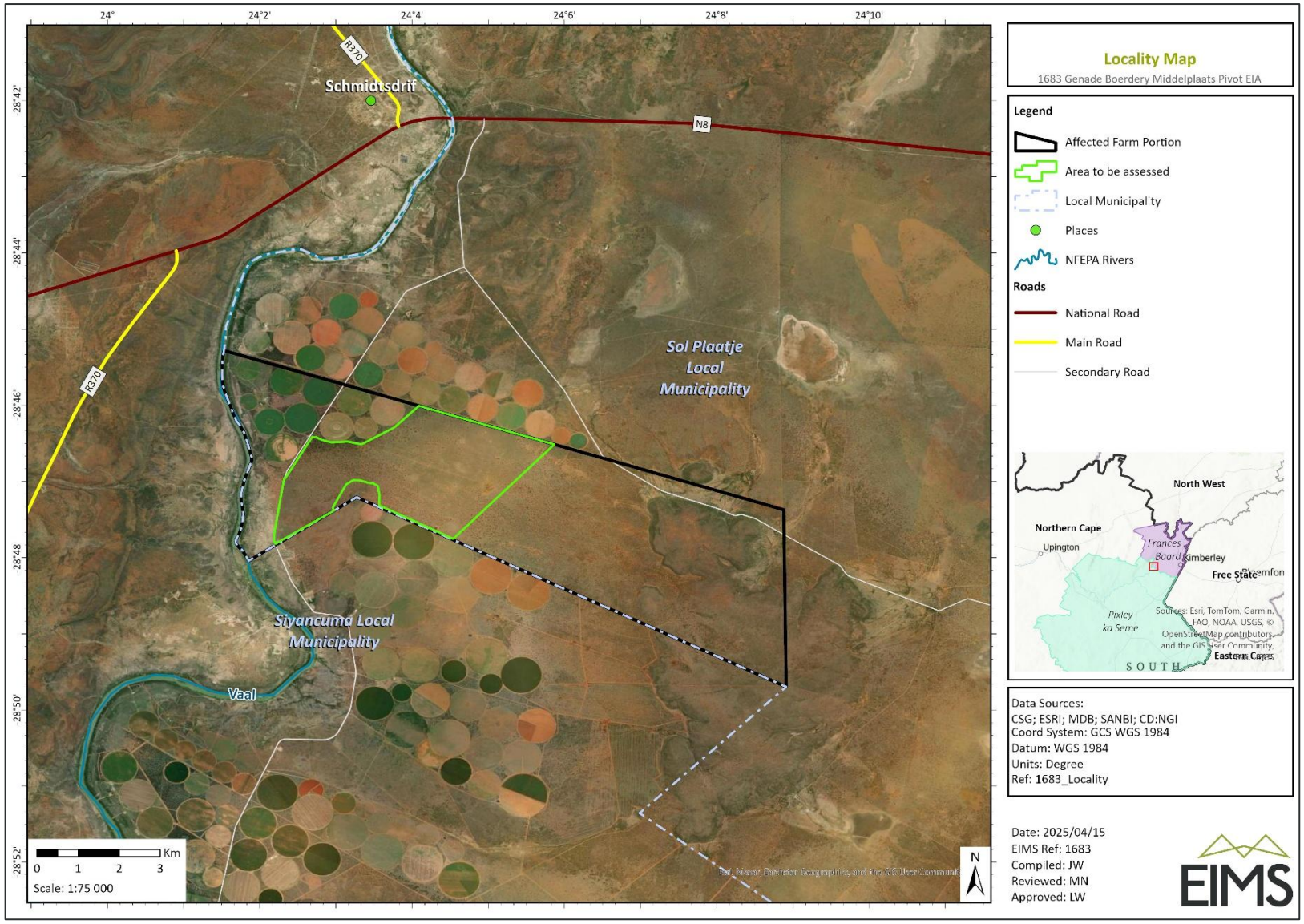


Figure 1: Locality Map.

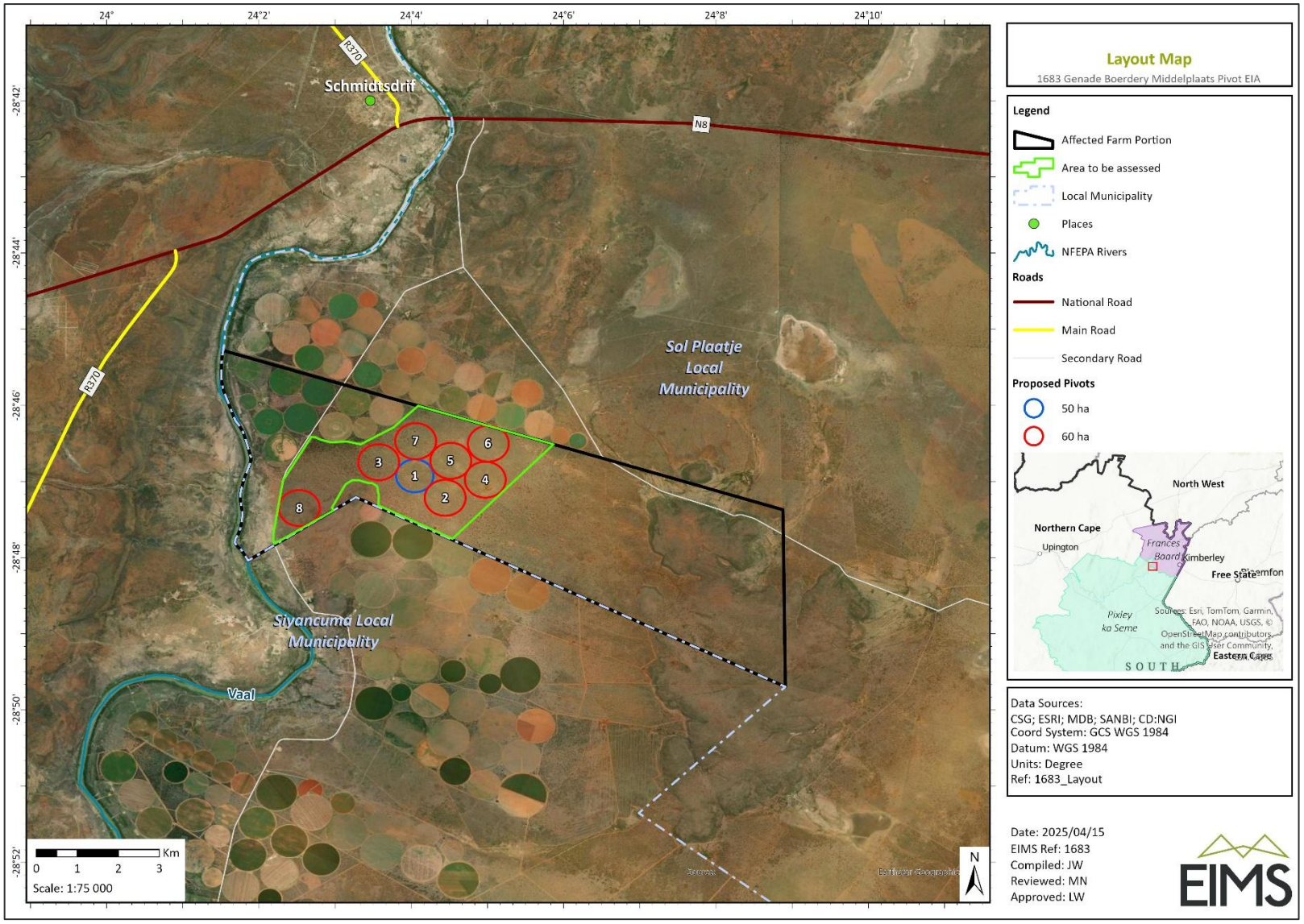


Figure 2: Pivot Layout Map.

1.1 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, 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.

Regulations	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(1)(a):	Details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Section 1.2**
Appendix 2(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;	**Sections 1.4.1** and **1.4.2**
Appendix 2(1)(c):	A plan which locates the proposed activity or activities applied for 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; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Figure 1** and **Figure 2**
Appendix 2(1)(d):	A description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	**Sections 1.4** and **2**
Appendix 2(1)(e):	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning	**Section 3**

Regulations	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	
Appendix 2(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 4**
Appendix 2(1)(g):	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including-	**Section 5**
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	**Section 6**
	(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 alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Section 7**
	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including then degree to which these impacts-	**Section 8.2**
	– (aa) can be reversed;	
	– (bb) may cause irreplaceable loss of resources; and	
	– (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	**Section 8.1**
	(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;	**Section 8.2**
	(viii) the possible mitigation measures that could be applied and level of residual risk;	

Regulations	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	**Sections 5** and **9.1**
Appendix 2(1)(h):	A plan of study for undertaking the environmental impact assessment process to be undertaken, including- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	**Section 9**
Appendix 2(1)(i):	An undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	**Section 11.1**

Regulations	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(iii) 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 2(1)(j):	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment	**Section 11.2**
Appendix 2(1)(k):	Where applicable, any specific information required by the competent authority; and	None.
Appendix 2(1)(l):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	None.

1.2 DETAILS OF THE EAP

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed by Genade Boerdery to assist in preparing and submitting the relevant environmental applications, associated reports and documentation, and to undertake a Public Participation Process (PPP) in support of the proposed Middelplaats Pivot EIA project. In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent Environmental Assessment Practitioner (EAP), must be appointed by the applicant to manage the application. EIMS and the compiler of this report are 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;
- Complies 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 details of the EAPs involved in the application and assessments are as follows:

Table 2: EAP details.

Practitioners	Jolene Webber (Junior EAP)	Monica Niehof (Senior EAP)
Tel No:	+27 11 789 7170	+27 11 789 7170
Fax No:	+27 86 571 9047	+27 86 571 9047
E-mail:	jolene@eims.co.za	monica@eims.co.za
Professional Registrations	EAPASA – Candidate EAP, 2023/7704.	EAPASA – Registered EAP, 2024/8835.

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 30 years' experience in conducting EIA's. Please refer to the EIMS website (www.eims.co.za) for further details of expertise and experience.

Jolene has served as an Environmental Consultant and GIS Consultant at EIMS since June 2023. Jolene is a registered Candidate Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). She has actively supported a range of projects in the mining, energy and infrastructure sectors. Her responsibilities have included coordinating Public Participation Processes, serving as a GIS consultant, and contributing to Environmental Impact Assessments (EIAs) and Basic Assessments. Jolene also has experience with Water Use License Applications, Site Sensitivity Verification and Screening, Basic Assessments and Environmental Compliance/Auditing and Performance Assessments.

Monica Niehof has 13 years' working experience in the environmental field and 23 years' work experience overall in a variety of fields including the tourism industry. Key experience in the environmental field include Environmental Impact Assessments, Water Use Licence (WUL) Applications, Waste Management Licence (WML) Applications, Atmospheric Emissions Licence (AEL) Applications, Environmental Management Programmes, Public Participation Processes, Environmental Authorisation, AEL and WML Auditing, Environmental Control and Monitoring for a variety of development projects including, residential, retail, mixed-use, commercial, infrastructure, industrial and mining projects.

The Curriculum Vitae of the EAPs are included in **Appendix A**.

1.3 SPECIALIST STUDIES

As part of this EIA, several specialist studies have been commissioned to investigate the key impacts that require further investigation. A list of the preliminary specialist studies is included in **Table 3**. Any additional studies that may be identified during the scoping and consultation process will be considered and included in the EIA phase where relevant.

Table 3: List of specialist studies to inform this EIA application.

Specialist Discipline	Company/Organisation	Specialist
Heritage and Archaeology Assessment	Environmental Impact Management Services (Pty) Ltd	Dr. Lucien James
Palaeontology Assessment	Banzai Environmental (Pty) Ltd	Mrs. Elize Butler
Terrestrial and Aquatic Biodiversity Assessment	Ecological Management Services (Pty) Ltd	Dr. Natalie Birch

1.4 DESCRIPTION AND SCOPE OF PROPOSED PROJECT

The sections below provide a detailed description of the proposed Genade Boerdery Middelplaats Pivot EIA project. The aim of the project description is to indicate the proposed activities to take place and to facilitate an understanding of the preliminary impacts identified and assessed in this report.

1.4.1 PROJECT DESCRIPTION

Genade Boerdery wishes to create 8 new cultivation (pivot) areas for the cultivation of potatoes. The development of these pivots will occur in phases over the course of 5 years. The crops will be rotated to prevent blight and allow for conservation of the soil. Once the planting cycle for a pivot area is completed, the area will be reseeded with grazing grasses for cattle. Seven of the new cultivation areas will each cover 60 hectares and one will cover 50 hectares, resulting in a total of ~470 hectares of indigenous vegetation clearance by the end of the five-year period. Irrigation requirements will be met using the applicant's existing lawful water use which authorizes the taking of water from the Vaal River system for irrigation of up to 60 hectares. No additional water resources will be required as only one crop area will be planted at a time.

1.4.2 PROJECT LOCALITY

Table 4 indicates the details of the project area for the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns. The proposed infrastructure is located on one farm portion, as described in the table below. A locality map is provided in **Figure 1**.

Table 4: Project Locality Details.

Project Area	The proposed project is located on the parent farm Middel Plaats South No. 104, Sol Plaatje Local Municipality, Northern Cape. The site is approximately 8km south of Schmidtsdrif. The centre point of the site is approximately 28°47'8.10"S, 24° 4'29.24"E.
Application Area (ha)	Approximately 470 hectares
Cadastral description	**Farm Name:** Middel Plaats South No. 104 **21-Digit SG Code:** C03700000000010400000
Province	Northern Cape

District Municipality	Frances Baard District Municipality
Local Municipalities	Sol Plaatje Local Municipality

1.4.3 PROJECT TIMELINE

The development of the pivots will occur in phases over the course of 5 years. The crops will be rotated to prevent blight and allow for conservation of the soil. The applicant has an existing lawful water use for the irrigation up to 60 hectares, and only one crop will be irrigated at a time. Once the planting cycle for a pivot area is completed, the area will be reseeded with rain-fed grazing grasses for cattle. **Figure 3** below shows the stages of initial crop development from clearance of natural vegetation to the irrigation and growing stage of the potato seed, to the rain-fed grazing grasses stage.

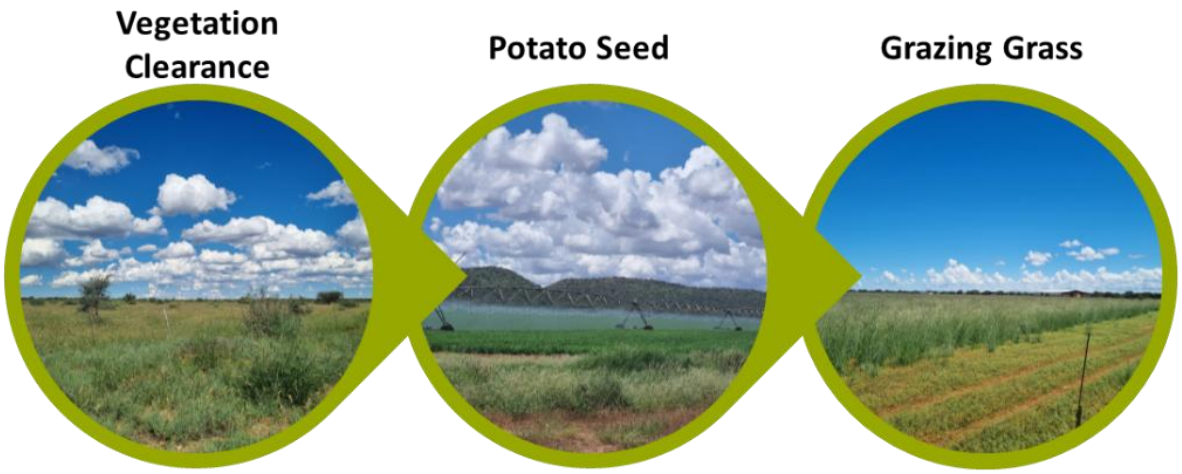


Figure 3: Photographic examples of the initial planting cycle from vegetation clearance, irrigation and growing period of potato seed to the rain-fed grazing grass stage.

Two pivot areas can be cleared and planted with seed potato per year – one pivot in September and one in December – all of the pivots will be developed by the end of the 5-year period (September 2029). The preliminary clearance and planting schedule is detailed in **Table 5** below. Following the 5-year period, the pivots will be rotated, for example, the grazing grasses in Pivot 1 will be cleared for the planting of seed potato in December of 2029, followed by Pivot 2 in September 2030, and so on.

Table 5: Anticipated clearance and planting schedule.

Pivot	Planned Clearance and Planting Date
Pivot 1	December 2025
Pivot 2	September 2026
Pivot 3	December 2026
Pivot 4	September 2027
Pivot 5	December 2027
Pivot 6	September 2028

Pivot	Planned Clearance and Planting Date
Pivot 7	December 2028
Pivot 8	September 2029

2 LISTED AND SPECIFIED ACTIVITIES

In terms of Section 24(2) of NEMA, the Minister and/or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (EIA) Regulations were promulgated in 2014 and amended in 2021 in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998 and consist of the following:

- **Regulation 982** provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process (also referred to as the EIA Regulations);
- **Listing Notice 1 (Regulation 983, as amended)** defines activities which will trigger the need for a Basic Assessment process;
- **Listing Notice 2 (Regulation 984, as amended)** defines activities which trigger an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required; and
- **Listing Notice 3 (Regulations 985, as amended)** defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas.

The above regulations were assessed to determine whether the proposed project will trigger any of the above listed activities, and if so, which Environmental Authorisation Process would be required. The triggered listed activities presented in **Table 6** will require authorisation in terms of GN R. 984 Listing Notice 2 of the NEMA EIA Regulations 2014 as amended. A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 6: NEMA listed activities relevant to proposed project.

Activity/ies No.	Activity description	Proposed project activity
NEMA GN R. 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 purposes undertaken in accordance with a maintenance management plan*	The site is situated within the Kimberley Thornveld vegetation type. A total clearance of approximately 470 hectares of indigenous vegetation over the course of five years will be required to develop the proposed pivot areas.

No waste management license activities are expected to be triggered by the proposed project based on the types and volume of waste expected to be generated. The applicant will utilize their existing lawful water use (File Number 27/2/C92B/250J5466/104KBY/0-35) which authorises the taking of water from the Vaal River System (Lower Vaal Weir to Schmidstdrift) of 60 hectares and 548,400 m^3 per annum. Therefore, no additional water uses in terms of the NWA will be applied for in this application process.

3 POLICY AND LEGISLATIVE CONTEXT

This section provides a description of the policy and legislative context within which the development is proposed. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority which is the Northern Cape Province Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL) in accordance with the requirements of 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 activity. The key legislation applicable to this project is discussed in the subsections below.

3.1 NATIONAL LEGISLATION

3.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

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 No. 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 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".

The EIA and associated impact mitigation actions are conducted to fulfil the requirement of the Bill of Rights.

3.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – 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). Subsequently, NEMA was passed 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 Department of Forestry, Fisheries and the Environment – DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended a number of times between 2010 and 2022. The NEMA 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 are triggered by the proposed project. The purpose of these procedures is to provide the competent authority with adequate information to make informed 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 Regulations (GN R. 982) 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.

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. **Figure 4** below provides a graphic representation of all the components of a full EIA process. The listed activities the proposed project triggers are detailed in **Section 2**.

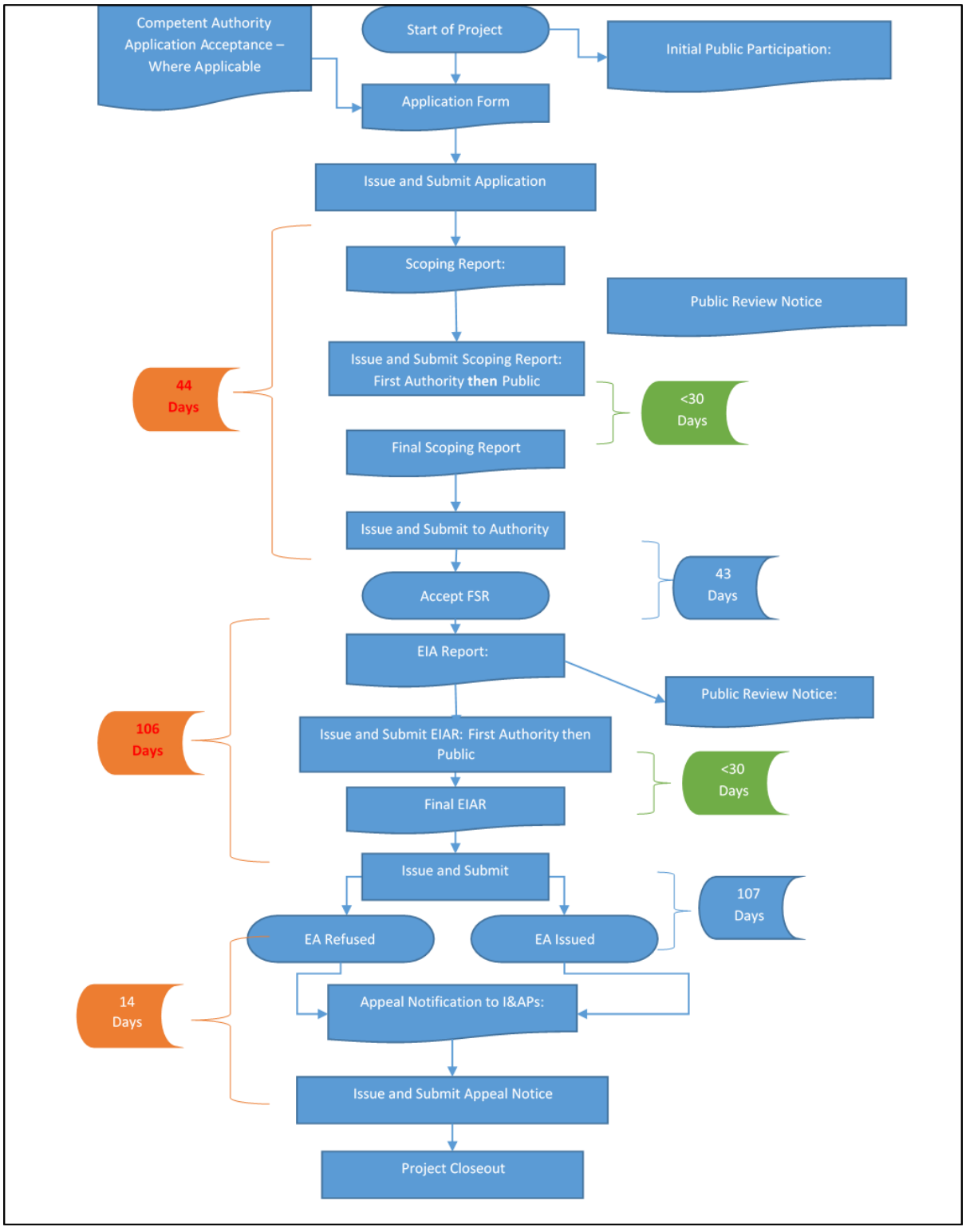


Figure 4: EIA process diagram.

NEMA is the main Environmental Legislation in South Africa and other Specific Environmental Management Acts (SEMA's) support its objectives. Examples of SEMA's include the following:

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); and
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).

NEMA sets out the general objectives of Integrated Environmental Management (IEM) in South Africa (section 23(2)) of which the following two are of relevance for this report:

- Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities. This is to be done with a view to minimising negative impacts, maximising benefits and promoting compliance with the principles of environmental management set out in section 2 (of NEMA).
- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.

The DFFE have published a number of guidelines and protocols which have been considered in the compilation of this report and include but not limited to:

- Public Participation Guideline in terms of NEMA EIA Regulations (2017).
- Need and desirability Guideline in terms of NEMA (2012).
- 2004 Information Series covering various aspects of the EIA process.
- Procedures for assessment and minimum criteria for specialist studies.

3.1.2.1 SCREENING TOOL

A Screening Tool Report was generated from the DFFE Screening tool as per the requirements of Regulation 16 (1)(b)(v) of the EIA Regulations 2014, as amended, and was included in the Application for EA. The screening Tool provided a list of specialist studies for consideration and inclusion in the Scoping and EIA process (refer to **Table 7**).

Table 7: Screening Tool environmental sensitivities

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture Theme	**X**			
Animal Species Theme		**X**		
Aquatic Biodiversity Theme				**X**
Archaeological and Cultural Heritage Theme				**X**
Civil Aviation Theme			**X**	
Defence Theme				**X**
Palaeontology Theme		**X**		
Plant Species Theme				**X**

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Terrestrial Biodiversity Theme				**X**

In this regard, a Site Sensitivity Verification Report (SSVR) has been compiled to consider the recommendations of the DFFE Screening Tool Report and to provide a rationale for the selection of specialist studies included in line with the recommendations of the Plan of Study for EIA included in this Scoping Report (refer to **Table 8**). Please refer to **Appendix E** for the Screening Tool Report and accompanying SSVR.

Table 8: SSVR findings and motivation.

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required level of Assessment	Motivation
Agriculture Impact Assessment	Very High	High	None	The proposed development is intended to make use of the agricultural potential of the land. The impact from the proposed development would therefore be a positive impact as it is making use of the land for agricultural purposes. The applicant will also make use of sustainable farming practices to avoid any degradation and improve the agricultural potential of the property. These measures will also be included in the Environmental Management Programme. It is the opinion of the EAP that an Agricultural Impact Assessment is deemed unnecessary for the proposed development.
Landscape/Visual Impact Assessment	Not Specified	Medium	None	The proposed development will change the current use of the land, however, there are numerous irrigated pivots in the area and the landscape/visual impact is expected to be minimal. A Landscape/Visual Impact Assessment is deemed unnecessary.
Archaeological and Cultural Heritage Impact Assessment	Low	Low	Full Study	A Phase I Department of Forestry, Fisheries and Environment (DFFE) and South African Heritage Resources Agency (SAHRA) / National Heritage Resources Act (NHRA) compliant specialist assessment has been commissioned to verify the site's Archaeological and Cultural Sensitivity.
Palaeontology Impact Assessment	High	Low	Other	A Palaeontological Desktop Study by a suitably qualified specialist has been commissioned to verify the site's Palaeontological Sensitivity.
Terrestrial Biodiversity	Low	High	Full Study	A DFFE compliant Terrestrial Biodiversity Assessment by a suitably qualified specialist

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required level of Assessment	Motivation
Impact Assessment				has been commissioned to verify the site's Terrestrial Biodiversity Sensitivity.
Aquatic Biodiversity Impact Assessment	Low	Low	Compliance Statement	A DFFE compliant Aquatic Ecology Compliance Statement by a suitably qualified specialist has been commissioned to verify the site's Aquatic Biodiversity Sensitivity.
Hydrology Assessment	Not Specified	Low	None	It is the opinion of the EAP, from a desktop analysis, as well as verified during the site visit, that the proposed activity does not require a hydrology specialist study as there are no natural surface water features occurring on or immediately adjacent to the study area. The water infrastructure is already developed, safe for extension of the irrigation pipelines from one pivot area to another as the project progresses. Mitigation measures for stormwater and to prevent erosion will be included in the Environmental Management Programme.
Socio-Economic Assessment	Not Specified	Low	None	Approximately 200 employment opportunities is expected to arise from the proposed development. Workers will be sourced from nearby settlements, therefore, there will be a positive socio-economic impact. A Socio-Economic Assessment will not be undertaken as part of this application.
Plant Species Assessment	Low	Low	Full Study	A DFFE compliant Terrestrial Biodiversity Assessment by a suitably qualified specialist has been commissioned and will cover the plant species theme.
Animal Species Assessment	High	Medium	Full Study	A DFFE compliant Terrestrial Biodiversity Assessment by a suitably qualified specialist has been commissioned and will cover the animal species theme.

3.1.3 NEMA ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED

In terms of section 24(2) of NEMA, the Minister and or any Member of the Executive Council (MEC) in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed before their implementation, and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. The scoping and EIA process for the proposed project is undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

3.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT

The National Environmental Management Protected Areas Act (Act No. 57 of 2003 – NEMPAA) is intended to *"provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes"* and creating a *"national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity".*

The NEMPAA defines various kinds of protected areas, namely: *"special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act 63 of 1970)".*

The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.

The site is not situated within a focus area in terms of the NPAES, nor within Conservation or Protected Areas in terms of the SACAD and SAPAD, respectively (refer to **Section 7.4** and **Figure 14**). It is located approximately 24 km east of the Ghaap Plateau Focus Area and approximately 26 km north of the Mokala National Park primary focus area.

3.1.5 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEM:BA)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004 – NEM:BA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA as well as the protection of species and ecosystems that warrant national protection. Within the framework of this act, various regulations are promulgated which provide specific requirements and management measures relating to protecting threatened ecosystems, threatened or protected species as well as the control of alien and invasive species. A summary of these regulations is presented below.

The National List of Ecosystems that are Threatened and in Need of Protection (GN 1002 of 2011) are promulgated under the NEM:BA and these Regulations provide for listing of threatened or protected ecosystems in one of the following categories:

- **Critically Endangered (CR) ecosystems**, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- **Endangered (EN) ecosystems**, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- **Vulnerable (VU) ecosystems**, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and

- **Protected ecosystems**, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

Further regulations published under the NEM:BA are the Threatened or Protected Species (TOPS) Regulations (GN R 152 of 2007) which aims to:

(a) further regulate the permit system set out in Chapter 7 of the Biodiversity Act insofar as that system applies to restricted activities involving specimens of listed threatened or protected species;

(b) provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;

(c) provide for the regulation of the carrying out of a specific restricted activity, namely hunting;

(d) provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;

(e) provide for the protection of wild populations of listed threatened species; and

(f) provide for the composition and operating procedure of the Scientific Authority.

A TOPS permit is required for any activities involving any TOPS listed species.

The Alien and Invasive Species Lists are promulgated under the NEM:BA with the aim of protecting the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- **Category 1a Listed Invasive Species (PROHIBITED):**
    - Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
    - A person in control of a Category 1a Listed Invasive Species must comply with the provisions of section 73(2) of the Act; immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
- **Category 1b Listed Invasive Species (PROHIBITED / Exempted if in Possession or Under Control):**
    - Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
    - 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 2 Listed Invasive Species (PERMIT REQUIRED):**
    - Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be;
    - A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area

contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3. Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

- **Category 3 Listed Invasive Species (PROHIBITED):**
    - 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 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.

In giving effect to the above, the Alien and Invasive Species Regulations (GNR 1020 of 2020) provide for amongst others, the prevention of the spread or allowing the spread of, any specimen of a listed invasive species.

3.1.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

On 2 June 2014, the NEMWA came into force. The objectives of this Act are:

a) to protect health, well-being and the environment by providing reasonable measures for-
    i. minimising the consumption of natural resources;
    ii. avoiding and minimising the generation of waste;
    iii. reducing, re-using, recycling and recovering waste;
    iv. treating and safely disposing of waste as a last resort;
    v. preventing pollution and ecological degradation;
    vi. securing ecologically sustainable development while promoting justifiable economic and social development;
    vii. promoting and ensuring the effective delivery of waste services;
    viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and
    ix. achieving integrated waste management reporting and planning;
b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;
c) to provide for compliance with the measures set out in paragraph (a); and
d) generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

Section 16 of the NEMWA states:

1. A holder of waste must, within the holder's power, take all reasonable measures to-
    a) "*Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*
    b) Reduce, re-use, recycle and recover waste;
    c) Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;

d) *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*

e) *Prevent any employee or any person under his or her supervision from contravening the Act; and*

f) *Prevent the waste from being used for unauthorised purposes.*"

The NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. However, the proposed development does not trigger any listed activities in terms of GNR 921. Therefore, there will be no application for a Waste Management Licence (WML). However, there will be waste associated with the development and proposed activities where general duty of care in respect of waste management is applicable.

3.1.7 THE NATIONAL WATER ACT (NWA)

The purpose of the National Water Act, 1998 (Act 36 of 1998 – NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

a) meeting the basic human needs of present and future generations;

b) promoting equitable access to water;

c) redressing the results of past racial and gender discrimination;

d) promoting the efficient, sustainable and beneficial use of water in the public interest;

e) facilitating social and economic development;

f) providing for growing demand for water use;

g) protecting aquatic and associated ecosystems and their biological diversity;

h) reducing and preventing pollution and degradation of water resources;

i) meeting international obligations;

j) promoting dam safety;

k) managing floods and droughts,

and for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

The NWA makes provision for two types of applications for water use licences (WULs), 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.

The above water use processes are described in **Figure 5**.

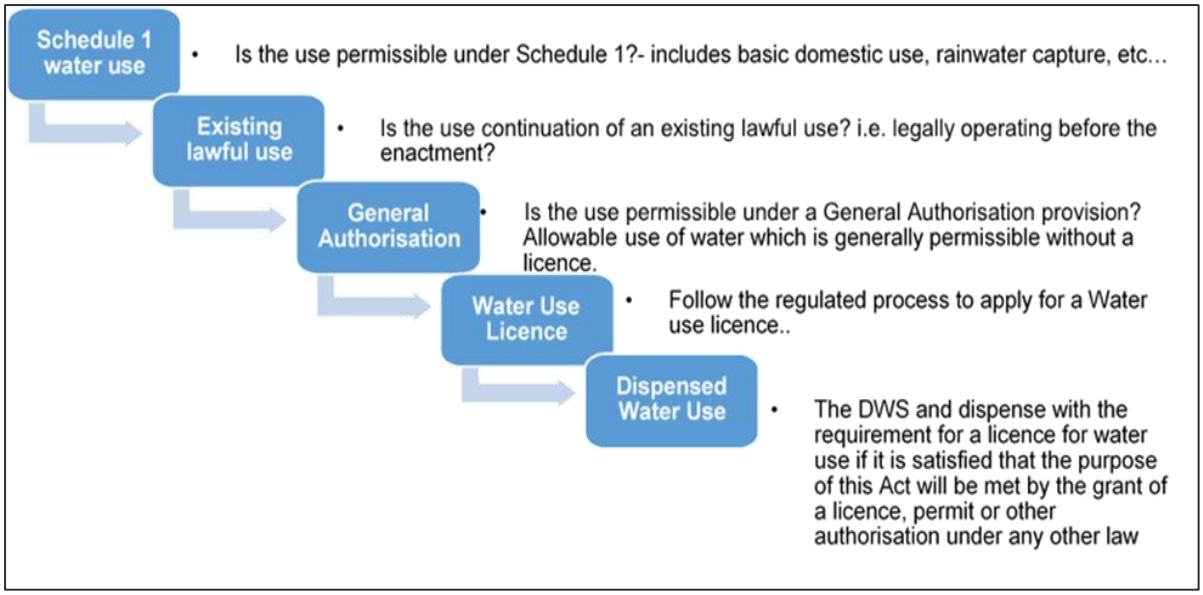


Figure 5: Authorisation processes for new water uses.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the DWS. The water uses for which an authorisation or licence can be issued include:

a) Taking water from a water resource;

b) Storing water;

c) Impeding or diverting the flow of water in a watercourse;

d) Engaging in a stream flow reduction activity contemplated in section 36;

e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;

g) Disposing of waste in a manner which may detrimentally impact on a water resource;

h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

i) Altering the bed, banks, course or characteristics of a watercourse;

j) 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

k) Using water for recreational purposes.

A watercourse is defined in terms of the Act as follows:

a) a river or spring;

b) a natural channel in which water flows regularly or intermittently;

c) a wetland, lake or dam into which, or from which, water flows; and

d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;

The regulated area of a watercourse for section 21(c) or (i) of the Act water uses, is similarly defined in terms of the Act as follows:

a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

The applicant will utilize their licensed water use (File Number 27/2/C92B/250J5466/104KBY/0-35) which authorises the taking of water from the Vaal River System (Lower Vaal Weir to Schmidstdrift) of 60 hectares and 548,400 m^3 per annum. Additionally, the Biodiversity Assessment (refer to **Appendix F**) indicates that there were no aquatic features found on site. **Therefore, no additional water uses in terms of the NWA will be applied for in this application process.**

South Africa is divided into six Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the CMS which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources.

The site is situated within the C92B Quaternary Catchment within the Lower Vaal Catchment of the Vaal-Orange WMA. The Vaal River borders the Middel Plaats South No. 104 farm; however, the site is situated approximately 750 m east of the Vaal River (refer to **Figure 6**). The Lower Vaal Catchment is approximately 136 146 km^2 spanning part of the northern Free State, central to western region of the North West and the northeastern region of the Northern Cape provinces, and comprises the Harts, Molopo and Vaal (from below Bloemhof dam) catchments (DWS, 2022). The Lower Vaal drains into the Lower Orange drainage region and eventually reaches the Atlantic Ocean near Alexander Bay. Taung, Spitskop, Wentzel, Vaalharts Weir, Bloemhof and Douglas Weir are the main dams within this catchment, while the main rivers are the Harts and Vaal rivers which are perennial – most of their tributaries are classified as ephemeral (DWS, 2022). Most of the surface water in the Lower Vaal Catchment comes from the upstream region of Bloemhof Dam. The Mean Annual Precipitation (MAP) of the Lower Vaal Catchment ranges from 150 to more than 600 mm per annum, experiencing more rainfall in the northeastern areas with a decline westward. S-pan evaporation shows an increase from 1800 mm per annum in the eastern region to 2690 mm per annum in the western region of the Catchment (DWS, 2022).

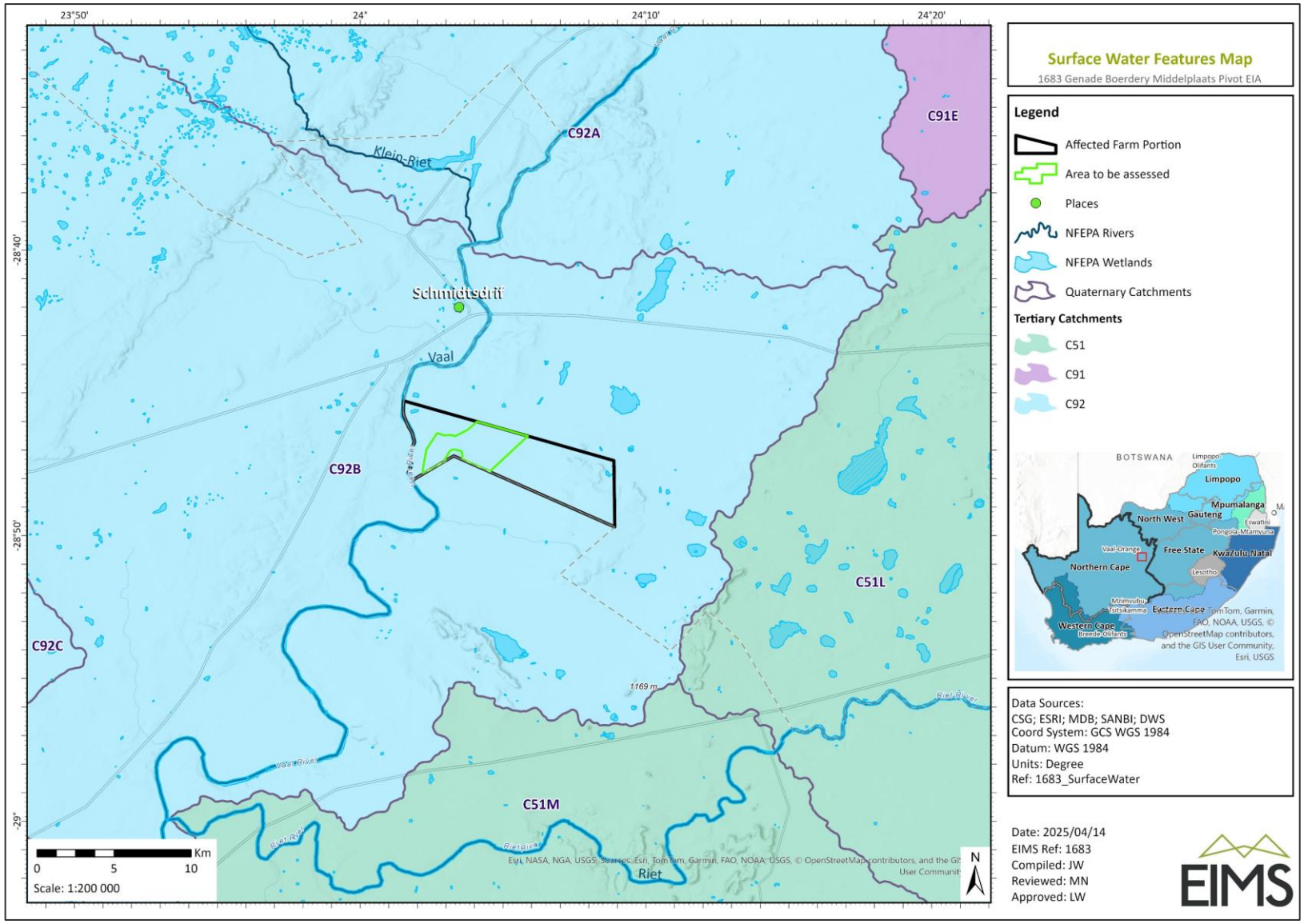


Figure 6: Surface Water Features Map.

3.1.8 NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation 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…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, Mineral and Petroleum Resources Development Act (MPRDA) and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA.

The NEMA 23(2)(b) gives effect to the NHRA and states that an integrated environmental management plan 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) 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. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended) which apply to Heritage Impact Assessments.

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Report is compiled.

A Heritage Impact Assessment undertaken by a suitably qualified specialist was commissioned as part of this EIA, please refer to **Appendix F** for the Heritage Impact Assessment report.

3.1.9 ENVIRONMENT CONSERVATION ACT (ECA)

The ECA (Act 73 of 1989) 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.

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction phase of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person".* The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

There are a few South African National Standards (SANS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se. A noise impact assessment will not be undertaken for this project due to the low noise impact nature of this development.

3.1.10 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. The CARA defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;

- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine.

This EIA is conducted to align with the CARA to promote sustainable utilisation of the natural agricultural resources. Precautionary measures will be included in the EMPr in order to conserve the soils and vegetation and to protect the proposed footprint area against weeds and invader species.

Impacts on the soil, biodiversity and water resources have been identified with regards to the proposed project, and mitigation and management measures recommended.

3.1.11 NATIONAL FORESTS ACT (NFA)

According to the National Forests Act (Act 84 of 1998), the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that "*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister*." **A permit is required for the destruction or transplant or transport of any protected tree species.**

3.1.12 NATIONAL VELD AND FOREST FIRE ACT

The purpose of the National Veld and Forest Fire Act (Act 101 of 1998) is to prevent and combat veld, forest and mountain fires. The Act provides for a variety of institutions, methods and practices for achieving the purpose such as the formation of fire protection associations. It also places responsibility on landowners to develop and maintain firebreaks as well as be sufficiently prepared to combat veld fires in terms of equipment as well as suitably trained personnel.

3.1.13 FERTILIZERS, FARM FEEDS, AGRICULTURAL REMEDIES AND STOCK REMEDIES ACT

The Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947) regulates the use of fertilizers and agricultural remedies, which are commonly used in pivot irrigation. It aims to ensure that these substances are used safely and effectively. The EIA and EMPr will align with this Act.

3.1.14 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management Act (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 Frances Baard District Municipality SDF as the proposed pivots will be constructed within a potential intensive irrigation agricultural area.

3.1.15 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 (ASTM) D1739:1970 or equivalent) 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.**

3.1.16 NOISE CONTROL REGULATIONS (NCR)

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction and decommissioning phases of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as:

> *"a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more."*

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as:

> *"any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person."*

Noise nuisance is not anticipated as part of the proposed farming activities as there are no nearby noise receptors.

3.1.17 OCCUPATIONAL HEALTH AND SAFETY ACT

The Occupational Health and Safety Act (Act 85 of 1993 - OHSA) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith. Worker safety will form part of the contractor's safety requirements and be guided by the OHSA. This would entail a full health and safety file including but not limited to pre-mobilization medical assessments, work environment and task specific risk assessments and method statements etc. The project will be required to comply with the OHSA. Therefore, safety of all personnel will be guided by overarching South African legislation.

3.2 PROVINCIAL POLICY AND PLANNING CONTEXT

3.2.1 NORTHERN CAPE NATURE CONSERVATION ACT (NCNCA)

The Northern Cape Nature Conservation Act (No. 9 of 2009) 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. In terms of this act the following section may be relevant with regards to any security fencing the development may require.

Manipulation of boundary fences 19. No Person may –

> *(a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom;*

The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), protected (schedule 2) to common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under schedule 1 or 2. A permit obtainable from the DAERL permit office in Kimberley would be required for the site clearing. A permit would also be required to destroy or translocate any nationally

or provincially listed species from the site. A single permit, which covers all of these permitting requirements as well as meets TOPS regulations, is used.

3.2.2 NORTHERN CAPE BIODIVERSITY SPATIAL PLAN

The Northern Cape Biodiversity Spatial Plan (NC BSP) (DAERL, 2024) is designed to guide biodiversity conservation in the Northern Cape and classifies areas within the province on the basis of their contribution to conservation targets within the province. Its primary goal is to conserve a representative sample of biodiversity patterns and ecological processes that support them, with an emphasis on preventing further habitat loss. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole. The NC BSP aims to inform broader land-use planning and decision-making across sectors to promote environmental sustainability and climate change resilience (Oosthuysen, & Geldenhuys, 2024).

- CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).

- ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as an 'Irreplaceable Critical Biodiversity Area' which usually represents pristine natural habitat that is very important for conservation. The NC BSP is sub-divided into CBA1, CBA2 and ESA areas with CBA1 areas classified as the most important biodiversity areas (Oosthuysen, & Geldenhuys, 2024).

3.3 MUNICIPAL POLICY AND PLANNING CONTEXT

The Frances Baard District Municipality (FBDM) Spatial Development Framework (SDF) (2021) (hereafter referred to as the FBDM SDF (2021)) aims to ensure that the socio-economic, biophysical and built environment principles of the FBDM and its resources are realised in terms of SPLUMA.

The Sol Plaatje Local Municipality (SPLM) draft Integrated Development Plan (IDP) (2024/25) (hereafter referred to as the SPLM IDP (2024/25)) is intended to be the foremost plan that informs and guides all municipal development and planning and the decision-making process on planning, development and management in the municipality. The IDP must include an SDF. The SPLM SDF (2022-2027) is a policy document intended to guide spatial planning and development within the SPLM and is informed in terms of Section 20 of the SPLUMA and Municipal Systems Act (Act No. 32 of 2000). It is used to inform the IDP in terms of reprioritisation and implementation of projects which can promote spatial change and encourage growth within the municipality.

Based on the FBDM SDF (2021), the site falls within the area zoned for Potential Intensive Irrigated Agriculture and directly south of the Agriculture Corridor Zone 2 and Intensive Agriculture area. According to the SPLM SDF (2022-2027), the site is situated directly south of the Intensive Agriculture area.

4 NEEDS AND DESIRABILITY OF PROPOSED PROJECT

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 6** below presents the needs and desirability analysis undertaken for the proposed pivot development.

Ref No.	Question	Answer
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.	The site falls within the Kimberley Thornveld Vegetation unit which is classified as Least Concern and Poorly Protected. The study area does not fall within a CBA as per the Northern Cape Biodiversity Spatial Plan, it is not considered a threatened ecosystem in terms of NEM:BA. The proposed development site does not fall within a River or wetland FEPA, it does not fall within or near any Important Bird Areas, nor does it fall within a strategic water resource area. It is not located within a focus area for land-based protected area expansion. It is located approximately 24 km east of the Ghaap Plateau Focus area and approximately 26 km North of the Mokala National Park primary focus area. Refer to **Sections 3.3** and **7.8** for the considerations of the SDF of the Frances Baard District Municipality and the Sol Plaatje Local Municipality. A number of specialist studies have been conducted to inform this application and environmental impact assessment, which includes: • Terrestrial and Aquatic Biodiversity Impact Assessment • Heritage Impact Assessment • Palaeontological Desktop Assessment These specialist studies informed areas of Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets and the Ecological drivers of the ecosystem for consideration in the proposed development.

Ref No.	Question	Answer
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 the baseline ecological information in **Section 7**, and the impact assessment and mitigation measures in **Section 8** of this Scoping Report. 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 5**, the baseline ecological information in **Section 7**, and the impact assessment and mitigation measures in **Section 8** of this Scoping 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 explored to safely treat and/or dispose of unavoidable waste?	Waste generated will consist mainly of plant material while clearing the proposed footprint area. Refer to **Section 5** for alternatives considered and **Section 8** for possible impact and mitigation measures relating to 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 F** for the specialist reports. The possible impacts and associated mitigation measures as identified by the specialist was also included as part of **Section 8**.
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	It is anticipated that no non-renewable natural resources will be impacted on. However, potatoes are known heavy feeders, meaning they can easily deplete soils of nutrients. Therefore, crop rotations will be done. Crop rotation is the growing of different crops in succession on a specific field. This practise, if implemented correctly, can among other positive impacts, improve soil health and fertility, maintain soil structure and integrity, and help combat pests and weeds. Refer to **Section 1.4**.

Ref No.	Question	Answer
	measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	
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 taking into account carrying 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?	The proposed pivots will only cover an area of ~470 ha on which crops will be planted. The main natural resource required is the initial soil area on which the crops will be planted which will require additional chemicals from time-to-time, when needed, to supplement the soil, as well as the water used for irrigation of the potato seed crops. An increase of resources will not be required to maintain economic growth as the crops planted over the 470 ha area should not depreciate in value over time. Water for irrigation will be sourced from the Vaal River System for irrigation during the potato growing season. The applicant will utilize their existing Lawful Water Use, therefore, no additional quantities of water other than what is authorised will be required. Following the potato harvest, the crops will be reseeded with rain-fed grasses for cattle grazing as part of the crop rotation strategy. This approach promotes a more sustainable use of resources and land use by reducing the risk of crop diseases such as blight, lowering the dependency on synthetic fertilizers by allowing the soil to naturally replenish its nutrient content, and reducing the irrigation demand during the rain-fed grass cultivation periods. This helps maintain economic growth while also decreasing dependency on the Vaal River as an irrigation resource.
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)?	The nature of the project will rely on the Vaal River system as a water resource for irrigation during the potato growing season. However, following the potato harvest, the crops will be reseeded with rain-fed grasses for cattle grazing as part of the crop rotation strategy. This approach promotes a more sustainable use of resources and land use by reducing the risk of crop diseases such as blight, lowering the dependency on synthetic fertilizers by allowing the soil to naturally replenish its nutrient content, and reducing the irrigation demand during the rain-fed grass cultivation periods. This helps maintain economic growth while also decreasing dependency on the Vaal River as an irrigation resource.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and	The application area has historically been utilized for grazing, resulting in the vegetation exhibiting a moderately poor condition. The current land use is uneconomical and no other activity alternatives were addressed as part of this application. Given that the area is largely used for agriculture purposes and there are numerous similar pivots located

Ref No.	Question	Answer
	intergenerational equity, and are there more important priorities for which the resources should be used?	nearby, the proposed project aligns with the prevailing regional land use practices. The proposed development will support job opportunities for nearby rural communities, thereby contributing to local economies. The proposed project will make use of water from the Vaal River system using the existing Lawful Water Use, thereby ensuring sustainable abstraction levels. Implementing sustainable farming practices such as crop rotation to reduce fertilizer dependency and occurrence of crop diseases, and limiting irrigation periods, as described in 1.7.1 above, aims to ensure that the land and water resources remain viable for future generations.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed location is situated on land that has historically been utilized for grazing, resulting in the vegetation exhibiting a moderately poor condition. The site falls within the Kimberley Thornveld Vegetation unit which is classified as Least Concern and Poorly Protected. The study area does not fall within a CBA as per the Northern Cape Biodiversity Spatial Plan, it is not considered a threatened ecosystem in terms of NEM:BA. The proposed development site does not fall within a River or wetland FEPA, it does not fall within or near any Important Bird Areas, nor does it fall within a strategic water resource area. It is not located within a focus area for land-based protected area expansion. The site therefore avoids high sensitive ecosystems. Given that the area is largely used for agriculture purposes and there are numerous similar pivots located nearby, the proposed project aligns with the prevailing regional land use practices. The proposed development will make use of irrigation pipelines that are already in place, reducing the need for further disturbance during construction. The sustainable farm practices such as crop rotation and reduced irrigation periods contribute to sustainable resource use as described in 1.7.1 and 1.7.2 above.
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 protected plant species within the proposed development footprint is not known. The EMPr will include a requirement for a specialist walkthrough to identify any protected species within the development footprint and to oversee the relocation of these plants, if required, prior to any developments. Additionally, chance finds with regards to cultural heritage and palaeontology is required to prevent the loss of heritage and palaeontological resources. A chance find protocol was

Ref No.	Question	Answer
		developed by the heritage/ palaeontology specialist. Refer to **Section 10** for the Assumptions, Limitations and Uncertainties.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk associated with the limits of current knowledge is considered low. Mitigation measures have been incorporated to reduce the level of risk attributed with limits of current knowledge (refer to **Section 8** for the impacts and mitigation measures).
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 risk-averse and cautious approach was applied to the development by undertaking specialist studies, a detailed impact assessment and the development of an EMPr.
1.9	**How will the ecological impacts 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 8** of this Scoping Report.
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 8** of this Scoping Report.
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.)?	Refer to baseline ecological information in **Section 7** where baseline ecological and socio-economic context of the area is discussed, and the impact assessment and mitigation measures in **Section 8** of this Scoping Report.
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 8** of this Scoping Report.

Ref No.	Question	Answer
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 5** for details of the alternatives considered, as well as this section of the Scoping Report for the advantages and disadvantages of the proposed activity.
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 8** of this Scoping Report.
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,	Details of the socio-economic context of the area in terms of the Frances Baard District Municipality and Sol Plaatje Local Municipality SDF and IDP are detailed in **Sections 3.3** and **7.8** of this Scoping Report.
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.),	The project is in line with the SDF for the area, and is located a fair distance from any human habitation.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	The proposed project aligns with the surrounding land uses. Refer to **Section 7** for the Environmental attributes and Baseline Environment.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The proposed project will promote and support sustainable economic growth for the business and support local economies by increasing job opportunities. Further, the agricultural sector is identified as an important economic sector for the region. According to the Sol Plaatje Local Municipality SDF (2022-2027), the potential for expanding the agricultural sector by expanding and intensifying the range of irrigated crops along the river is identified in the LED Strategy.

Ref No.	Question	Answer
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. Refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping 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. The proposed pivot plant project will support the LED through the creation of job opportunities for the local community as far as reasonably possible.
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 6** of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in **Section 9.6**. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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?	Refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report.
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 is located in the middle of mostly agricultural land which is located approximately 8km south of Schmidtsdrif. Should the project proceed, additional jobs are anticipated to be created for the foreseeable future for the nearby surrounding farming communities.
2.5.2	Reduce the need for transport of people and goods.	The proposed project will not have an increase or reduction on the need for transportation of goods and people as the proposed project will allow for the continuation of farming practices for the applicant.

Ref No.	Question	Answer
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 of 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.
2.5.7	Optimise the use of existing resources and infrastructure,	The proposed project will make use of the existing irrigation pipelines on the property.
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 the Project Description, **Section 1.4** of this Scoping Report.
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	The proposed project will not have an impact on urban sprawl and compaction/densification as the project location is situated approximately 8km south of Schmidtsdrif and 62km west of Kimberley.
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 is agricultural, which aligns with the surroundings. The pivot areas will be subject to crop rotations, a well-known agricultural best practice, to ensure sustainability, as discussed in items 1.7 to 1.7.3 of this table (above).

Ref No.	Question	Answer
2.5.12	Take into account 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 of workers from local communities. Surrounding the proposed development footprint are other successful pivot operations, suggesting that the area has potential to succeed economically.
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, and	A suitably qualified Archaeologist and Palaeontologist undertook a Heritage Impact Assessment and a Palaeontological Desktop Assessment (respectively). The results of which can be found in **Appendix F**. No significant impacts on the heritage of the area are expected.
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?	It is not anticipated that the project will have an impact on the existing settlements in the area.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts	
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer to **Section 10** for the Assumptions, Limitations and Uncertainties.
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?	Refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report. Overall, the impact and risk are considered low.
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 be resulting from this development, impact on people's environmental right in terms following:**	

Ref No.	Question	Answer
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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. 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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. 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 impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. 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 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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. 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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. The preferred alternative is considered the best practicable environmental option as discussed in items 1.7 to 1.7.3 of this table (above).

Ref No.	Question	Answer
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 Scoping 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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 6** of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in **Section 9.6**. 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. The scoping report will be made available on the at a local public place (Public Library) and the EIMS website after completion, and all registered I&APs will be notified of the report availability.
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 taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	

Ref No.	Question	Answer
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)?	Refer to the public participation process undertaken to date in **Section 6** of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in **Section 9.6**.
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.	Approximately 50 new skilled and 50 new un-skilled employment opportunities (100 in total) is expected to be created during the construction phase (temporary). Approximately 200 new employment opportunities are expected to be created during the operational phase (50 un-skilled, and 150 skilled) (permanent).
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).	Labour will largely be sourced from the nearby community of Schmidtsdrif.
2.16.3	The distance from where labourers will have to travel.	The project location is situated approximately 8km south of Schmidtsdrif.
2.16.4	The location of jobs opportunities versus the location of impacts.	The location of job opportunities is in the same location as the impacts as assessed in this report.

Ref No.	Question	Answer
2.16.5	The opportunity costs in terms of job creation.	The opportunity cost is considered low. The current land use is uneconomical and is not supporting many jobs. The proposed project will result in job creation as discussed in 2.16.1 above. As the area is largely used for agricultural purposes, the project aligns with regional land use patterns, indicating that it is the most realistic and productive option in terms of job creation. No alternative land uses have been identified as part of this application that would yield greater employment opportunities.
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 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.	
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 6** of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in **Section 9.6**. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. Potato seedlings are sought in the agricultural industry and will contribute to food security on a national scale.
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 8** of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 identified impacts, their assessment and recommended mitigation measures in **Section 8** of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.

Ref No.	Question	Answer
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 5** for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 8** of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.

5 PROJECT ALTERNATIVES

The identification of alternatives is a key aspect of the success of the impact assessment process. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess. There are, however, some significant constraints that have to be taken into account when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which will be 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);
- Scheduling alternatives;
- 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. **Section 4** provides an overview of the project need and desirability.

In this section the various alternatives considered are described and their advantages and disadvantages are presented where applicable. Furthermore, the feasibility of the considered alternatives, from both a technical as well as environmental perspective, is determined and the result thereof are the alternatives that will be investigated further in the EIA phase, towards the selection of preferred alternatives. 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 method of development, 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. 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. This section provides information on the Project's location, process, technology and activity alternatives considered and assessed.

5.1 LOCATION ALTERNATIVES

Location alternatives can apply to the entire Project (e.g. the strategic decision to locate the proposed development at a specific geographical location), as well as more specific footprints of individual components of the project.

5.1.1 DEVELOPMENT LOCATION ALTERNATIVES

Due to the applicant's existing private ownership of the proposed development site, a decision has been made to preclude consideration of location alternatives.

5.1.2 DESIGN OR LAYOUT ALTERNATIVES

The evaluation of site layout alternatives for agricultural pivot developments typically examines various spatial configurations to optimize irrigation efficiency and land utilization. Site layout alternatives may be considered during the EIA phase of the project.

5.2 SCHEDULING ALTERNATIVES

Scheduling alternatives are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise a number of components, which can be scheduled in a different order or at different times and as such

produce different impacts. In the context of this agricultural pivot development, the core activities of land preparation, irrigation system installation, and subsequent crop production are intrinsically linked and do not offer viable alternative sequencing options. Consequently, phasing alternatives are not applicable and will not be further discussed. No specific scheduling alternatives have been assessed as discrete alternatives, however various mitigation measures contain scheduling requirements to reduce the overall impacts of the development.

5.3 PROCESS ALTERNATIVES

Process alternatives imply the investigation of alternative processes or methods to achieve the same goal for the proposed Project. This includes using environmentally friendly designs or materials and re-using scarce resources like water and non-renewable energy sources. No process alternatives are considered reasonable and/or feasible and therefore have not been considered. Process alternatives will be defined and implemented as incremental alternatives during the assessment and incorporated into the EMPr. 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.

5.4 TECHNOLOGY ALTERNATIVES

The selection of the technology alternatives or techniques to be adopted for the construction and operation of the Project are described in this section. No technology alternatives are considered reasonable and/or feasible and therefore have not been considered.

5.5 ACTIVITY ALTERNATIVES

Activity alternatives refer to project alternatives which requires a change in the nature of the proposed activity. No activity alternatives are considered reasonable and/or feasible and therefore have not been considered.

5.6 NO GO ALTERNATIVE

The “No Go” or “No Action” alternative refers to the alternative of not embarking on the proposed project at all. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. It is important to note that the No Go alternative is the baseline against which all other alternatives and the development proposal are assessed. When considering the No Go alternative, the impacts (both positive and negative) associated with any other specific alternative, or the current project proposal would not occur and in effect the impacts of the No Go alternative are therefore inadvertently assessed by assessing the other alternatives. In addition to the direct implications of retaining the status quo, there are certain other indirect impacts, which may occur should the No Go alternative be followed. The ‘no-go’ alternative provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the ‘no-go’ alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

6 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 comments are considered, and a record included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided this 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 to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

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

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);
- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

The PPP must comply with several important sets of legislation that require public participation as part of an application for authorisation or approval. For this project, the National Environmental Management Act (Act No. 107 of 1998 – NEMA) applies. Adherence to the requirements of the above-mentioned Act will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Act. The PPP is undertaken 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. The details of the Integrated PPP followed are provided below.

6.1 PRE-CONSULTATION WITH THE COMPETENT AUTHORITY

A pre-application meeting with the competent authority (DAERL) was requested by the EAP on the 19th of February 2025. The pre-application meeting was held on the 3rd of March 2025. The purpose of the pre-consultation was to provide the authorities with background information of the proposed project, confirm NEMA EIA triggered listed activities, the process to be followed and plan of study for the EIA such as specialist studies and public participation.

6.2 GENERAL APPROACH TO SCOPING AND PUBLIC PARTICIPATION

The PPP for the proposed project has been undertaken in accordance with the requirements of the NEMA EIA Regulations (2014), and 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 and have their views considered and included as part of project planning.

An initial I&AP database has been compiled from historic projects in the area, and Windeed searches were conducted to obtain the contact details of the surrounding landowners. The I&APs referred to in the PPR includes amongst others: Pre-identified and registered landowners and surrounding landowners; Pre-identified and registered key stakeholders; Regulatory authorities; 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 attached in **Appendix C**.

Efforts to pre-identify key I&APs involved various avenues such as consultation with the proponent and known landowners within the study area, review of related previously conducted studies, and identification of key interest groups and authorities within the vicinity of the study area and municipality.

6.2.1 LIST OF ORGANS OF STATE IDENTIFIED AND NOTIFIED

The following Organs of State, but not limited to, were notified of the proposed project and invited to participate in the public participation process:

- Agricultural Research Council.
- Council of Geoscience.
- Eskom SOC Ltd.
- Frances Baard District Municipality.
- National Department of Agriculture Land Reform and Rural Development.
- National Department of Co-operative Governance and Traditional Affairs.
- National Department of Forestry, Fisheries and the Environment (DFFE).
- National Department of Human Settlements.
- National Department of Mineral Resources & Energy (DMRE).
- National Department of Rural Development and Land Affairs.
- National Department of Tourism.
- National Department of Transport.
- National Department of Water and Sanitation.
- National Transmission Company of South Africa SOC (Ltd).
- Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform.
- Northern Cape Department of Co-operative Governance, Human Settlement and Traditional Affairs (NC COGHSTA).
- Northen Cape Department of Health.
- Northern Cape Department of Economic Development and Tourism.
- Northern Cape Department of Roads & Public Works (NC DR&PW).
- Northern Cape Department of Roads and Public Works.
- Northern Cape Department of Water and Sanitation.
- Northern Cape Department of Social Development.
- Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA).
- Northern Cape Heritage Resources Authority (NCHRA).
- Northern Cape Tourism Authority.
- Presidential Climate Commission.
- Sol Plaatje Local Municipality.
- South African Civil Aviation Authority (SACAA).
- South African Defence Force (SANDF).
- South African Heritage Resources Agency (SAHRA).
- South African National Parks.
- South African National Roads Agency Limited (SANRAL).

- South African Radio Astronomy Observatory.
- Transnet SOC Limited.
- Ward Councillors.

6.2.2 OTHER KEY I&APS IDENTIFIED AND NOTIFIED

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

- Pre-identified and registered landowners and surrounding landowners.
- AgriCulture South Africa (AgriSA).
- Agri Northern Cape.
- BirdLife South Africa.
- Botanical Society.
- Centre for Environmental Rights.
- Conservation South Africa (CSA).
- Council for Geoscience.
- Earth Life Africa.
- Endangered Wildlife Trust.
- Federation for a Sustainable Environment.
- Greenpeace Africa.
- GroundWork SA.
- National Khoisan Council.
- Natural Justice.
- Northern Cape Wetland Forum.
- Wildlife and Environment Society of South Africa (WESSA).
- Wildlife and Environment Society of South Africa (WESSA) - Northern Cape.
- World Wildlife Fund.

6.2.3 INITIAL NOTIFICATION OF I&APS

The PPP commenced on the 17th of March 2025 with an initial call to register notification. Notification during this initial consultation was given in the manner described below.

6.2.3.1 **EMAILS, REGISTERED MAIL AND FAXES**

Notification letters (in English and Afrikaans) were distributed to pre-identified I&APS through either faxes, SMSs, registered mail, and/or emails on the 17th of March 2025.

The notification documents included the following information:

- Authorisations required;
- Sufficient detail of the proposed development to enable I&APs to assess/surmise what impact the development will have on them or the use of their land;
- The purpose of the proposed project;
- Details of the application processes associated with proposed activities;
- Details of the affected properties;
- Details of the South African environmental legislation that must be adhered to;
- Contact details of the EAP.

Proof of the registered letters, emails and facsimiles that were distributed during the initial notification and call to register period are attached in **Appendix C**.

6.2.3.2 **NEWSPAPER AND GAZETTE ADVERTISEMENTS**

Advertisements (in English and Afrikaans) describing the proposed project and Environmental Impact Assessment process were placed in the Diamond Fields Advertiser Newspaper with circulation in the vicinity of the study area on the 20th of March 2025. The Gazette Notice was placed in the Northern Cape Provincial

Gazette on the 24th of March 2025. The newspaper and Gazette Notice adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Proof of the Newspaper and Gazette Advertisements placed during the initial notification and call to register period are attached in **Appendix C**.

6.2.3.3 SITE NOTICES AND POSTERS

Four (4) A1 correx board site notices and two (2) posters (in English and Afrikaans) were placed at six (6) locations around the proposed project study area on the 19th of March 2025. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Proof of the Site Notices and Posters placed during the initial notification and call to register period are attached in **Appendix C**.

6.2.4 NOTIFICATION OF AVAILABILITY OF SCOPING REPORT

Notification (in English and Afrikaans) regarding the availability of the Scoping Report for public review and comment will be provided to pre-identified and registered I&APs. The notifications will be distributed through either email, registered mail, fax, and/or SMS, where contact details are available. Contact details will be provided to I&APs should they require assistance accessing the information or require copies of the reports.

A hard copy of the Scoping Report will be placed at the Kimberley Public Library for a period of 30 days. Electronic copies will be available on the EIMS website (www.eims.co.za/public-participation/).

6.2.5 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**). As the project is still at Draft Scoping stage most of the comments received so have been requests to be included on the database and requests for additional information, refer to the Public Participation Report in **Appendix C** for details of comments received.

The comments received during the initial call to register period to date were used to inform the compilation of the PPR. The PPR will be updated for submission to the competent authority, the Northern Cape Department of

Agriculture, Environmental Affairs, Rural Development and Land Reform, following the 30-day public participation period.

To date, the following comments have been received:

- South African Heritage Resources Agency request for an application to made.
- South African National Roads Agency (SANRAL) request to redirect the initial notification to the relevant region/department.
- Northern Cape Department of Social Development (NCDSD) acknowledgement of receipt of the initial notification.
- Eskom request for KMZ file.
- Transnet wayleave application outcome - Transnet Pipelines not affected by the proposed project.
- South African Civil Aviation Authority (SACAA) request to redirect the initial notification to the relevant department and request to delist other SACAA email addresses from the project's database.

7 ENVIRONMENTAL BASELINE ATTRIBUTES

This section of the Scoping 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.

7.1 CLIMATE

The Sol Plaatje Local Municipality (SPLM) Spatial Development Framework (SDF) 2022-2027 describes various challenges experienced due to climatic conditions that largely affect the agricultural sector. Extreme temperature fluctuations pose risks to crop production as extreme heat in summer and frost in winter damages crops. Low rainfall experienced in the region poses risks for dry-land cropping, resulting in increased pressure on the water catchment.

Kimberley exhibits a mid-latitude steppe and desert climate (Köppen classification: BSh), characterized by significant temperature variability and limited precipitation. This climate type is typical of continental interiors, distant from maritime air sources, and is often contiguous with tropical desert climates. This region type owes its origins to locations deep within continental interiors, far from the windward coasts and sources of moist, maritime air (Weatherbase, 2025).

Kimberley experiences substantial temperature fluctuations throughout the year. The annual mean temperature is 18.9°C, with January being the warmest month, averaging 25.6°C, and June the coolest, averaging 11.1°C. Recorded temperature extremes range from 40°C in January to -7.2°C in July (Weatherbase, 2025). Annual precipitation in Kimberley averages 486 mm. January receives the highest average rainfall at approximately 82 mm, while July experiences the lowest, with an average of 6 mm. The relative humidity is moderate throughout the year in Kimberley. Kimberley experiences its highest humidity in April, reaching 59%. In September, the humidity drops to its lowest level at 36% (Weather & Climate, 2025).

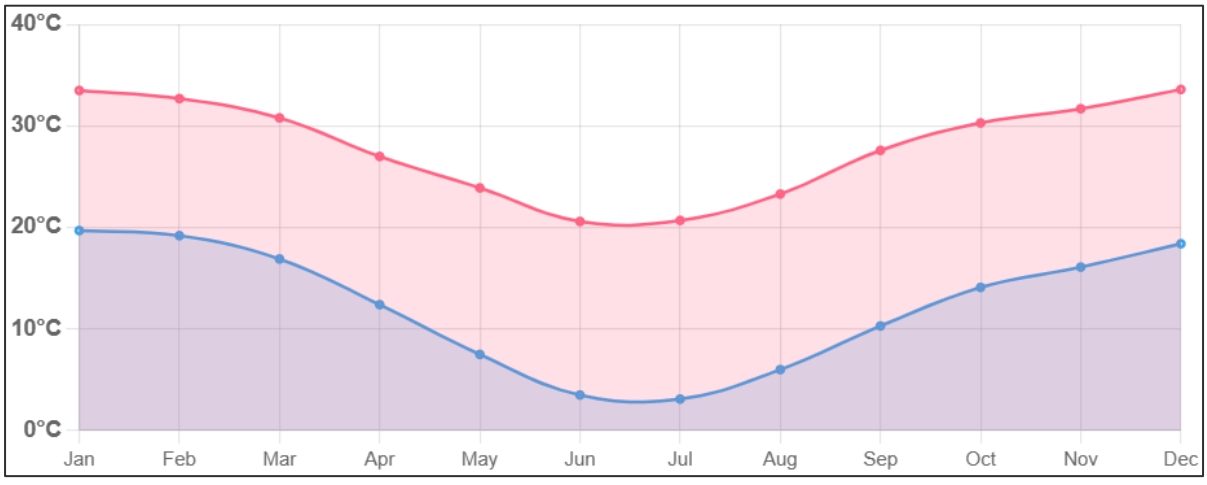


Figure 7: Average maximum day and minimum night temperatures in Kimberley (Weather & Climate, 2025).

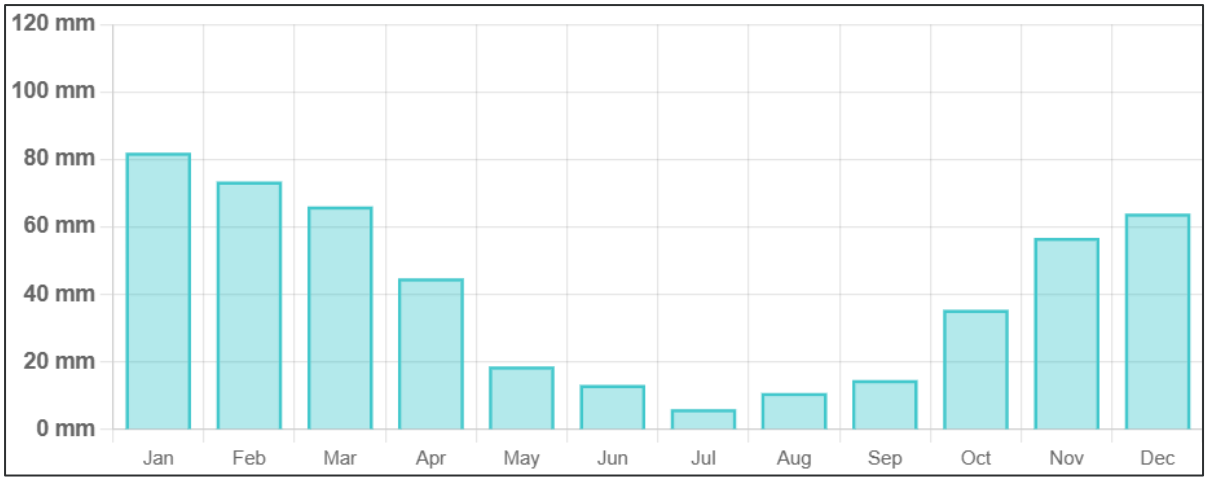


Figure 8: The mean monthly precipitation over the year, including rain, hail and snow (Weather & Climate, 2025).

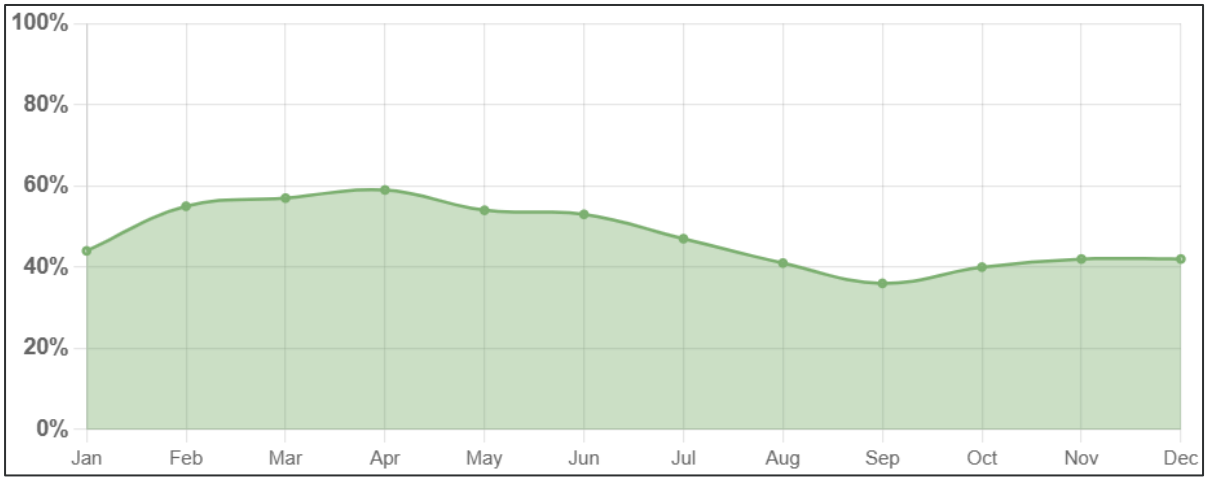


Figure 9: Relative humidity over the year (Weather & Climate, 2025).

7.2 TOPOGRAPHY

The topography of the site is generally flat. A small rocky outcrop/hill is located to the south of the property. The region of pivots 1 to 7 are generally flat with a very slight decline westwards towards the Vaal River. The gradient near pivot 8 differs in that the terrain is sloped at a steeper westwards decline originating from the rocky outcrop/hill (east of pivot 8). **Figure 10** below shows a map of the topography of the site.

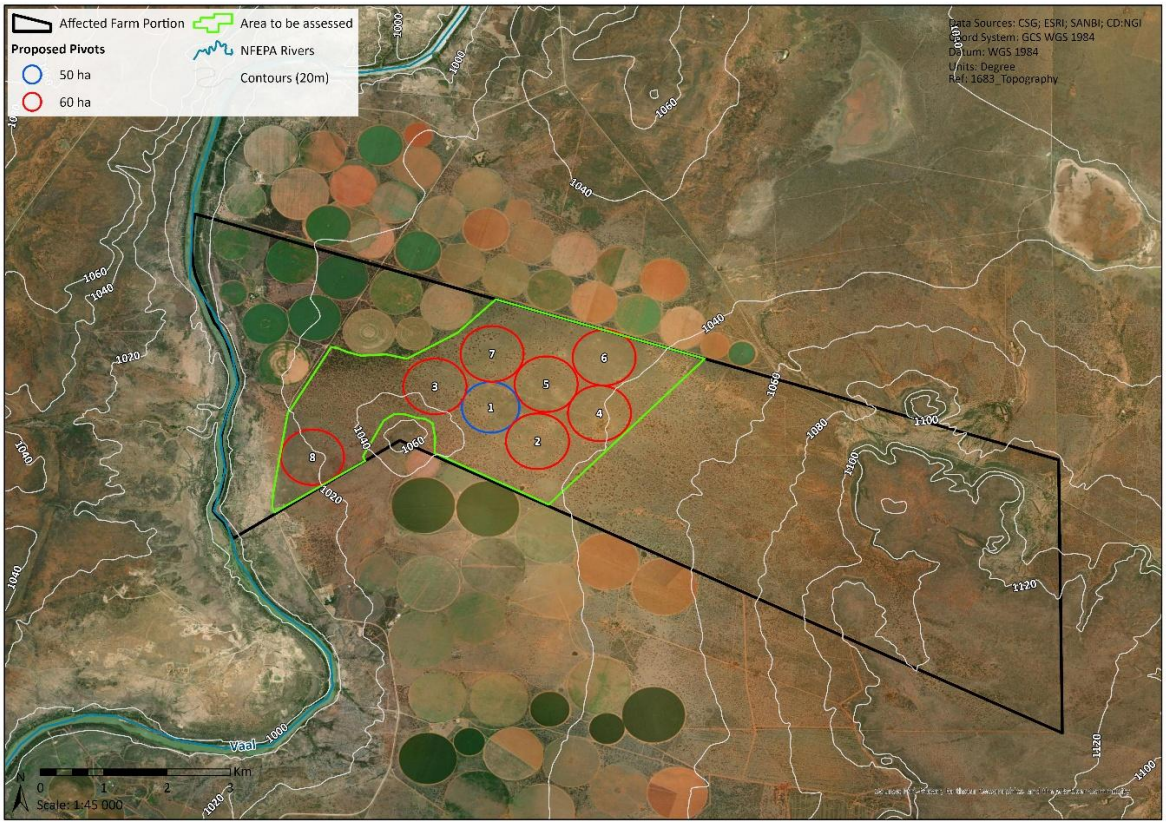


Figure 10: Topography Map.

7.3 GEOLOGY AND SOILS

According to the 1: 250 000 Kimberley 2824 Geological Map (Council for Geosciences, 1993), the proposed development is underlain by Quaternary to Recent red and grey aeolian dune sand as well as alluvium. Dolerite dikes and sills are located south and east of the development footprint. The Quaternary superficial deposits are the youngest geological deposits formed during the most recent period of geological time (approximately 2.6 million years ago to present). Most of the superficial deposits are unconsolidated sediments and consist of gravel, sand, silt, and clay, and they form relatively thin, often discontinuous patches of sediments or larger spreads onshore.

Updated Geology (Council for Geoscience) indicates that the study site is entirely underlain by the Kalahari Group. 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 (De Witt et al., 2000; Johnsen et al., 2006). 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 Ma to 2.588 Ma placing the Gordonia Formation almost entirely within the Pleistocene Epoch. The Simplified Geology Map below (**Figure 11**) indicates the site is primarily underlain Aeolian sand (cover sands and sand dunes) of the Gordonia formation, while the south western corner of the assessment area is underlain by Calcrete and surface limestone.

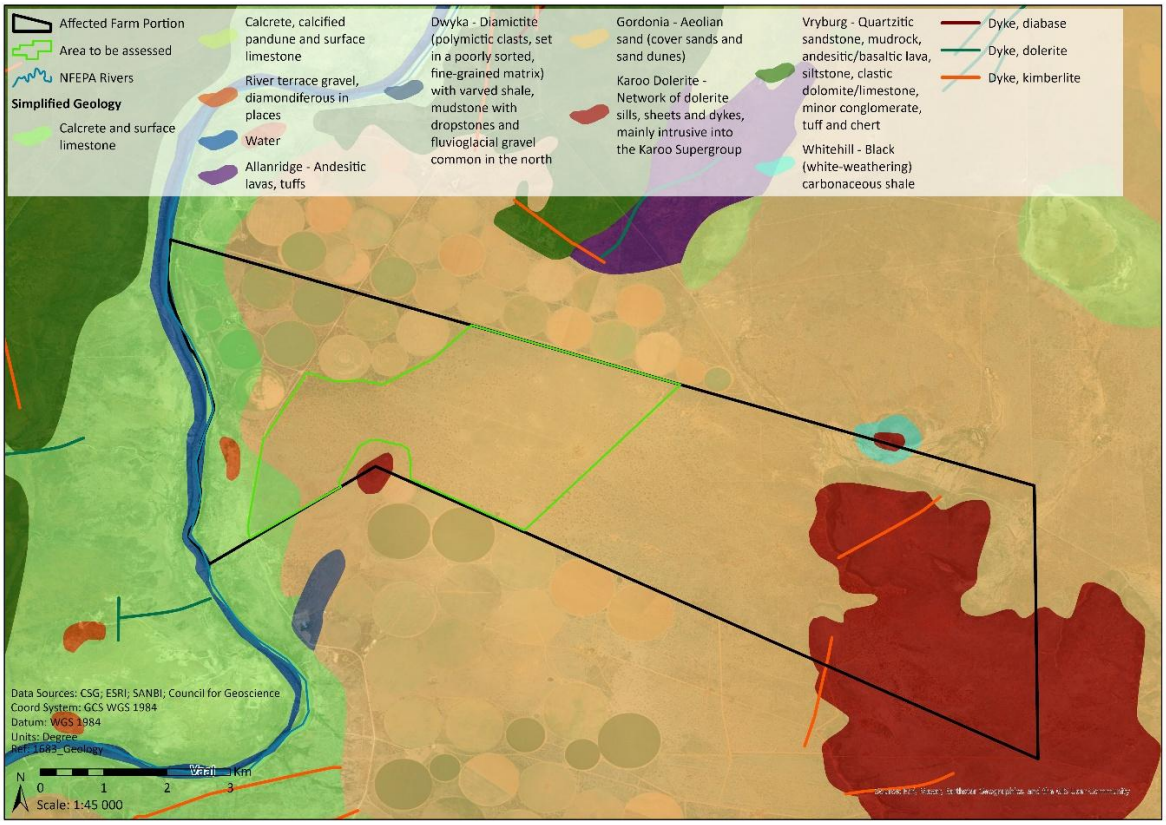


Figure 11: Simplified Geology Map.

The proposed project area is underlain by the CMx- Chromic Cambisols soil type according to the International Soil Reference and Information System (ISRIC 2008/06) and Global Assessment of Land Degradation (GLADA 2008/03) reports and spatial data (**Figure 12**). This soil type within the project area is characterised by a mean gradient of less than 10% and a relief intensity of less than 50 m/km^2. According to ISRIC, Cambisols are mostly found in temperate and boreal regions, where the soil's parent material is still young or where low temperatures slow down processes of soil formation. Britannica (2021) explains that because of the favourable aggregate structure and high content of weatherable minerals in Cambisols, they can be exploited for agriculture.

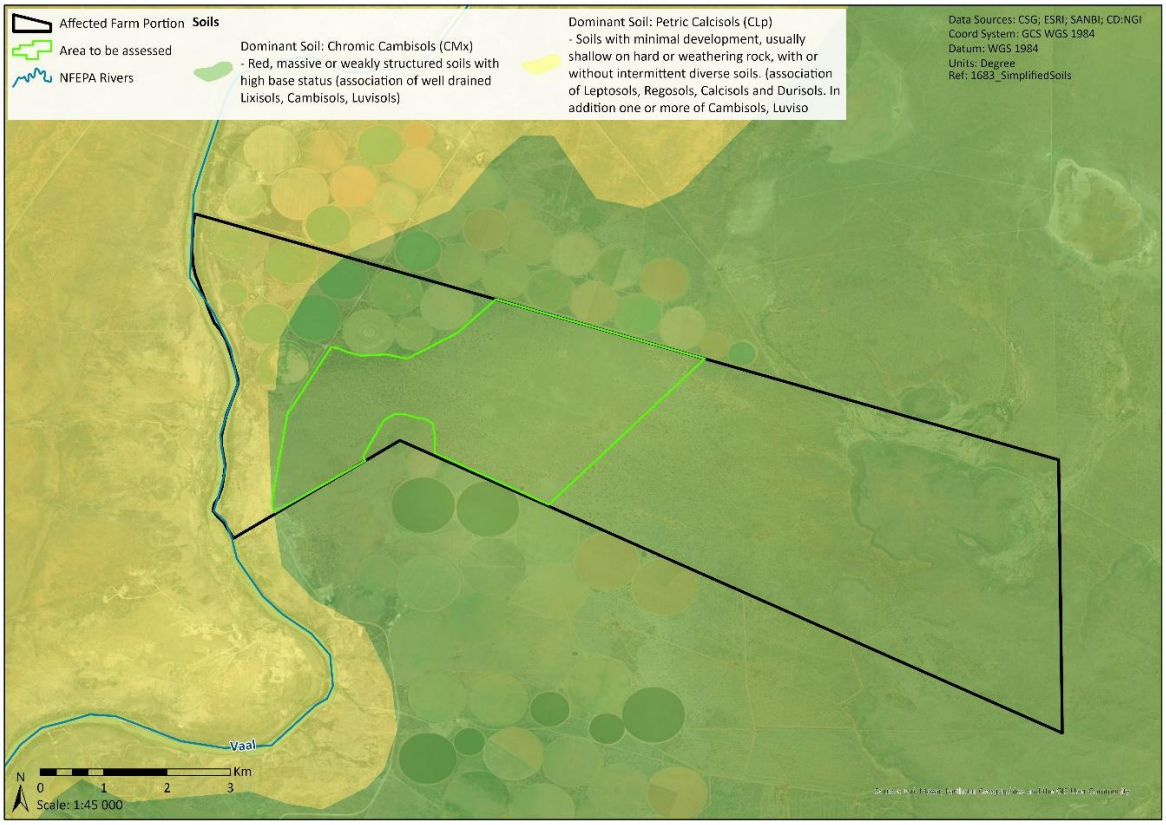


Figure 12: Simplified Soil Map.

7.4 TERRESTRIAL BIODIVERSITY

A Biodiversity Assessment was undertaken by Dr. Natalie Birch (Ecological Management Services (Pty) Ltd – EMS), which assessed the Terrestrial and Aquatic Biodiversity of the site. Abstracts from the Biodiversity Assessment Report are incorporated below and in the following sub-sections. Please refer to **Appendix F** for the full report.

The vegetation within the study area is classified as Kimberley Thornveld Vegetation (Mucina & Rutherford 2006, VegMap 2018). Kimberley Thornveld is described as having a well-developed tree layer with *Vachellia erioloba, Vachellia 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.

The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments.

The two headline indicators assessed in the NBA are:

- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. Red List of Ecosystems (RLE) 2021 – The list was first published in 2011 and has since been substantially revised by authors Dr Andrew Skowno and Mrs Maphale Monyeki (SANBI, 2022). This list is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa by Mucina and Rutherford (2006). A total of 120 of the 456 terrestrial ecosystem types assessed

are categorised as threatened and together make up approximately 10% of the remaining natural habitat in the country. Of these 120 ecosystem types, 55 are Critically Endangered (CR), 51 Endangered (EN) and 14 are Vulnerable (VU). The remainder are categorised as Least Concern (LC) (SANBI, 2022; Skowno & Monyeki, 2021).

- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.

The Vegetation Status Map (**Figure 13**) below indicates that the Kimberley Thornveld has a Conservation Target of 16%, a Protection Level of PP. Kimberley Thornveld is classified as Least Threatened only 4.4% of this vegetation is formerly conserved and 26.4% is considered transformed, mostly by agricultural cultivation. Threats include bush encroachment mostly by *Senegalia mellifera* owing to overgrazing, cultivation and mining.

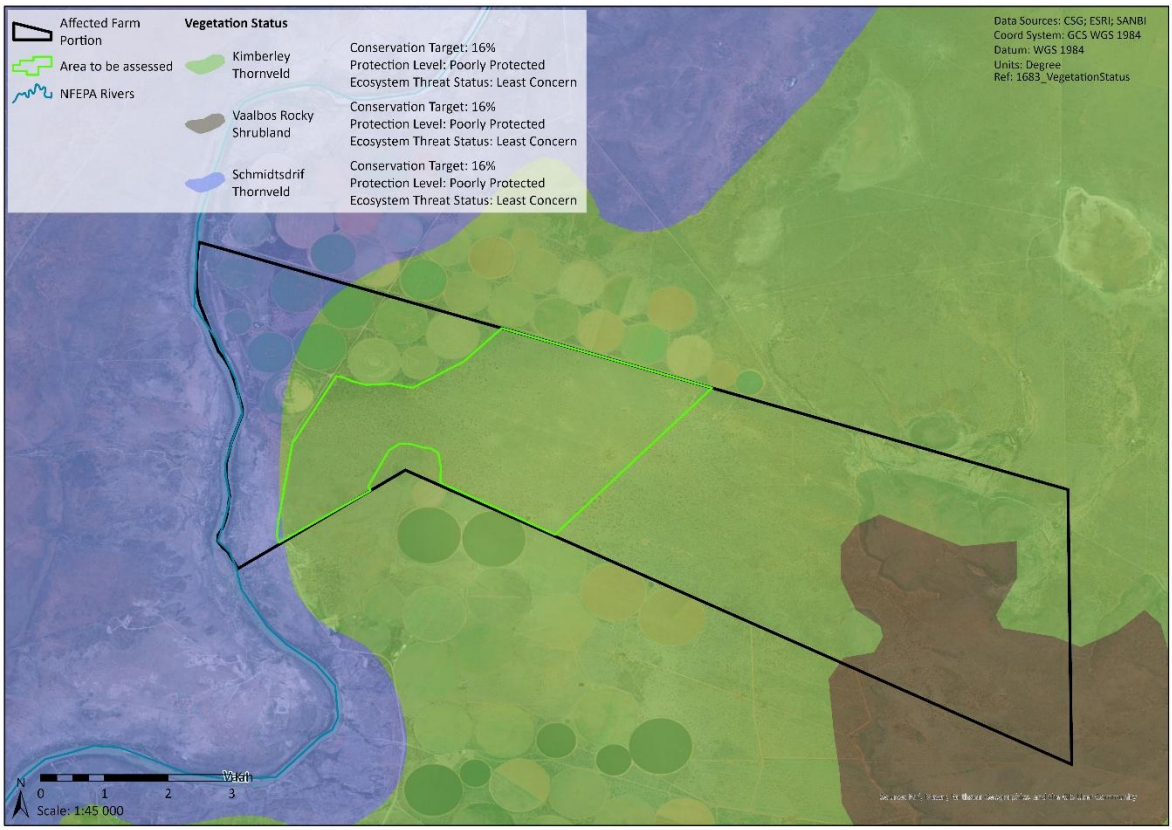


Figure 13: Vegetation Status Map.

The study area does not fall within a CBA nor an ESA as per the Northern Cape Biodiversity Spatial Plan, it is not considered a threatened ecosystem in terms of NEM:BA. The proposed development site does not fall within a River or wetland FEPA, it does not fall within or near any Important Bird Areas (IBAs), nor does it fall within a strategic water resource area (refer to **Figure 14**). It is not located within a focus area for land-based protected area expansion. It is located approximately 24 km east of the Ghaap Plateau Focus Area and approximately 26 km north of the Mokala National Park primary focus area. 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.

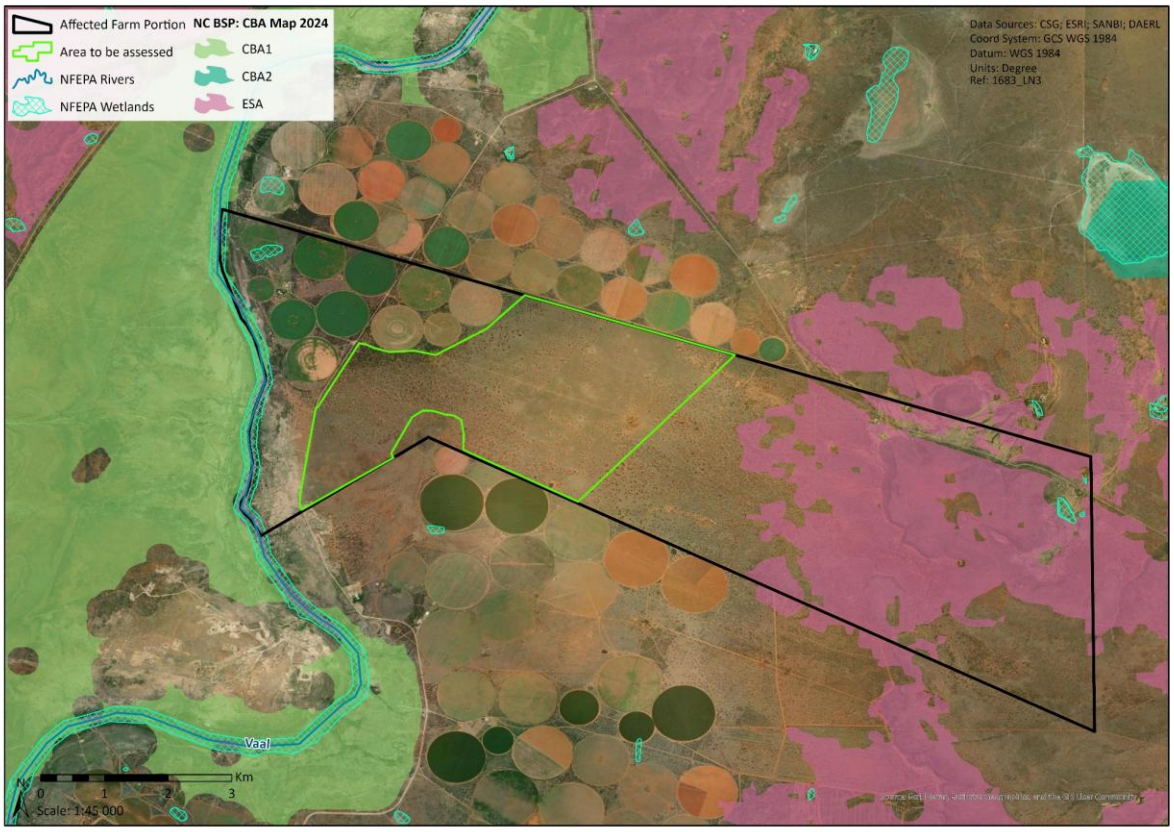


Figure 14: Listing Notice 3 Applicability Map.

7.4.1 BASELINE FINDINGS OF THE BIODIVERSITY ASSESSMENT - FLORA

This section and the sub-sections below discuss the baseline findings of the Floral communities and species on site as per the Biodiversity Assessment Report (EMS, 2025). Please refer to **Appendix F** for the full report.

Vegetation within this proposed development area is relatively homogenous in terms of species composition. There is a slight variation in density of the trees across the area which results in patches of open grassland with this savannah. The vegetation associated with the rocky outcrops “koppies” is the only area where the vegetation changes with any significance. Prior to the purchase of the property by Genade Boerdery the property was utilized for extensive cattle grazing, and was quite heavily grazed, with the vegetation exhibiting a moderately poor condition.

7.4.1.1 PLANT COMMUNITY DESCRIPTION

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 however *Ziziphus muconata*, *Vachellia haematoxylon, Vachellia karroo, Boscia albitrunca* and *Grewia flava* also occur. 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 *Melhania 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.*

***Vachellia erioloba* woodland**

This vegetation type occurs in the northwestern section of the property. It is distinguished from the Mixed *Vachellia* Savanna by the high density of *Vachellia erioloba*, it dominates the woody species composition with only scattered individuals of other woody species recorded within the area and the grass sword is dominated by *Schmidtia pappophoroides*. The existing pivots occur within this vegetation type and only a small intact area vegetation remains along the edge of these pivots.

Grasslands

Open grasslands occur within the study area. The height of the grass sword varies depending on the level of utilisation but averages between 50-70cm tall, the percentage coverage in most of the grassland is good between 75% and 85%. Prominent grass species include, *Eragrostis lehmanniana, Stipagrostis uniplumis, Aristida congesta, Eragrostis curvula, Eragrostis obtuse, Fingerhuthia Africana, Eragrostis superba, Stipagrostis obtuse* and *Schmidtia pappophoroides.*

***Senegalia mellifera* scrub.**

This vegetation type is associated with the rocky outcrops which occur in the area. The vegetation is dominated by *Senegalia mellifera* although shrubs such as *Ehretia rigida, Gymnosporia buxifolia Tarchonanthus camphoratus*, and *Grewia flava* were recorded.

7.4.1.2 POPULATIONS OF SENSITIVE AND/OR THREATENED SPECIES

Historical records of Red List plant species were consulted 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 the table below:

Table 9: Potential and recorded Protected Plant species on site (EMS, 2025).

Species	Legislation	Conservation Status	Potential of occurrence on site
Vachellia erioloba	National Forests Act 1998	Protected	Recorded on property and within development footprint.
Vachellia haematoxylon	National Forests Act 1998	Protected	Recorded on property and within development footprint.
Bosica albitrunca	National Forests Act 1998	Protected	Recorded in the area but NOT within development footprint.
	NCNCA	Schedule 2	
Titanopsis calcarea	NCNCA	Schedule 2	Not recorded during field survey, **Low** potential of occurrence within development footprint.
Plinthus karooicus	NCNCA	Schedule 2	Not recorded during field survey, **Low** potential of occurrence within development footprint.
Ruschia ruralis	NCNCA	Schedule 2	Not recorded during field survey, **Low** potential of occurrence within development footprint.

Species	Legislation	Conservation Status	Potential of occurrence on site
Bulbine abyssinica	NCNCA	Schedule 2	Not recorded during field survey, **Moderate** potential of occurrence within development footprint.
Aloe claviflora	NCNCA	Schedule 2	Not recorded during field survey, **Moderate** potential of occurrence within development footprint.
Ornithogalum nanodes	NCNCA	Schedule 2	Not recorded during field survey, **Low** potential of occurrence within development footprint.
Nemesia pubescens	NCNCA	Schedule 2	Not recorded during field survey, **Low** potential of occurrence within development footprint.
Aloe grandidentata	NCNCA	Schedule 2	Not recorded during survey but **very high** possibility of occurrence in the area.

Owing to the narrow temporal window of sampling some species may not have been recorded, this however does not preclude them from occurring within the development site. It is therefore recommended that **prior to clearing an additional walk through is conducted**. 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 DAERL** 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 Department of Forestry, Fisheries & the Environment**.

7.4.2 BASELINE FINDINGS OF THE BIODIVERSITY ASSESSMENT – FAUNA

This section and the sub-sections below discuss the baseline findings of the Faunal communities and species on site as per the Biodiversity Assessment Report (EMS, 2025). Please refer to **Appendix F** for the full report.

The property has already been disturbed by agricultural activity (existing pivots and extensive cattle grazing). The grazing pressure reduces the standing biomass and grass cover which affects the habitat suitability of certain faunal species. 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.

Based on the bird species identified while on-site, the proposed development site hosts both grassland and bushveld bird species. The loose sandy soils which occurs over a large portion of the study site, makes these areas suitable for burrowing mammals.

7.4.2.1 REPTILES SPECIES OF CONSERVATION CONCERN

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. There are however some species of reptiles that may occur in the area that are protected in terms of the NCNCA these are listed in the table below.

Table 10: Protected Reptile species (EMS, 2025).

Species	Legislation	Conservation Status
Chamaeleo dilepis	NCNCA	Schedule 1
Psammobates tentorius	NCNCA	Schedule 2
Geochelone pardalis	NCNCA	Schedule 2
Lamprophis fuligonosus	NCNCA	Schedule 2
Pseudaspis cana	NCNCA	Schedule 2
Prosymna sundevalli	NCNCA	Schedule 2

7.4.2.2 AMPHIBIANS OF CONSERVATION CONCERN

No red data amphibians were identified as occurring in the quarter degree squares, based on the distribution maps available in the South African Red Data Book for amphibians (Minter *et al*., 2004) Du Preez and Carruthers (2009) and the South African Frog Atlas project. There are however some species that are protected in terms of the NCNCA that may occur in the area, these are listed in **Table 11**.

Table 11: Protected Amphibians (EMS, 2025).

Species	Legislation	Conservation Status
Xenopus laevis	NCNCA	Schedule 2
Bufo gariepensis	NCNCA	Schedule 2
Bufo gutturalis	NCNCA	Schedule 2
Bufo garmani	NCNCA	Schedule 2
Tomopterna cryptotis	NCNCA	Schedule 2
Rana angolensis	NCNCA	Schedule 2
Rana fuscigula	NCNCA	Schedule 2

7.4.2.3 BIRDS OF CONSERVATION CONCERN

A list of all red data bird species occurring in the quarter degree square, was extracted from the SABAP 1 and SABAP 2 databases and Birdlife South Africa's Important Bird Areas and from the Red Data Book of Birds (Taylor *et al* 2015) with the distribution being confirmed in Roberts – Birds of Southern Africa, 7th edition (Hockey *et al.*, 2005). The IUCN 3.1. status is also presented in the table. Based on an evaluation of the habitat requirements for these red data species, the potential of these species occurring either on-site or within 500m of the property boundary is provided in **Table 12** below.

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 12: Bird species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on the site (EMS, 2025).

Common Name	Scientific Name	Conservation Status (*Regional, Global)	Suitable Habitat Requirements[1]	Potential for Occurrence On-site and Surrounding Area
Blue Crane	*Anthropoides paradiseus*	Near Threatened Vulnerable	Grasslands, cultivated lands Karoo scrub and edges of vleis.	**Very Low** – Edge of distribution range, vegetation too dense.
Kori Bustard	*Ardeotis kori*	Near Threatened Near Threatened	Dry thornveld grassland, arid scrub requires the cover of some trees.	**High** – Recorded in the area Suitable habitat occurs on site.
Greater Flamingo	*Phoenicopterus ruber*	Near Threatened Least Concerned	Greater Flamingos forage on open shallow eutrophic wetlands, both inland and coastal, with a preference for saline and brackish waters.	**Very Low** - No large bodies of open water occur on the proposed development site.
Lanner Falcon	*Falco biarmicus*	Vulnerable Least Concerned	Lanner Falcons are generally a cliff nesting bird, but have adapted to using the disused nests of Black and Pied crows, situated either in trees or on power lines For foraging purposes, Lanner Falcons utilise a wide range of habitats, from semi desert to woodland, agricultural land and also occurs in cities, but appear to prefer open habitats.	**High** – Suitable foraging habitat occurs on site.
Lesser Flamingo	*Phoenicopterus minor*	Near Threatened Near Threatened	The Lesser Flamingo forages on large brackish or saline, inland and coastal waters, shallow eutrophic wetlands, saltpans and sheltered coastal lagoons This species may use water bodies more saline than those used by the Greater.	**Very Low** - no large bodies of open water occur on the proposed development site.
Secretary bird	*Asagittarius serpentarius*	Vulnerable Vulnerable	This species shows a preference for open country, mainly savannah, open woodland, grassland, dwarf	**High** – Suitable habitat occurs on site.

[1] Habitat requirements determined using the following reference material: Harrison et al., 1997a; Harrison et al., 1997b; Hockey et al., 2005.

Common Name	Scientific Name	Conservation Status (*Regional, Global)	Suitable Habitat Requirements[1]	Potential for Occurrence On-site and Surrounding Area
			shrubland, mountain slopes and man-made habitats such as grazing paddocks and fallow fields.	
African White backed Vulture	*Gyps africanus*	Critically endangered Critically endangered	Savannah and bushveld. Nest in tall trees (*Vachellia erioloba).*	**High** – 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	*Gyps coprotheres*	Endangered Endangered	Widespread in southern Africa where it can be found in open grasslands and woodlands, from sea level to very high mountains provided there are high cliffs to breed on. They can, however, roost on trees and pylons far away from their breeding sites.	**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.

7.4.2.4 MAMMALS OF CONSERVATION CONCERN

A list of all red data mammal species occurring in the quarter degree squares, was extrapolated 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 500m of the property boundary is provided in the table below:

Table 13: Mammal species of conservation concern identified as occurring in and around the quarter degree squares and the potential for occurrence on the site (EMS, 2025).

Common Name	Scientific Name	Conservation Status[2]	Suitable Habitat On-site[3]	Potential For Occurrence On-site and Surrounding Area
South African hedgehog	*Atelerix frontalis*	Near Threatened	The South African Hedgehog is a nocturnal species that has been recorded to occur in grassland, resting curled up under matted grass, in debris	**High** – Area has sufficient grassland and bushes thus suitable habitat is present.

[2] Status based on listing in the National Red List of Mammals 2016.
[3] Habitat requirements determined using the following reference material: Skinner and Smithers, 1990; EWT, 2004; Skinner and Chimimba, 2005.

Common Name	Scientific Name	Conservation Status[2]	Suitable Habitat On-site[3]	Potential For Occurrence On-site and Surrounding Area
			under the shade of bushes or in holes under the ground.	
Brown hyaena	*Hyaena brunnea*	Near Threatened	They occur in semi-desert scrub, open scrub and open woodland savannah. As they are nocturnal, cover in which to lie in during the day is essential, such as dense shade or holes in the ground. This species has been reported in the general vicinity of the site, and it is possible that this species may currently visit the site as a vagrant when feeding.	**Low** – For the most part, the vegetation cover of the proposed development site is suitable however the substantial amount of agricultural activity and its promiximity to human habitation make it unlikely that this animal will occur in the area.
Spotted-necked otter	*Lutra maculicollis*	Vulnerable	Spotted-necked Otters are found in fresh water of large rivers with prominent pools, lakes, dams and well-watered swamps. They occur in deeper water than the Cape Clawless Otter, but do not move far from the water margins They are also dependent on adequate cover of dense vegetation or holes in which to hide.	**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.
Black-footed Cat	*Felis nigripes*	Vulnerable	Arid and mesic savanna and scrubland, prefer rocky areas.	**Moderate** – limited suitable habitat.

7.4.3 ALIEN/INVASIVE SPECIES

The Conservation of Agricultural Resources Act (CARA) regulates and restricts the propagation, harboring and sale of invasive alien plant and weed species listed in a set of Regulations published in terms of the Act. CARA was amended in 2001 and is administered by the National Department of Agriculture.

The National Environmental Management: Biodiversity Act (NEM:BA – Act no. 10 of 2004) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. All listed Invasive Alien Plants (IAPs) are divided into four categories as described in **Section 3.1.5**. The table below lists the alien invasive species that occur in and around the property.

Table 14: Alien invasive species that occur in and around the property (EMS, 2025).

Species		Category
Argemone mexicana	Yellow flowered Mexican Poppy	1b
Prosopis* cf. *glandulosa	Mesquite	3
Argemone ochroleuca	White flowered Mexican poppy	1b
Datura ferox	Large thorn apple	1

7.4.4 TERRESTRIAL BIODIVERSITY SITE SENSITIVITY

In order to advise the impact assessment and the proposed mitigation, a sensitivity map has been generated for the property using a number of criteria. In order to quantify and detail the sensitive areas in terms of the criteria used to assess sensitivity, the site was demarcated into a number of manageable blocks. A table was created to list each of the sensitivity criteria and a value assigned to each criteria. Each block was then assessed in terms of its relative sensitivity value. This produced a quantifiable sensitivity map (refer to **Figure 15**). Refer to the Biodiversity Assessment Report in **Appendix F** for the criteria used to assess the sensitivity.

Areas have been classified as follows:

- **Low (0-9)** sensitivity areas are already highly transformed and/or already contain development. Any development in these areas will not have a significant environmental impact.
- **Medium (10-20)** sensitivity areas: The vegetation and habitats in these areas have had some disturbance and may include some potential habitat for red data species or the presence of limited red data/protected species. Development in these areas, would be subject to guidelines and the mitigation measures.
- **High (21-25)** sensitivity areas included confirmed high number of red data /protected species, and ideal red data species habitat. Any development in these areas would have a significant environmental impact. No development should take place in these areas, but it is recognised that in certain exceptional cases, development may need to take place. Under these conditions very strict development guidelines would be required, and only under guarantee that similar areas within the site would be conserved thus reducing the risk of development.

The pivots mostly fall within the moderate sensitivity areas. The high and moderate sensitivity areas contain protected trees, the areas of greater tree density have been classified as high sensitive areas. These trees will be lost when the vegetation is cleared for the construction of the pivots. 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.

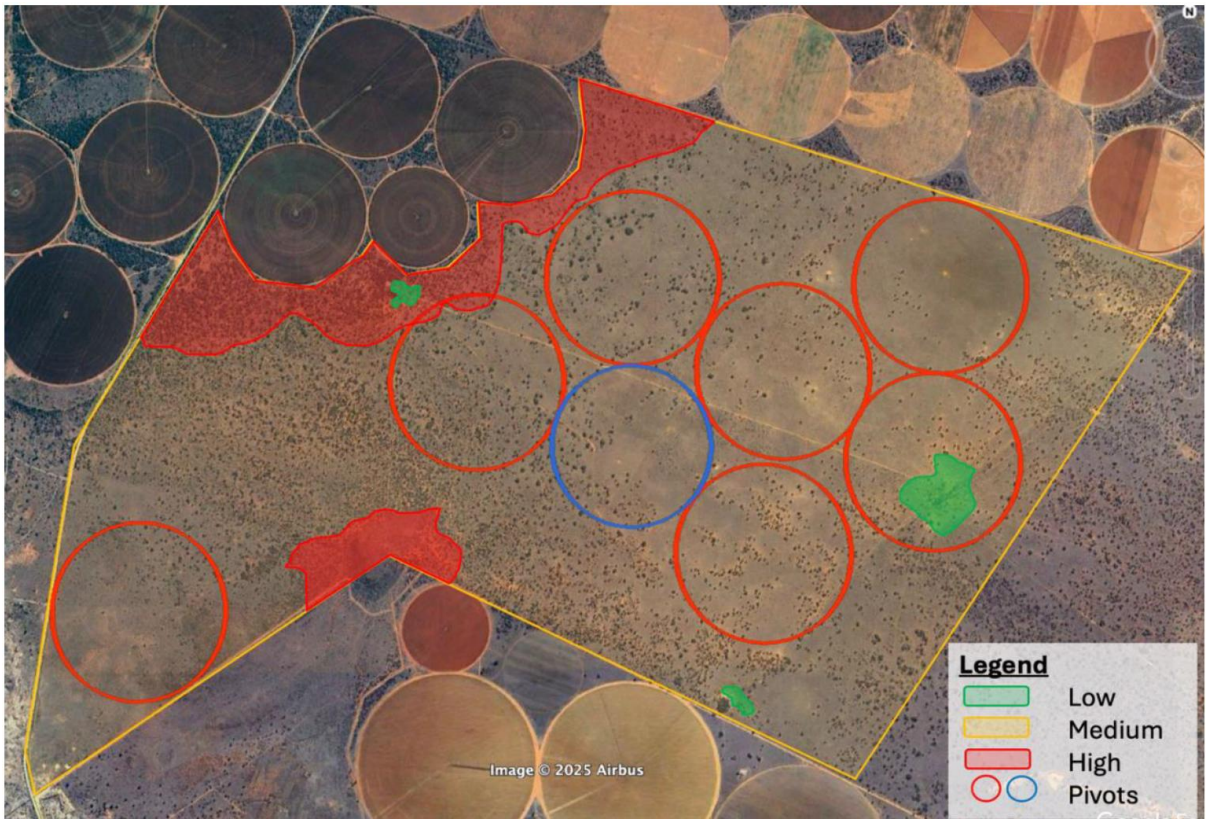


Figure 15: Terrestrial Biodiversity Site Sensitivity Map (EMS, 2025).

7.5 SURFACE WATER AND AQUATIC BIODIVERSITY

The site is situated within the C92B Quaternary Catchment within the Lower Vaal Catchment of the Vaal-Orange WMA. The Vaal River borders the Middel Plaats South No. 104 farm, however, the site is situated approximately 750m east of the Vaal River (refer to **Section 3.1.7** and **Figure 6**).

The National Freshwater Ecosystem Protection Area (NFEPA) database forms part of a comprehensive approach to the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the National Water Act (Act 36 of 1998) (NWA). This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives (Nel et al., 2011). The NFEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the biodiversity goals of the National Environment Management Biodiversity Act (NEM:BA) (Act 10 of 2004), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel et al., 2011).

Strategic Water Source Areas (SWSAs) are areas that supply a disproportionate amount of mean annual runoff to a geographical region of interest. The areas supplying 50% of South Africa's water supply (which were represented by areas with a mean annual runoff of ≥ 135 mm/year) represent national Strategic Water Source Areas which represent only 10% of the land area of South Africa, Eswatini and Lesotho (SANBI, 2023). These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing. Groundwater and interflow play a key role in sustaining surface water flows during the dry season and account for up to 42% of river baseflow, thereby sustaining aquatic and water-dependent biota. Therefore, the protection and management of these areas are imperative (Le Maitre et al., 2018).

In terms of the Environmental Screening Tool, the site is considered to be of low Aquatic Biodiversity sensitivity (refer to **Appendix E**). There are no identified FEPA wetlands within the development site or situated within

500m of the development site (refer to **Figure 14**). The Vaal River is situated to the west of the study site which is bordered by a gravel road. The closest point of the river is about 1km from the road. No wetlands or drainage lines were encountered within the proposed development footprint or in the immediate surrounds of the study site. The site does not fall within a SWSA. The site does not fall within an identified River FEPA, or an important fish support area or an Upstream management area, and thus can be considered to be of low sensitivity in terms of aquatic biodiversity. Further, the site is considered to have a low aquatic biodiversity sensitivity rating, as **there are no aquatic biodiversity features on site**, this was confirmed during the site survey by the EAP, as well as the specialist. The site survey was undertaken during the wet season which eases the identification of wetland systems, should they be present (EMS, 2025). Therefore, only a compliance statement as per the protocol for aquatic biodiversity studies, by the specialist is required and has been submitted as part of the Biodiversity Assessment report (**Appendix F**).

7.6 HERITAGE

A Phase 1 Heritage Impact Assessment (HIA) was undertaken by Dr Lucien James (Environmental Impact Management Services (Pty) Ltd). A comprehensive assessment was conducted to evaluate the potential impact of the project on archaeological and heritage resources. The study included a literature review, desktop assessment, and a single day field survey. Through a desktop investigation, two potential heritage features were identified. These features were further evaluated are not of heritage significance. A total of 8 separate locations were earmarked in relation to a sprawl of Later Stone Age (LSA) finds identified within the footprint of Pivot 8. These finds have been deposited in the area through various processes associated with nearby diggings, and drainage channels. Finds include scatters of LSA tools, not limited to flakes, cores, and debitage.

Abstracts from the HIA report are provided in the following sub-sections. Please refer to **Appendix F** for the full report.

7.6.1 SITE-SPECIFIC BACKGROUND

The Northern Cape is associated with a long archaeological record that spans across pre-colonial and colonial periods. Most notable is the region's significant role in terms of Hunter-gatherer activity. The closest town to the site in question is Kimberley, which itself embodies rich heritage in relation to the colonial history and modern economic development of South Africa.

7.6.1.1 EARLY HOMININ SUBSISTENCE BEHAVIOUR AND LATER HUNTER-GATHERER ACTIVITY

Stone Age artefacts or finds and sites form a key component of the archaeological record of the Northern Cape. This is related to the extensive hunter-gatherer activity in the area. The Northen Cape Stone Age is defined by its lithic collection which includes examples of ESA, MSA, and LSA. Key examples of the lithic finds associated with the Northern Cape can be observed at Wonderwerk Cave and Canteen Kopje as previously discussed, and around the Kathu Townlands (Walker et al., 2014). **Figure 16** and **Figure 17** includes some examples of the lithic finds one can expect associated with early hominin sites in the Northern Cape. The significance of sites such as Kathu and Canteen Kopje have been argued to represent a turning point in stone tool technology from the Acheulean to the Fauresmith, essentially anticipating the MSA (Beaumont and Morris, 1990).

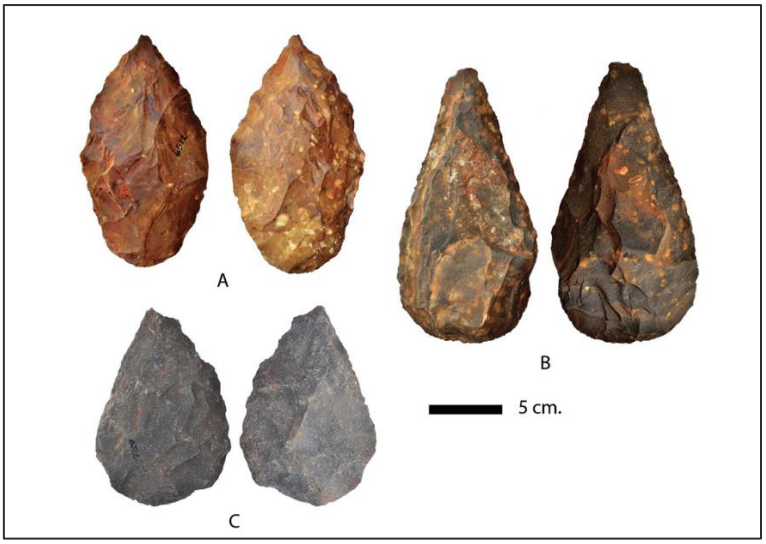


Figure 16: Some key examples of handaxes found near the Kathu Townlands. The examples are banded ironstone (A and B), and Quartzite (C) (After Walker et al., 2014).

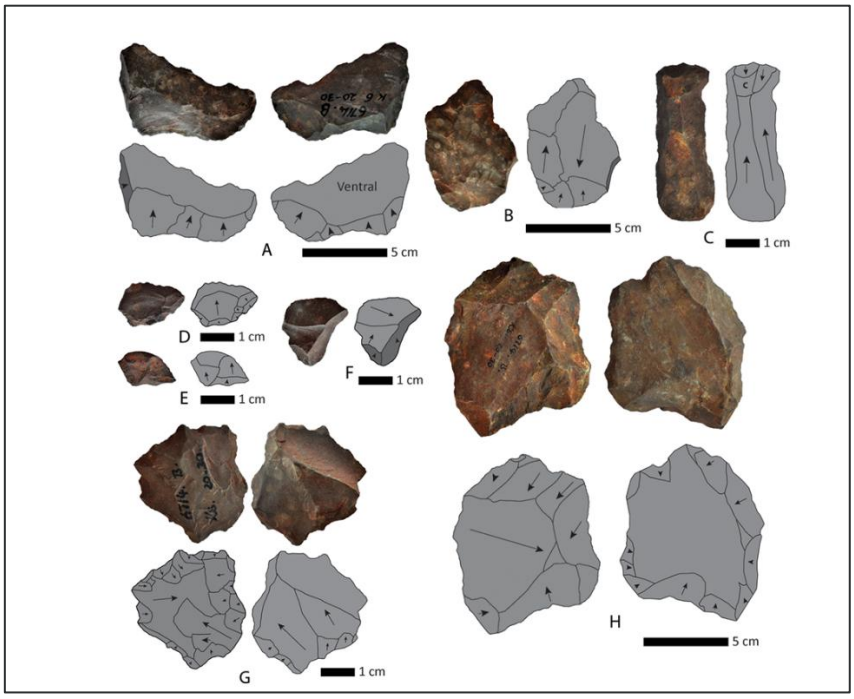


Figure 17: Examples of small flakes and cores. (A) Large flake off of the edge of the core consistent with biface shaping removal, (B) Large flake with dorsal scars (C) Blade (D–F) Small flakes (G-H) Discoidal cores (After Walker et al., 2014).

Other finds include the occurrence of graves and human remains as well as rock engravings or petroglyphs. Rock engravings have been observed in areas around the Northern Cape and have been attached to hunter-gatherer activity. Driekopseiland near Kimberley is a key example site including stone engravings in the Northern Cape (Beaumont and Morris, 1990). This site has been extensively studied and interpreted in relation to hunter-gatherer traditions and belief systems (van Riet Lowe, 1952; Deacon, 1997; Morris, 2016, 2022). Further, the petroglyphs observed in the Northern Cape (**Figure 18**) are but some examples of similar rock art found across the country.

Figure 18: A photograph taken of engraved motifs forming part of the petroglyphs identified at Driekopseiland near Kimberley, Northern Cape (After Morris, 2022).

7.6.1.2 CULTURAL HISTORY OF KIMBERLEY

Kimberley has a rich cultural history being one of the main early mining towns of South Africa. The city was founded following the discovery of diamonds between the late 1860s and early 1870s. Kimberley was originally a mining camp called “New Rush” which was later then incorporated into the Cape Colony. Later in its history, Kimberley became a key player in the South African War given its economic standpoint in the country.

Kimberley has become a tourist destination founded on its cultural heritage value. Several monuments and points of interest can be found in the city, which include statues of colonial figures such as Cecil Rhodes. An iconic monument is Kimberley’s Big Hole. The Big Hole is considered the world’s largest hand-excavated open-pit diamond mine.

7.6.2 SUMMARY OF FINDINGS

Following a desktop assessment, some potential heritage features or sensitivities were identified, however, none were of confirmed heritage significance as the structures identified (MI001 and MI002) were not older than 60 years. Through the field survey, 8 new finds and sites were identified which hold heritage significance or value. This consisted of stone age finds. **Figure 19** presents a visual summary of the different findings and their locations. **Table 15** provides a summary of the different features identified, a description of the feature, as well as the coordinates of where the feature is located or a relative central point associated with a site.

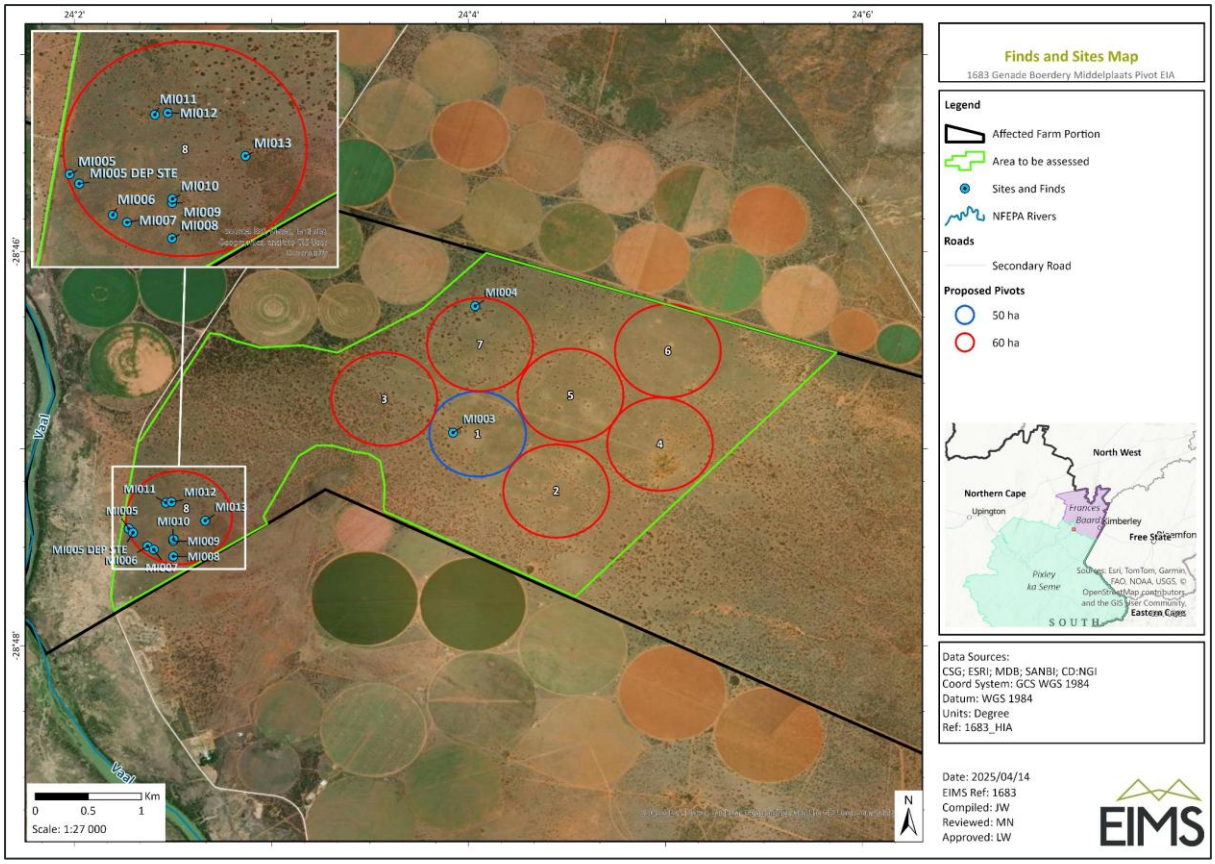


Figure 19: Map of the different finds and sites of interest identified during the field survey.

Table 15: Summary of different finds and sites identified.

Feature No.	Description	Rating and Significance	Coordinate
MI001	Identified Kraal area – identified on 1969 First Edition Topographic Map.	N/A	28°46'29.59"S 24° 3'18.77"E
MI002	Identified farm infrastructure – identified on 1969 First Edition Topographic Map.	N/A	28°47'35.98"S 24° 4'18.82"E
MI003	Single stone tool find – Flake including signs of retouch	Grade IV B* Low	28°46'55.11"S 24° 3'55.29"E
MI004	Faunal (ungulate) remains (skull)	N/A	28°46'16.57"S 24° 4'2.02"E
MI005	LSA Stone tool site. Includes examples of mainly debitage and cores. Note that finds were scattered around an identified drainage channel/path	Grade IV B Low	28°47'24.31"S 24° 2'16.53"E
MI006	LSA Stone tool site. Includes examples of small lithic pieces such as retouched flakes.	Grade IV B Low	28°47'29.70"S 24° 2'22.24"E
MI007	LSA Stone tool site. Note that finds were scattered around an identified drainage channel.	Grade IV B	28°47'30.70"S 24° 2'24.12"E

Feature No.	Description	Rating and Significance	Coordinate
		Low	
MI008	LSA Stone tool site. Includes examples of cores and formal tools.	Grade IV B Low	28°47'32.79"S 24° 2'30.09"E
MI009	Single glass bottle fragment of contemporary origin	N/A	28°47'28.11"S 24° 2'30.10"E
MI010[4]	Area including rubble and rock potentially originating from old diggings	N/A	28°47'27.58"S 24° 2'30.14"E
MI011	LSA Stone tool site. Includes examples of small lithic pieces such as retouched flakes.	Grade IV B Low	28°47'16.44"S 24° 2'27.81"E
MI012	Single stone tool core – potentially originating from MI011	Grade IV B Low	28°47'16.21"S 24° 2'29.52"E
MI013	LSA Stone tool site. Includes examples of small lithic pieces such as retouched flakes.	Grade IV B Low	28°47'21.90"S 24° 2'39.80"E

*According to the SAHRA Minimum Standards (2007), Grade IV B is classified as follows: *Level = General Protection B, Grade = IV B, Significance = Medium, Action = Record Before Destruction*. A full list of the SAHRA Minimum Standards (2007) recommendations is available in the HIA Report in **Appendix F**.

7.6.2.1 STONE AGE FINDS

Stone Age artefacts were the primary set of finds identified during the site visit (Please refer to the HIA Report in **Appendix F** for photographs of the finds). Individual stone tool finds as well as stone age sites. These are presented below.

MI003, a single stone tool flake was identified within the footprint of Pivot 1. The flake was no more than 3cm in size and showed some signs of retouch. The find was located along an existing, and eroded dirt path. While MI005 included examples of LSA lithic artefacts located within the footprint of Pivot 8, the site also exhibited signs indicating that waste rock was dumped in the area potentially originating from the nearby diggings. The old diggings are noted to have been in the area since no later than 1969, as illustrated on the First Edition Topographic map. Further signs of disturbance were noted south from where the site was located, identified as a potential source or depositional site along an old path or channel. MI006 and MI007 appear to be related, being both associated with the same drainage channel. MI006 is an LSA site including several examples of small lithic artefacts such as retouched flakes. MI007 includes several lithic pieces along the channel. Like MI005, these sites were found within the footprint of Pivot 8. Also located within the same Pivot's footprint, MI008 included some examples of LSA lithic artefacts, both cores and formal tools such as scrapers. Although the site was approximately 50 meters from an identified dirt track, it was further away from MI006 and MI007, suggesting it may be a unique depositional site. MI011 and MI013 exhibited similar traits to the other sites identified in the general area and footprint of Pivot 8 (i.e. MI005, MI006, MI007 and MI008). Several LSA tools and retouched flakes were identified at the sites with MI013 noted as an area where material would have been deposited through alluvial processes. A core was identified at MI012. It can be argued that the identified core at MI012 is part of the overall LSA site identified as MI011.

[4] Although not a site or find, MI010 was earmarked as an example where rock and rubble were noted. This was to provide context in terms of associated finds (refer to the HIA Report in **Appendix F**).

The context of all the Stone Age finds identified were limited to interpretations related to landscape disturbance and post-depositional processes. For instance, no knapping or occupational sites were identified in proximity to any of the finds, indicating that the finds could have originated from the nearby diggings and the material being transported along the dirt path, or deposited on the area as noted. Further, drainage channels of the area appear to have dispersed the material located within the footprint of Pivot 8, leading to the area including spread-out examples of similar lithic pieces. For this reason, the identified Stone Age finds have been allocated the field rating of Grade IV B. In this respect, it is recommended that although the finds and sites may not be of contextual value, the developer must remain cognisant of their presence and ensure that during development, other examples which may be identified during construction be recorded.

7.6.2.2 HISTORICAL AND CONTEMPORARY FINDS

A partial ungulate skull (MI004) was located within the footprint of Pivot 7. This is associated with the game and/or cattle kept on site at the present moment. This find was of no heritage significance, and therefore, was only noted as part of surface findings. In a similar way, a single glass bottle fragment was identified in the footprint of Pivot 8 (MI009). The fragment appeared to be that of a modern as opposed to an older glass bottle. It is argued here that the fragment could have been part of the deposit associated with the old diggings and the dirt path which it was located along. This find was of no heritage significance and therefore was only noted. Please refer to the HIA Report in **Appendix F** for photographs of the finds.

7.7 PALAEONTOLOGY

A Palaeontological Desktop Assessment (PDA) was undertaken by Mrs. Elize Butler (Banzai Environmental (Pty) Ltd). Abstracts from the PDA report are provided in this section. Please refer to **Appendix F** for the full report.

According to the 1: 250 000 Kimberley 2824 Geological Map (Council for Geosciences, 1993), the proposed development is underlain by Quaternary to Recent red and grey aeolian dune sand as well as alluvium. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Quaternary sands is Medium (green), while that of the alluvium is high (orange) (**Figure 20**). The suggested location is classified as having a High Palaeontology Theme Sensitivity in the DFFE Screening Report (refer to **Appendix E**). Dolerite dikes and sills (Jd; Karoo Igneous Province) is located south and east of the development footprint and is entirely unfossiliferous, while the fossiliferous Vryburg Formation is located to the west (refer to the PDA Report in **Appendix F**).

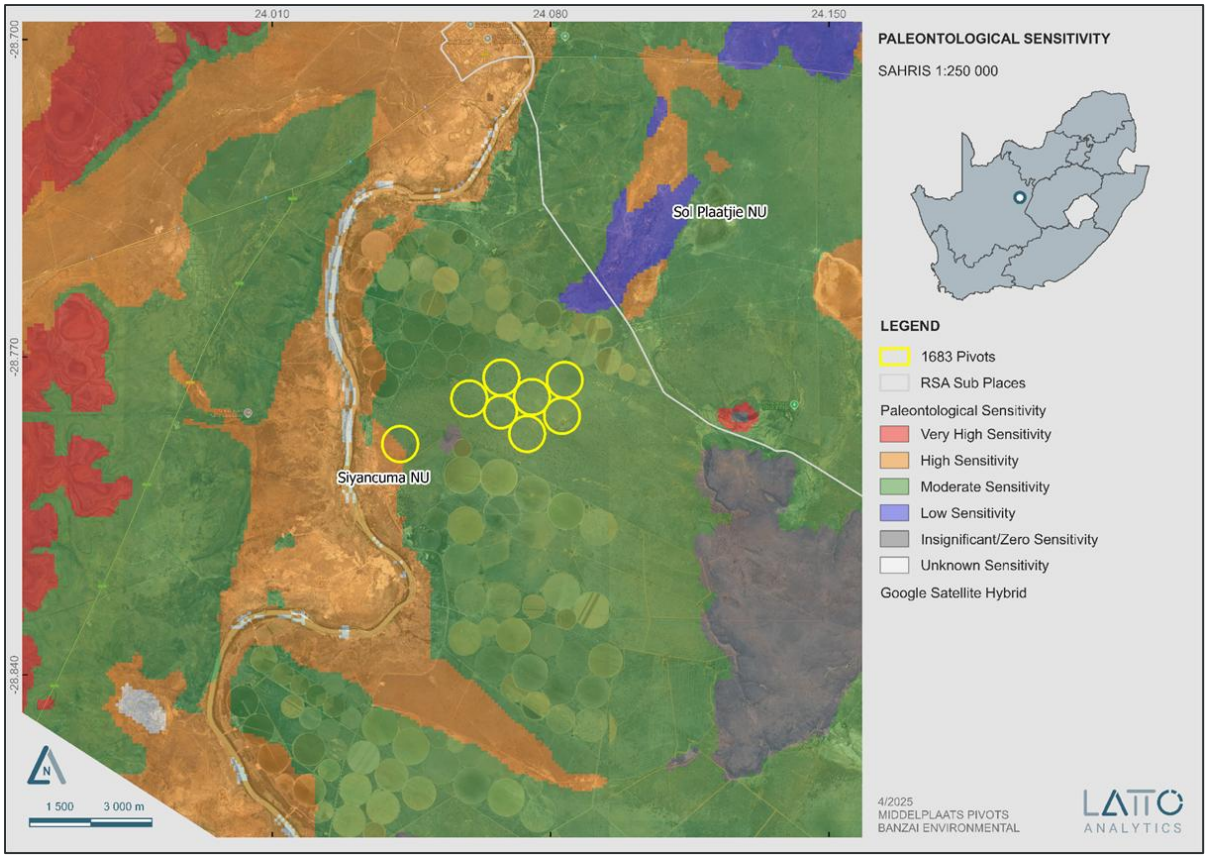


Figure 20: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicating the High (orange) and Moderate (green) Palaeontological Sensitivity of the study area (Banzai Environmental, 2025).

The Quaternary superficial deposits are the youngest geological deposits formed during the most recent period of geological time (approximately 2.6 million years ago to present). Most of the superficial deposits are unconsolidated sediments and consist of gravel, sand, silt, and clay, and they form relatively thin, often discontinuous patches of sediments or larger spreads onshore.

The Quaternary deposits are of significant importance due to the palaeoclimatic changes that are reflected in the different geological formations (Hunter et al., 2006). During the climate fluctuations in the Cenozoic Era most geomorphologic features in southern Africa where formed (Maud, 2012). Barnosky (2005) indicated that various warming and cooling events occurred in the Cenozoic but states that climatic changes during the Quaternary Period, specifically the last 1.8 Ma, were the most drastic climate changes relative to all climate variations in the past. Climate variations that occurred in the Quaternary Period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth et al., 2004).

Updated Geology (Council for Geoscience) indicates that the study site is entirely underlain by the Kalahari Group. 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 (De Witt et al., 2000; Johnsen et al, 2006). 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 Ma to 2.588 Ma 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. 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 corns as well as mammalian teeth (Klein, 1984). 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.

7.8 SOCIO-ECONOMIC ENVIRONMENT

This section provides an overview of the socio-economic profile of the Frances Baard District Municipality (FBDM) and the Sol Plaatje Local Municipality (SPLM), located within the Northern Cape Province. The analysis focuses on key demographic indicators, including gender, age, and population distribution, as well as employment rates within these municipalities.

7.8.1 FRANCES BAARD DISTRICT MUNICIPALITY

The Frances Baard District Municipality (FBDM), situated in the Northern Cape Province, had a total population of 434,343 in the 2022 census, representing an increase from 382,086 in 2011. The gender distribution, as depicted in **Figure 21**, shows a female majority (52.1%) compared to males (47.9%). The population demographic is predominantly Black African (67%), followed by Coloured (24%) and White (8%), with a detailed breakdown provided in **Figure 22** (Stats SA Census, 2022).

A significant proportion of the FBDM population is economically inactive. As shown in **Figure 23**, 26.8% of the population is not economically active. Furthermore, youth unemployment, specifically among those aged 15 to 34, contributes an additional 43.9% to economic inactivity. This combined figure highlights a considerable challenge in terms of economic participation within the district (Frances Baard District Municipality, 2021).

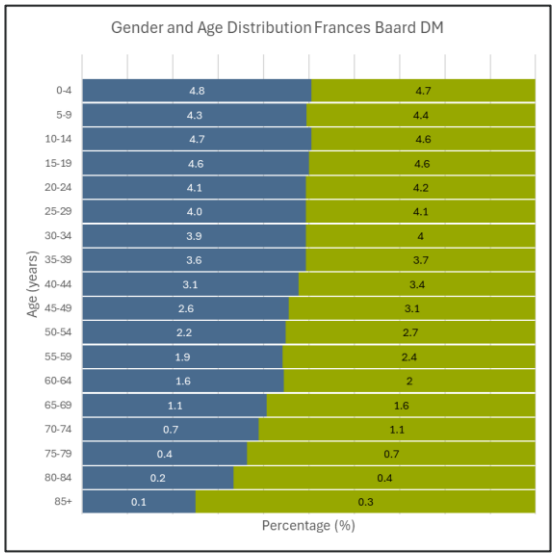


Figure 21: FBDM Gender and age distribution (Stats SA Census, 2022).

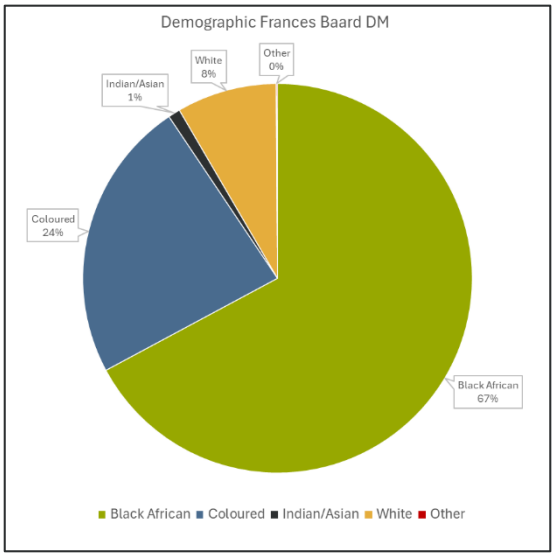


Figure 22: FBDM demographic (Stats SA Census, 2022).

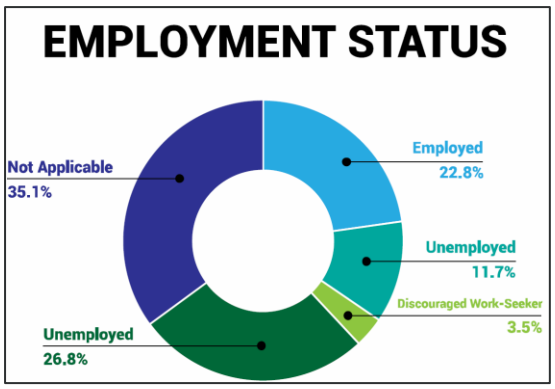


Figure 23: FBDM employment status (Frances Baard District Municipality, 2021).

The FBDM represents the strongest economic region within the Northern Cape Province, contributing 36% to the provincial Gross Domestic Product (GDP). The district's economy is diversified, comprising:

- Primary Sector (14%): Agriculture and mining;
- Secondary Sector (9%): Manufacturing, electricity, and construction; and
- Tertiary Sector (77%): Trade, transport, financial, and social services.

Economic growth within the FBDM has been volatile, as evidenced by fluctuations in GDP. In 2006, the GDP growth rate was 3.4%, which subsequently declined to -4% in 2009 due to the global recession. The period from 2010 to 2012 saw slow growth, reflecting recovery from the recession and reduced production in the primary and secondary sectors. A further decline in economic growth occurred from 2013 (1.4%) to 2014 (0.4%) and 2015 (0.3%), attributed to a decline in domestic growth, which significantly impacted consumer purchasing power within the predominantly service-sector-driven FBDM.

Despite its economic potential, the FBDM faces a substantial unemployment challenge, with an overall rate of 39.4%. Unemployment rates vary across the local municipalities, with particularly high rates in Phokwane (47.8%), Magareng (53.9%), Dikgatlong (44%), and Sol Plaatje (36.2%). The FBDM, through its local economic development initiatives, aims to address these unemployment challenges and improve economic conditions within the district (Frances Baard District Municipality, 2021).

7.8.2 SOL PLAATJE LOCAL MUNICIPALITY

The total population of the Sol Plaatje Local Municipality (SPLM) is 270 078 as of the 2022 census (248 041 during the 2011 census). The gender distribution, as depicted in **Figure 24**, shows a female majority (52.1%) compared to males (47.9%). The population demographic is predominantly Black African (62%), followed by Coloured (28%) and White (9%), with a detailed breakdown provided in **Figure 25** (Stats SA Census, 2022).

A significant proportion of the FBDM population is economically inactive. As shown in **Figure 26**, 39% of the population is not economically active. Furthermore, youth unemployment contributes an additional 41.7% to economic inactivity. This combined figure highlights a considerable challenge in terms of economic participation within the district (Sol Plaatje Local Municipality, 2022).

In 2015 the labour force participation rate for the SPLM was at 60.0% which is very similar when compared to the 59.2% in 2005. The unemployment rate is an efficient indicator that measures the success rate of the labour force relative to employment. In 2005, the unemployment rate for SPLM was 36.6% and decreased overtime to 36.0% in 2015. The gap between the labour force participation rate and the unemployment rate decreased which indicates a negative outlook for the employment within SPLM (Sol Plaatje Local Municipality, 2022).

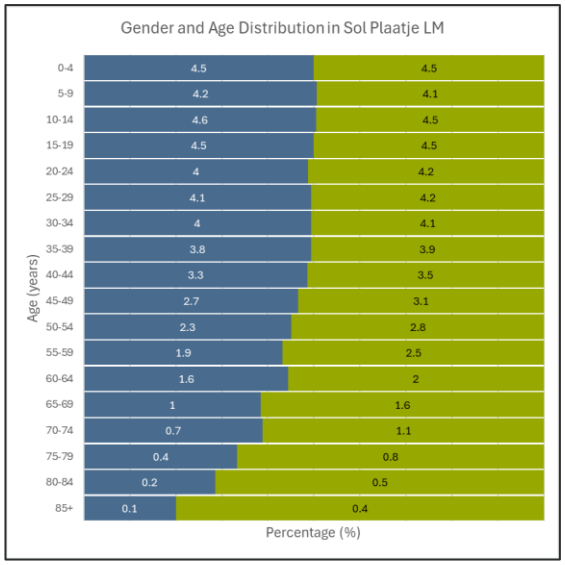


Figure 24: SPLM gender and age distribution (Stats SA Census, 2022).

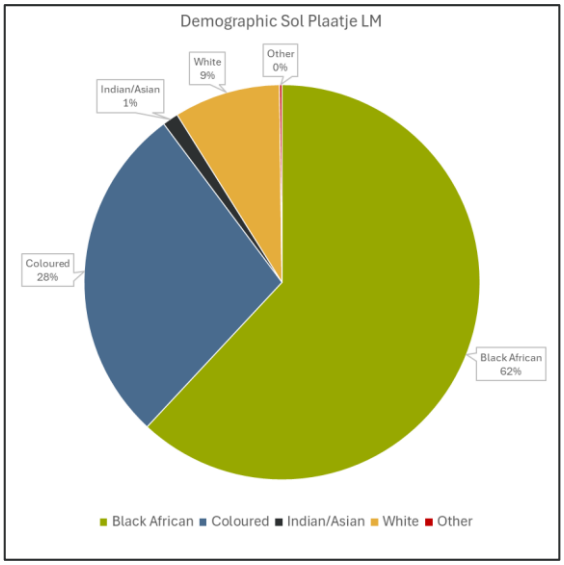


Figure 25: SPLM demographic (Stats SA Census, 2022).

Figure 26: SPLM employment status (Sol Plaatje Local Municipality, 2022).

7.8.3 LAND USE

The affected property is mainly undeveloped natural areas used for game farming and cattle grazing. There are farm dams located on the property and their associated irrigation pipelines that were put in place by the property's previous owners. Irrigated pivot crops are located on the north-western corner of the farm Middel Plaats South No. 104, as well as north and south of the property on adjacent farms. Some of the surrounding farms have small solar plants. Signs of historic alluvial diamond mining activities (old excavations and soil deposits) are located in the south-western region of the farm. The Vaal River runs on the western border of the farm Middel Plaats South No. 104. Refer to **Figure 27** below which shows a Land Cover Map of the area.

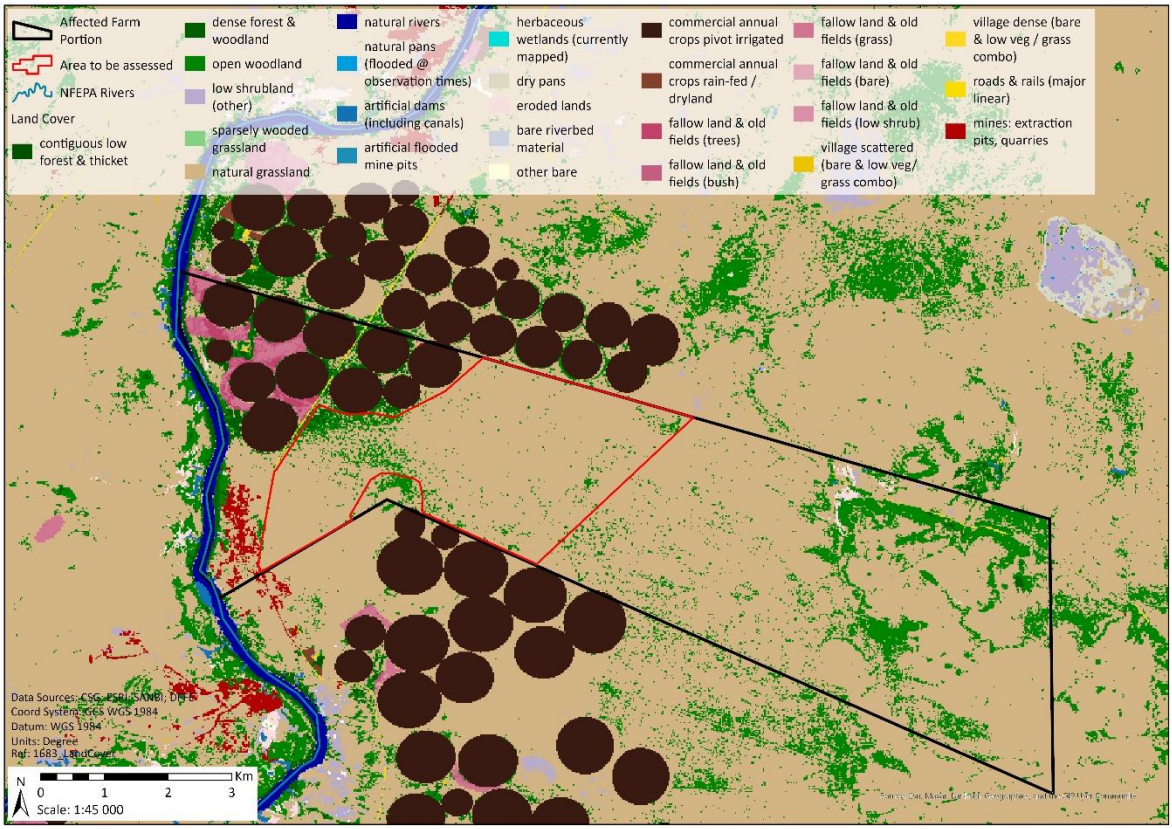


Figure 27: Land Cover Map.

8 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 will be 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.

8.1 IMPACT ASSESSMENT METHODOLOGY

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 approach may be altered or substituted on a case by case basis if the specific aspect being assessed requires such- such instances require prior EIMS Project Manager approval. The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S 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 S to determine the overall final significance rating (FS). The impact assessment will be applied to all identified alternatives.

8.1.1 DETERMINATION OF SIGNIFICANCE

The final significance (FS) of an impact or risk is determined by applying a prioritisation factor (PF) to the post-mitigation environmental significance. The significance 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:

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

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in **Table 16** below.

Table 16: 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. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).

Aspect	Score	Definition
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	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/ operation/ decommissioning).
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, or affected environmental components are already degraded)
	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; or where change affects area of potential conservation or other value, or use of resources).
	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; or where change affects high conservation value areas or species of conservation concern)
	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; or disturbance to pristine areas of critical conservation value or critically endangered species)
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 very high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the significance is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per **Table 17**.

It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that

happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically, the probability of an unmitigated environmental impact is regarded as highly likely or certain (management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen.

Table 17: Probability/ Likelihood Scoring

Probability	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

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

$$\boldsymbol{S = C\ x\ P}$$

Table 18: Determination of Significance

Consequence	5- Very High[5]	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the significance assessment will result in a range of scores, ranging from 1 through to 25. These significance scores are then grouped into respective classes as described in **Table 19**.

Table 19: Significance Scores

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).

[5] In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

S Score	Description
>4,25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

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

8.1.2 IMPACT PRIORITIZATION

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

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

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

Table 20: 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 20**. The impact priority is therefore determined as follows:

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

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 21**).

Table 21: 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 (FS), the PF is multiplied by the post-mitigation significance 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 higher significance).

Table 22: Final Environmental Significance Rating

Significance Rating	Description
<-25	Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.
0	No impact
1 to 4.25	Low positive

Significance Rating	Description
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

The significance ratings and additional considerations applied to each impact will be 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 will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

8.2 IMPACTS AND MITIGATION

This Section presents the potential impacts that have been identified during the scoping phase assessment. **It should be noted that this report will be made available to I&APs for review and comment and their comments and concerns will be addressed in the final Scoping report submitted to the CA for adjudication**. The results of the public consultation will be used to update the identified potential impacts which will be further refined during the course of the EIA assessment and consultation process.

Potential environmental impacts were identified during the scoping process. These impacts were identified by the EAP, the appointed specialists, as well as the public.

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 which will be updated during the detailed EIA level investigation.

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. For example, air movement patterns result in localised air quality impacts having a cumulative effect on air quality in the region. Similarly, water acts as a vector for distribution of impacts such as contamination across a much wider area than the localised extent of the impacts source. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.

8.2.1 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 and operational phases.

8.2.2 CONSTRUCTION PHASE IMPACTS

The Construction Phase will entail the clearance of vegetation for the Pivot areas and installation of pivot irrigation systems. The irrigation pipes are already in place, therefore, no new pipelines will be laid. The preliminary impacts identified for the Construction phase will be discussed in this section.

8.2.2.1 HABITAT FRAGMENTATION, LOSS OF NATURAL VEGETATION AND ALIEN INVASION

Vegetation clearing will occur as a result of the development of irrigation pivots. This loss of natural vegetation will cause 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. 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 / 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.

As with all disturbance, there is an increased risk of alien infestation. 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.

(i) Mitigation Measures

- Vegetation clearing should be restricted to areas of the pivot only. Alien vegetation that has grown as a result of land clearing must be removed by approved methods.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "Medium" - it is probable that the impact will result in spatial and temporal cumulative change.
- There are already substantial numbers of pivots located all along the Vaal River from Douglas to Schmitsdrif, as well as a secondary gravel road that runs along the river connecting the R375 to the N8, so much of this ecosystem has already been fragmented. The layout of the pivots is such that there will be some continuous natural vegetation on the property which may assist in lessening the onsite impact of fragmentation from the pivots.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss of Resources was assessed to be "Low" - the impact is unlikely to result in irreplaceable loss of resources.
- 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.

8.2.2.2 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 areas where the protected trees occur in high densities has been excluded from development. The loss of suitable habitat for Red Data Book (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.

(i) Mitigation Measures

- A search and rescue operation should be performed prior to clearing, it is however not a feasible or practical option with regard to the protected trees, so it's important to ensure that trees between the pivots remain undisturbed.
- In order to remove species listed in Schedule 1 & 2 of the NCNCA during site clearing activities, an integrated permit application must be made to the DAERL to obtain the required permission to remove and/or translocate these species from site. A permit would also be required to destroy or translocate

any nationally or provincially listed species from the site. A single permit, which covers all of these permitting requirements as well as meets TOPS regulations, is used.

- In order to remove the protected trees a license application will have to be made to the Department of Forestry, Fisheries and the Environment.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "Medium" - it is probable that the impact will result in spatial and temporal cumulative change.
- 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.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss of Resources was assessed to be "Low" - the impact is unlikely to result in irreplaceable loss of resources.

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

Anthropogenic disturbances include aspects such as, vibrations caused by machinery and 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.

(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.
- Equipment, vehicles and machinery must be serviced and kept in good working order to avoid unnecessary vibrations.
- A search and rescue can be conducted prior to clearing activities, for example animals such as tortoises should be moved out of harm's way.
- As the 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.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "High" - it is highly probable/definite that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss of Resources was assessed to be "Low" - the impact is unlikely to result in irreplaceable loss of resources.

8.2.2.4 IMPACTS ON HERITAGE RESOURCES

The proposed activities will have an impact on heritage features, particularly those located within the footprint of Pivot 8. Although these features (mainly stone tool sites and scatters) are of low significance, their sprawl across the area is of noted concern. It is expected that should development take place, these finds will be destroyed or displaced. As previously discussed, no knapping or occupational sites were noted and can be

related to the stone tool sites and singular finds. This suggests that these were deposited across the area through various processes both natural and as a byproduct of other activities in the area such as those associated with the old diggings nearby. Further, the finds and sites identified exhibit similar traits to similar sites of the area, with low potential to yield any new information in terms of the heritage significance of the wider area. It is here suggested that the developer maintain vigilance during construction activities. Should surface finds become more densely concentrated (i.e. more than 20 finds/m^2), an Archaeologist and SAHRA must be alerted before construction continues.

While the features identified represent markers of heritage significance (in particular, the stone age finds), the occurrence of below-ground heritage finds may be possible. For this reason, as a mitigation measure proposed, a Heritage Finds or Chance Find Procedure for addressing heritage finds must be adopted as part of construction processes. Should finds of an alarming significance, for example, a grave or high density of small finds be discovered during construction, this procedure will inform the next steps taken to ensure the documentation of these finds, and further action to be taken should a heritage professional deem necessary.

Altogether, post-mitigation of the identified heritage impacts is rated a Low Negative, given that the impacts to be expected will be on already-disturbed and displaced features, and the potential for a heritage procedure to allow for the documentation, recording, and further assessment of undiscovered finds and sites. A heritage procedure can present opportunity to limit the impact of development on heritage finds to construction activities, with the potential to document and further assess finds should they be related to broader sites. This ultimately presents opportunity to reverse the adverse effects of development of heritage finds, given that their value can be evaluated through documentation. This also presents opportunity to better understand the heritage significance of the area to be developed.

8.2.2.4.1 DESTRUCTION OR DISTURBANCE OF IDENTIFIED STONE TOOL SITES AND FINDS (STONE TOOL SITES)

(i) Mitigation Measures

- The Developer must remain vigilant of heritage resources during the installation of the pivots, especially in the area around Pivot 8. SAHRA and an Archaeologist must be alerted should stone tool finds be found in higher densities (More than 20 finds/m^2), before construction activities continues.
- The Heritage Protocol or Chance Find Procedure as described below is advised to be followed should additional heritage finds or sites be encountered:
    - In the event of a chance find which appears of significant value to the lay person, all development activities must be temporarily halted.
    - Finds should not be displaced. Instead, their location should be recorded, and a short description prepared for further evaluation to follow.
    - A qualified Archaeologist must be consulted to, firstly, record the find and evaluate its heritage significance. The Archaeologist should provide recommendations on how to approach the finds moving forward. This may include recommendations for the mitigation of impacts on the heritage resources in question.
    - Should the Archaeologist recommend, development can resume following the application of recommendations and mitigation measures.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be “Low” – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss was assessed to be “Medium” – the initial construction of the pivots may result in the irreplaceable loss of Heritage Resources, but the value of these resources is limited.

8.2.2.4.2 DESTRUCTION OR DISTURBANCE OF UNDISCOVERED BELOW-GROUND HERITAGE FEATURES (UNIDENTIFIED BELOW-GROUND HERITAGE FEATURES)

(i) Mitigation Measures

- A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "Low" – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss was assessed to be "Medium" – the initial construction of the pivots may result in the irreplaceable loss of Heritage Resources, but the value of these resources is limited.

8.2.2.5 LOSS OF FOSSIL HERITAGE

Loss of fossil heritage will be a negative impact. However, if fossil heritage is discovered it may have a positive impact as fossils will be available for scientific study. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur. As fossil heritage will be destroyed the impact is irreversible. The significance of the impact occurring will be Medium High pre-mitigation and Medium Low post-mitigation.

(i) Mitigation Measures

- If fossil remains are discovered during any phase of construction, either on the surface or uncovered by excavations, the **Chance Find Protocol** must be implemented. These discoveries must be secured and the ECO/site manager ought to alert 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) so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports must meet the minimum standards for palaeontological impact studies developed by SAHRA.

- The naturally preserved remnants (or traces) of plants or animals embedded in rock are known as fossils. These plants and animals existed millions of years ago in the geologic past. Fossils are incredibly valuable and difficult to replace. It is possible to identify the environmental conditions in a certain geographical area millions of years ago by analysing fossils.

  This information is intended for construction workers and foremen. It describes what to do if fossil material is discovered accidentally during vegetation clearance.

- It is the responsibility of the project's Environmental Control Officer (ECO) or site manager to train the workers and foremen on what to do if a fossil is accidentally discovered. In the absence of the ECO, a member of staff must be designated to be accountable for the effective application of the chance discovery protocol so that the conservation of fossil material is not jeopardised.

- If fossils are discovered during excavation, the following method shall be followed:

  - **Legislation**

    - Cultural Heritage in South Africa (including all heritage resources) is protected by the National Heritage Resources Act (Act No 25 of 1999) (NHRA). According to Section 3 of the Act, all Heritage resources include "all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens".

- The NHRA protects and owns the state's palaeontological legacy, which is unique and non-renewable. It is consequently the responsibility of the state to manage and protect fossils on behalf of South African citizens. According to Section 35 of the NHRA, palaeontological resources may not be excavated, broken, transferred, or destroyed by any development without previous assessment and a permit from the relevant heritage resources authority.

- **Chance Find Procedure**

  - If a chance find is made, the person responsible for the find must immediately stop working, and all work in the immediate vicinity of the find must stop as well.

  - The individual who discovered the item must immediately notify his or her direct supervisor, who must then notify his or her management and the ECO or site manager. The ECO or site manager must notify the relevant Heritage Agency (South African Heritage Resources Agency, SAHRA) of the discovery. (Contact information: SAHRA, 111 Harrington Street, Cape Town, South Africa. PO Box 4637, Cape Town 8000, South Africa. Fax: +27 (0)21 462 4509. Tel: 021 462 4502. Web address: www.sahra.org.za). Photographs of the find from various perspectives, as well as GPS coordinates, must be submitted to the Heritage Agency.

  - Within 24 hours of the discovery, a preliminary report must be sent to the Heritage Agency, which must include the following: 1) the date of finding; 2) a description of the discovery; and 3) a description of the fossil and its context (depth and position of the fossil), as well as GPS coordinates.

  - Photographs of the discovery (the more the merrier) must be of high quality, in focus, and accompanied by a scale. Photographs of the vertical part (side) where the fossil was discovered are also required.

  - Upon receipt of the preliminary report, the Heritage Agency will notify the ECO (or site manager) whether a palaeontologist rescue excavation or collection is required.

  - The fossil site must be guarded to prevent future damage. There should be no attempt to remove material from their environment. Stabilize the exposed items and cover them with a plastic sheet or sand bags. The Heritage organization will also be able to advise on the best way to protect the find.

  - If the fossil cannot be stabilized, the ECO (site manager) may carefully collect the fossil.

  - Once the Heritage Agency has received the written authorization, the mine may continue with the mining activity in the affected area.

  - Fossil finds must be placed in tissue paper and in an appropriate box while necessary care must be taken to remove any fossil material from the rescue site.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be “Low” – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable Loss of Resources

- Impacts on palaeontological heritage during the construction phase could potentially occur. As fossil heritage will be destroyed the impact is irreversible.

8.2.2.6 IMPACT ON SOIL

Land clearance, a precursor to pivot irrigation development, initiates a cascade of potential impacts on soil integrity. The removal of vegetation cover exposes the soil surface to increased erosive forces, primarily wind and water. This susceptibility can lead to significant topsoil loss, which has an impact on long-term soil fertility and agricultural productivity. The disruption of established root systems diminishes soil structure, reducing its ability to retain water and nutrients. Furthermore, the use of heavy machinery during land clearance often results in soil compaction, impeding water infiltration, aeration, and root penetration.

Land clearance can also alter the soil's chemical composition. The removal of vegetation reduces the input of organic matter, which plays a vital role in maintaining soil health and buffering capacity. This decline in organic matter can lead to a decrease in soil fertility and an increased vulnerability to nutrient leaching. If inappropriate methods are used, there is also the potential for contamination from fuel or other chemicals used by machinery. The combined effect of these alterations can significantly degrade soil quality, impacting the long-term sustainability of agricultural activities within the pivot irrigation system.

(i) Mitigation measures

- Erosion Control:
    - Implement erosion control measures such as silt fences, sediment basins, and contouring.
    - Minimize the area of exposed soil at any one time.
    - Revegetate disturbed areas as soon as possible.
    - Avoid construction/clearance during periods of heavy rainfall.
- Compaction Prevention:
    - Restrict heavy machinery to designated access routes.
    - Use low-impact construction techniques.
    - Aerate compacted soils after construction.
- Contamination Prevention:
    - Use bunded containment for fuel and chemical storage.
    - Develop and implement a spill response plan.
    - Properly dispose of all waste materials at a licenced waste facility.
    - Use drip trays for stationery vehicles.
    - Maintain all vehicles and machinery.

(ii) Cumulative Impacts

- Cumulative Impacts were assessed to be “Low” – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.7 IMPACT ON WATER

Land clearance for pivot irrigation development significantly alters the hydrological regime, leading to a range of potential impacts on water resources. The removal of natural vegetation cover disrupts the established evapotranspiration processes, resulting in increased surface runoff. This increase of runoff can lead to sediment transport to downstream watercourses such as the Vaal River, located approximately 750m from the site.

Although the river is not immediately adjacent, cumulative runoff from the cleared land could still degrade water quality and potentially impact aquatic ecosystems. The increased volume and velocity of runoff also elevate the risk of localised flooding, especially during periods of heavy rainfall.

Furthermore, land clearance can compromise groundwater recharge. The removal of vegetation and subsequent soil compaction can reduce the infiltration capacity of the soil, limiting the replenishment of aquifers. This can lead to a decline in groundwater levels in the long-term. The disruption of natural drainage patterns can also alter the flow dynamics of both surface and groundwater, potentially affecting downstream water availability and quality. Additionally, improper management of land clearance activities can result in the introduction of pollutants into watercourses, such as sediment, fertilizers, and pesticides, further exacerbating water quality degradation.

(i) Mitigation measures

- Runoff Control:
    - Design and implement stormwater management systems.
    - Create retention ponds or swales to slow down runoff.
    - Maintain existing drainage patterns as much as possible.
- Sedimentation Control:
    - Ensure that water / stormwater does not exit the site, but is rather diverted back to the site and/or other vegetation for use on site.
- Groundwater Protection:
    - Implement strict controls on the use and disposal of hazardous materials.
- Water Quality Protection:
    - Control runoff from construction sites.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be “Low” – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.8 IMPACT ON AIR

The immediate removal of vegetation cover results in the release of particulate matter into the atmosphere. This is particularly pronounced during dry and windy conditions, where exposed soil becomes a significant source of dust generation. These airborne particulates, including fine soil particles and organic matter, can contribute to respiratory problems and reduce visibility in surrounding areas. Furthermore, the operation of heavy machinery during land clearance activities contributes to air pollution through the emission of combustion byproducts. Vehicles and equipment powered by fossil fuels release gases such as carbon monoxide, nitrogen oxides, and volatile organic compounds. These emissions can contribute to the formation of ground-level ozone, a harmful air pollutant, and exacerbate regional air quality issues. The intensity of these emissions is directly proportional to the size of the cleared area and the duration of the land clearance process. In a broader context, the temporary loss of vegetation cover also reduces the capacity of the land to sequester carbon dioxide, a key greenhouse gas, potentially contributing to climate change.

(i) Mitigation measures

- Dust Control:

- Water down construction sites and access roads regularly.
- Cover stockpiles of soil and other materials.
- Use dust suppressants.

- Vehicle Emissions Control:
  - Maintain construction vehicles in good working order.
  - Minimize idling time.
  - Use low-emission construction equipment.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.9 SOCIO-ECONOMIC IMPACT

Initially the construction phase, which constitutes mainly of land clearance, may generate temporary employment opportunities for local labourers, particularly in manual clearing and machinery operation. However, this job creation is typically short-lived, ceasing once the land preparation is complete. This impact was assessed to be low to medium positive prior to implementation of the proposed improvement measures, and medium to high positive after implementation of the proposed improvement measures.

(i) Improvement measures

- Employ local work force.
- Utilise existing community structure.
- Opportunities to be given previously disadvantaged individuals.
- It is recommended that cleared vegetation be recycled as far as practicably possible. Usable timber from vegetation clearance can be donated to communities for firewood or furniture crafting thereby supporting local circular economies.
- Support local food security.

(ii) Cumulative Impacts

- The cumulative impact of temporary employment opportunities during construction is assessed to be “Low” – it is unlikely that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.10 VISUAL IMPACT

The introduction of large-scale agricultural infrastructure, including pivot irrigation systems, water supply infrastructure, and access roads, inevitably introduces anthropogenic elements into the visual landscape. These structures possess the potential to create a visually discordant contrast with the surrounding natural environment. The expansive scale of pivot systems, particularly in large-scale agricultural developments, can further contribute to a perceived industrialisation of the landscape. However, given the project area's considerable distance from potential visual receptors, the magnitude of this impact is assessed to be relatively low. Furthermore, the proponent's commitment to promoting the growth and maintenance of indigenous

vegetation within the inter-pivot areas serves to mitigate the visual impact by preserving elements of the natural landscape.

(i) Mitigation measures

- Dedicated waste bins to be placed near construction sites to prevent littering.
- Preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area.
- Limit vegetation clearance to access roads, pivots and infrastructure.
- Implement alien vegetation control measures.

(ii) Cumulative Impacts

- Cumulative Impacts are expected to be “Low”.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.11 NOISE IMPACT

The use of bulldozers, excavators, tractors, and other construction equipment during land preparation produces substantial noise levels, which can be disruptive to both human and wildlife populations. The intensity and duration of noise impacts are directly related to the scale of the land clearance operation and the proximity of sensitive receptors, such as wildlife habitats.

(i) Mitigation measures

- Schedule noisy activities during daytime hours.
- Use noise barriers or mufflers on construction equipment, as far as possible.
- Provide hearing protection to workers.
- Inform the community of loud operations.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.12 FIRE DAMAGE

The removal of natural vegetation, including grasses, shrubs, and trees, creates a substantial accumulation of dry organic material, such as cut vegetation and debris. This material, if left unmanaged, acts as a readily available fuel source, significantly increasing the risk of ignition and rapid fire spread. The operation of heavy machinery during land clearance further exacerbates fire risks. Additionally, the use of welding equipment or other hot work during infrastructure installation poses a potential ignition source. The presence of flammable liquids, such as fuel and lubricants, on site also increases the risk of fire incidents. The potential for uncontrolled fires to spread to adjacent farmlands, natural vegetation, or infrastructure poses a considerable threat to both ecological integrity and human safety. Therefore, stringent fire prevention and suppression measures must be implemented during all phases of pivot development, particularly during land clearance.

(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.
- Prevent the accumulation of dry organic material by removing the material as soon as possible.
- It is recommended that cleared vegetation be recycled as far as practicably possible. Cleared organic material can be allowed to compost or mulch areas needing rehabilitation, and usable timber can be upcycled for use on-site such as fencing or donated to communities for firewood or furniture crafting.

(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 is expected.

8.2.3 OPERATIONAL PHASE IMPACTS

The Operational Phase will initially entail the planting, growing and irrigation of the potato seed crops. Once all pivots have been established at the end of the 5-year development period, it will also entail the clearance of the grazing grass vegetation to make way for the potato seed crop. During the grazing grass stage of the rotation, it is expected that small vegetation communities and species will be found in the pivot areas.

8.2.3.1 HABITAT FRAGMENTATION, LOSS OF NATURAL VEGETATION AND ALIEN INVASION

Vegetation clearing will occur as a result of the development of irrigation pivots. This loss of natural vegetation will cause 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. 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 / 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.

As with all disturbance, there is an increased risk of alien infestation. 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.

(i) Mitigation Measures

- Vegetation clearing should be restricted to areas of the pivot only. Alien vegetation that has grown as a result of land clearing must be removed by approved methods.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "Medium" - it is probable that the impact will result in spatial and temporal cumulative change.

- There are already substantial numbers of pivots located all along the Vaal River from Douglas to Schmitsdrif, as well as a secondary gravel road that runs along the river connecting the R375 to the N8, so much of this ecosystem has already been fragmented. The layout of the pivots is such that there will be some continuous natural vegetation on the property which may assist in lessening the onsite impact of fragmentation from the pivots.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss of Resources was assessed to be "Low" - the impact is unlikely to result in irreplaceable loss of resources.
- 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.

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

Anthropogenic disturbances include aspects such as, vibrations caused by machinery and 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.

(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.
- Equipment, vehicles and machinery must be serviced and kept in good working order to avoid unnecessary vibrations.
- A search and rescue can be conducted prior to clearing activities, for example animals such as tortoises should be moved out of harm's way.
- As the 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.

(ii) Cumulative Impacts

- Cumulative Impacts was assessed to be "High" - it is highly probable/definite that the impact will result in spatial and temporal cumulative change.

(iii) Irreplaceable Loss of Resources

- Irreplaceable Loss of Resources was assessed to be "Low" - the impact is unlikely to result in irreplaceable loss of resources.

8.2.3.3 IMPACT ON SOIL

Pivot agriculture, while enhancing agricultural productivity, introduces a range of potential impacts on soil health and integrity. The consistent application of irrigation water, particularly if not managed optimally, can lead to soil salinization. This occurs when salts, naturally present in irrigation water, accumulate in the soil profile due to evapotranspiration exceeding leaching, especially in arid and semi-arid regions. This salinization can degrade soil structure, reduce water infiltration, and inhibit plant growth.

Intensive pivot irrigation often necessitates the application of fertilizers and pesticides to maximize crop yields. The overuse or improper application of these chemicals can lead to soil contamination, altering the soil's chemical balance and potentially harming beneficial soil organisms. Excessive nitrogen and phosphorus inputs

can contribute to nutrient imbalances and eutrophication of nearby water bodies through runoff. Pesticide residues can accumulate in the soil, posing risks to soil biota and potentially entering the food chain.

Soil compaction is another significant concern associated with pivot agriculture. The operation of heavy machinery for irrigation system maintenance, fertilizer application, and harvesting can compact the soil, reducing its porosity and impeding water infiltration, aeration, and root penetration. This compaction can lead to increased runoff, soil erosion, and reduced crop yields. Leaks on vehicles or tractors or accidental spillages can seep into and contaminate soil and possibly the groundwater.

The potential for soil erosion is heightened due to the removal of natural vegetation and the creation of large, exposed areas. While pivot systems themselves can reduce some wind erosion, water erosion is still a concern, especially on sloped terrain. The increased runoff from irrigation can carry away topsoil, reducing soil fertility and contributing to sedimentation of downstream water bodies. Therefore, soil management practices, including appropriate irrigation scheduling, integrated pest management, and conservation tillage, are essential to mitigate these adverse impacts and ensure the long-term sustainability of pivot agriculture.

The integration of potato and onion cultivation within crop rotation systems can lead to improvements in soil structure and fertility. The diverse root systems of these crops explore varying soil horizons, and the post-harvest organic matter contributes to soil enrichment. Specific cultivation practices associated with potato farming, such as the implementation of cover crops and mulching, are effective in reducing soil erosion. Similarly, the application of mulching techniques in onion farming contributes to soil conservation. In comparison to certain alternative food production systems, potato production generally exhibits a lower carbon footprint per unit of energy provided (Gustaven, 2021). Effective Weed Management through Integrated Strategies: The utilization of mulching in both potato and onion cultivation serves as an effective method for suppressing weed proliferation, thereby reducing the requirement for chemical herbicides. Furthermore, the intercropping of onions with compatible species can provide an additional layer of weed control. The practice of intercropping potatoes or onions with complementary plant species can enhance biodiversity within the agricultural system. This increased diversity has the potential to attract beneficial insect populations and contribute to improved soil health.

(i) Mitigation measures

- Implementation of efficient irrigation scheduling, reducing water application and evapotranspiration.
- Conduct routine soil tests to monitor salinity levels and identify areas of accumulation.
- Implement periodic leaching practices by applying excess water to flush accumulated salts below the root zone.
- Implement Integrated Pest Management (IPM) strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications
- Utilize soil testing and crop nutrient requirements to determine precise fertilizer application rates, reducing over-application
- Employ slow-release fertilizers as far as possible to minimize nutrient leaching and runoff.
- Implement strict protocols for the handling, storage, and disposal of fertilizers and pesticides to prevent soil contamination.
- Minimise soil compaction by using designated routes as far as possible.
- Implement minimum or no-till farming practices as far as possible to minimize soil disturbance and maintain soil structure.
- Incorporate organic matter, such as compost or cover crops, into the soil to improve soil structure and reduce compaction, where possible.
- Plant cover crops during fallow periods to protect the soil from erosion.

- Establish windbreaks using local indigenous trees or shrubs to reduce wind erosion between pivots.
- Where possible, consider intercropping, i.e. planting multiple crops simultaneously to increase soil biodiversity and nutrient utilisation.
- Ensure that all vehicles used 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 bunded impervious area and no direct contact between the storage containers and the ground is allowed.
- Implement crop rotation, mulching and cattle grazing during fallow season to contribute to soil quality improvement.
- Undertake Global G.A.P. audits to ensure fertilizer application is undertaking in accordance with the regulations.

(i) Cumulative Impacts

- The Cumulative Impacts on soil quality and health from the operation of the pivots over time can be medium to high if not properly mitigated. When combined with robust and proactive soil management practices, the cumulative impact can be reduced significantly. With effective implementation of the proposed mitigation measures, the cumulative impact can be reduced to “Low”.

(ii) Irreplaceable loss of Resources

- No irreplaceable loss is expected with the proposed mitigation measures effected.

8.2.3.4 IMPACT ON WATER

Surface water contamination from agricultural runoff (nutrients, pesticides) and oil/ fuel spillages.

Pivot irrigation systems, particularly in large-scale operations, necessitate substantial water abstraction from surface or groundwater sources, potentially leading to depletion of these resources and surface and groundwater contamination. Agricultural runoff from pivot-irrigated fields often carries fertilizers, pesticides, and sediments into nearby water bodies. Excessive nutrient loading, particularly nitrogen and phosphorus, can lead to eutrophication, causing algal blooms, oxygen depletion, and degradation of aquatic ecosystems. Pesticide runoff can contaminate surface and groundwater, posing risks to aquatic life and human health. Sedimentation from soil erosion can reduce water clarity and impair aquatic habitats.

While these systems are generally more efficient than traditional flood irrigation, losses can still occur through evaporation, runoff, and deep percolation. Improperly maintained or poorly designed systems can exacerbate these losses, leading to increased water demand and reduced water availability for other users. Additionally, the alteration of natural drainage patterns due to the construction of irrigation infrastructure can change hydrological regimes, affecting downstream water availability and quality. Leaks from vehicles or tractors or accidental spillages can seep into and contaminate soil and possibly the groundwater.

Studies have shown that South African potato producers, on average, are among the most water-efficient in the world. This means they produce a significant amount of potatoes with a relatively low amount of water (Kriel, 2015).

(i) Mitigation measures

- Implementation of efficient irrigation scheduling, reducing water application and evapotranspiration.
- Employ evapotranspiration-based irrigation scheduling to match water application with crop water needs, reducing over-irrigation.

- Establish a monitoring program to track water levels and identify potential depletion.
- Utilize IPM strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications as far as possible.
- Employ soil testing and crop nutrient requirements to determine precise fertilizer application rates, reducing over-application.
- Utilize slow-release fertilizers as far as possible to minimize nutrient leaching and runoff.
- Employ erosion control techniques, such as mulching, to minimize sediment runoff.
- Develop and Implement a Nutrient Management Plan, detailing the type, amount, timing and placement of fertilizers.
- Develop and implement a pesticide management plan, detailing what pesticides are being used, and how they will be applied.
- Conduct regular maintenance and inspections of irrigation systems to identify and repair leaks or malfunctions.

(ii) Cumulative Impacts

- Cumulative Impacts is assessed to be "Low" – it is unlikely that the impact will result in spatial and temporal cumulative change

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.5 IMPACT ON AIR

Pesticide drift, dust generation during harvesting, emissions from farm machinery.

Pivot agriculture generates several impacts on air quality, with the most significant concern is the potential for increased dust generation. The large, exposed areas created by pivot irrigation systems, particularly during land preparation and harvesting, can become significant sources of airborne particulate matter. This dust, composed of soil particles and organic matter, can be carried by wind, leading to reduced visibility, respiratory problems, and deposition on surrounding vegetation and infrastructure.

The operation of farm machinery, including tractors, harvesters, and irrigation pumps, contributes to air pollution through the emission of combustion byproducts. These emissions, containing nitrogen oxides, carbon monoxide, volatile organic compounds, and particulate matter, can degrade local air quality and contribute to regional air pollution. The intensity of these emissions is influenced by the type and age of machinery, the duration of operation, and the type of fuel used.

The application of pesticides and fertilizers in pivot agriculture can also impact air quality. Pesticide drift, the airborne movement of pesticide droplets or vapours, can contaminate surrounding areas, posing risks to human health and non-target organisms. Volatile organic compounds (VOCs) emitted from some pesticides can contribute to the formation of ground-level ozone, a harmful air pollutant. Similarly, the volatilization of ammonia from nitrogen fertilizers can contribute to the formation of secondary particulate matter, further degrading air quality. Additionally, the application of nitrogen fertilizers can lead to the release of nitrous oxide, a potent greenhouse gas. The decomposition of organic matter in irrigated soils can also contribute to methane emissions. While these emissions may be relatively small on a per-farm basis, the cumulative impact of widespread pivot agriculture can be significant.

(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.

- Apply dust suppressants to roads and bare fields.
- Implement minimum tillage or no-till farming practices to minimize soil disturbance.
- Establish windbreaks using local indigenous trees or shrubs to reduce wind speeds and dust generation.
- Ensure that all farm machinery is regularly maintained and in good working order to minimize emissions.
- Stationary vehicles should be powered down, avoiding extended periods of idling, to reduce unnecessary emissions.
- Avoid applying pesticides during windy conditions.
- Use low-drift application techniques, as far as possible to minimise airborne particles of pesticides.
- Implement an IPM to minimize pesticide use by relying on biological control, cultural practices, and targeted applications.
- Apply fertilizers based on soil testing and crop nutrient requirements to minimize over-application.

(ii) Cumulative Impacts

- Cumulative Impacts are assessed to be “Low”.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.6 SOCIO-ECONOMIC IMPACT

Increased agricultural production, potential for job creation (long-term), changes in land use, potential health risks from pesticide exposure.

The proposed project will create employment opportunities and contribute to food security. During operation, approximately 150 skilled opportunities and 50 un-skilled opportunities will be created. These are more permanent in nature as the workforce will be required during each harvest for the duration of the project. This impact was rated as medium to high positive before and after implementation of improvement measures. Additionally, this project will contribute to increased agriculture production, thereby also contributing to the development and expansion of agricultural activities as per the Sol Plaatje Local Municipality SDF.

(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 is expected.

8.2.3.7 VISUAL IMPACT

The impact is not expected to be significant as one of the major surrounding land uses in the area is pivot irrigation and other agricultural practices, however, the visual aesthetic of the directly affected footprint area will be different than its current, vegetated natural state. Additionally, the proponent's commitment to promoting the growth and maintenance of indigenous vegetation within the inter-pivot areas serves to mitigate the visual impact by preserving elements of the natural landscape.

(i) Mitigation measures

- Implement alien vegetation control measures.

(ii) Cumulative Impacts

- Cumulative Impacts of the pivots is expected to be “Medium” - it is probable that the impact will result in spatial and temporal cumulative change, as there are already numerous similar pivots in the area, therefore the additional pivots will contribute to the visual impact of the general area.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.8 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.

(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.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.9 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.

(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.
- No smoking will be allowed within close vicinity of the site.
- It is recommended that if fire breaks were created around each pivot, that they be maintained and regularly cleared of any vegetation.
- Prevent the accumulation of dry organic material by removing the material as soon as possible.

- It is recommended that cleared vegetation be recycled as far as practicably possible. Cleared organic material can be allowed to compost or mulch areas needing rehabilitation.

(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 is expected.

8.2.4 DECOMMISSIONING AND REHABILITATION PHASE IMPACTS

Decommissioning of a pivot is not a high impact process. It will entail removal of the centre pivot system and allowing natural rehabilitation to occur over time. The applicant will be 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.

8.2.4.1 RESIDUAL CONTAMINATION OF SOIL

Potential for residual contamination, soil compaction.

Residual soil contamination can arise from the prolonged use of agricultural chemicals, such as pesticides and fertilizers, which may persist in the soil matrix even after irrigation activities cease. Improper removal or decommissioning of storage facilities for these chemicals can further exacerbate this risk, leading to localized contamination hotspots. Additionally, potential spills or leaks of fuels and lubricants from machinery during the decommissioning process can introduce hydrocarbons into the soil, posing long-term contamination hazards.

The long-term implications of residual contamination extend beyond immediate environmental degradation. Persistent soil and water contamination can hinder the successful rehabilitation of the site, impeding the establishment of native vegetation and potentially impacting future land use. Contaminated soil can also pose risks to human health if the land is repurposed for residential or recreational activities. Contaminated water sources can affect downstream users and aquatic ecosystems. Therefore, thorough soil and water testing, coupled with appropriate remediation and restoration strategies, are essential to minimize the residual impacts of pivot irrigation decommissioning and closure.

(i) Mitigation measures

- Conduct comprehensive soil testing to identify potential contamination sites.
- Develop and implement a site-specific soil remediation plan based on the results of soil testing.
- Remove all residual chemicals and fuels from storage facilities and equipment.
- Remove all infrastructure and equipment.
- Implement erosion control measures during the rehabilitation phase, such as silt fences, and sediment basins, to prevent contaminated soil from entering waterways.
- Implement a long-term monitoring program to assess the effectiveness of remediation and rehabilitation efforts.

(i) Cumulative Impacts

- The Cumulative Impacts of residual soil contamination, if not properly mitigated, can be high. With effective implementation of the proposed mitigation measures, the cumulative impact can be reduced to Low.

(ii) Irreplaceable loss of Resources

- No irreplaceable loss is expected with the proposed mitigation measures effected.

8.2.4.2 RESIDUAL CONTAMINATION OF WATER

Potential for residual contamination of groundwater or surface water.

Residual soil contamination can arise from the prolonged use of agricultural chemicals, such as pesticides and fertilizers, which may persist in the soil matrix even after irrigation activities cease. Improper removal or decommissioning of storage facilities for these chemicals can further exacerbate this risk, leading to localized contamination hotspots. Additionally, potential spills or leaks of fuels and lubricants from machinery during the decommissioning process can introduce hydrocarbons into the soil, posing long-term contamination hazards.

Similarly, the potential for residual water contamination is a significant concern during this phase. Groundwater and surface water resources can be affected by the leaching of residual agricultural chemicals from the soil into water bodies. Runoff from rehabilitated areas, particularly if erosion control measures are inadequate, can transport contaminated sediments and dissolved chemicals into surface water systems. Furthermore, the removal of irrigation infrastructure, such as pipelines and storage reservoirs, can disturb accumulated sediments or introduce contaminants into watercourses if not handled with appropriate precautions.

The long-term implications of residual contamination extend beyond immediate environmental degradation. Persistent soil and water contamination can hinder the successful rehabilitation of the site, impeding the establishment of native vegetation and potentially impacting future land use. Contaminated soil can also pose risks to human health if the land is repurposed for residential or recreational activities. Contaminated water sources can affect downstream users and aquatic ecosystems. Therefore, thorough soil and water testing, coupled with appropriate remediation and restoration strategies, are essential to minimize the residual impacts of pivot irrigation decommissioning and closure.

(i) Mitigation measures

- Conduct comprehensive soil testing to identify potential contamination sites.
- Develop and implement a site-specific soil remediation plan based on the results of soil testing.
- Remove all residual chemicals and fuels from storage facilities and equipment.
- Remove all infrastructure and equipment.
- Implement erosion control measures during the rehabilitation phase, such as silt fences, and sediment basins, to prevent contaminated soil from entering waterways.
- Implement a long-term monitoring program to assess the effectiveness of remediation and rehabilitation efforts.

(ii) Cumulative Impacts

- The Cumulative Impacts of residual water contamination, if not properly mitigated, can be high. With effective implementation of the proposed mitigation measures, the cumulative impact can be reduced to Low.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected with the proposed mitigations effected.

8.2.4.3 IMPACT ON BIODIVERSITY – ALIEN SPECIES INVASION

During the rehabilitation and decommissioning phase, disturbed areas will be susceptible to colonisation by alien invasive species, particularly along the periphery of the irrigation lands. Disturbance creates favourable conditions for such species to establish and spread, posing a threat to local biodiversity in several 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.

(i) Mitigation measures

- Alien vegetation that has grown in the pivot areas and disturbed land must be removed through approved methods.
- The pivot footprints need to be revegetated with local indigenous grass species.

(iv) Cumulative Impacts

- No cumulative impacts are expected.

(v) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.3 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 23** below.

Table 23: Identified Preliminary Impacts.

Impact	Alternative	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Consequence2	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Loss of fossil Heritage	A1	Construction	-1	1	5	3	5	-3.5	3	-10.5	Medium to high -	-1	1	5	1	5	-3	2	-6	Medium to low -	High	1	3	1.25	-7.50	Medium to low -
Habitat fragmentation, Loss of Natural vegetation and Alien invasion	A1	Construction	-1	2	4	3	4	-3.25	3	-9.75	Medium to high -	-1	1	4	2	3	-2.5	3	-7.5	Medium to low -	High	2	1	1.13	-8.44	Medium to low -
Loss of Species of Conservation Concern	A1	Construction	-1	2	4	3	3	-3	3	-9	Medium to high -	-1	1	4	2	3	-2.5	3	-7.5	Medium to low -	High	2	1	1.13	-8.44	Medium to low -
Anthropogenic Disturbances, Intentional and/or accidental killing of fauna	A1	Construction	-1	1	3	2	2	-2	3	-6	Medium to low -	-1	1	3	1	2	-1.75	2	-3.5	Low -	Medium	2	1	1.13	-3.94	Low -
Habitat fragmentation, Loss of Natural vegetation and Alien invasion	A1	Operation	-1	2	4	3	4	-3.25	3	-9.75	Medium to high -	-1	1	4	2	3	-2.5	3	-7.5	Medium to low -	High	2	1	1.13	-8.44	Medium to low -
Anthropogenic Disturbances, Intentional and/or accidental killing of fauna	A1	Operation	-1	1	3	2	2	-2	3	-6	Medium to low -	-1	1	3	1	2	-1.75	2	-3.5	Low -	Medium	2	1	1.13	-3.94	Low -
Impact on Biodiversity - Alien Species Invasion	A1	Decommissioning	-1	2	4	3	4	0	3	-9.75	Medium to high -	-1	1	4	2	2	-2.25	3	-6.75	Medium to low -	High	1	1	1.00	-6.75	Medium to low -
Socio-economic Impacts - Construction	A1	Construction	1	3	1	1	3	2	4	8	Low to medium +	1	3	1	2	3	2.25	4	9	Medium to high +	Medium	1	1	1.00	9.00	Medium to high +
Socio-economic Impacts - Operation	A1	Operation	1	3	2	2	3	2.5	4	10	Medium to high +	1	3	2	3	3	2.75	4	11	Medium to high +	Medium	2	1	1.13	12.38	Medium to high +
Destruction or disturbance of identified stone tool sites and finds.	A1	Construction	-1	1	5	1	2	-2.25	5	-11.25	Medium to high -	-1	1	1	2	2	-1.5	2	-3	Low -	Medium	1	2	1.13	-3.38	Low -
Destruction or disturbance of undiscovered below-ground heritage features.	A1	Construction	-1	1	5	4	5	-3.75	2	-7.5	Medium to low -	-1	1	1	2	3	-1.75	2	-3.5	Low -	Medium	1	2	1.13	-3.94	Low -
Noise Nuisance	A1	Construction	-1	2	1	3	2	-2	4	-8	Medium to low -	-1	1	1	2	1	-1.25	2	-2.5	Low -	High	1	1	1.00	-2.50	Low -
Noise Nuisance	A1	Operation	-1	2	2	3	2	-2.25	4	-9	Medium to high -	-1	1	2	2	1	-1.5	2	-3	Low -	High	1	1	1.00	-3.00	Low -
Fire Damage	A1	Construction	-1	2	2	3	3	-2.5	3	-7.5	Medium to low -	-1	2	2	1	2	-1.75	1	-1.75	Low -	Low	2	1	1.13	-1.97	Low -

Impact	Alternative	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Consequence2	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Fire Damage	A1	Operation	-1	2	2	3	3	-2.5	2	-5	Medium to low -	-1	2	2	1	2	-1.75	1	-1.75	Low -	Low	2	1	1.13	-1.97	Low -
Impact on Soil	A1	Construction	-1	2	3	2	3	-2.5	2	-5	Medium to low -	-1	2	2	1	2	-1.75	2	-3.5	Low -	High	1	1	1.00	-3.50	Low -
Impact on Soil	A1	Operation	-1	2	5	4	4	-3.75	4	-15	High -	-1	2	3	2	1	-2	2	-4	Low -	High	1	1	1.00	-4.00	Low -
Residual Impacts on Soil	A1	Decommissioning	-1	2	5	4	4	-3.75	4	-15	High -	-1	2	2	2	1	-1.75	2	-3.5	Low -	High	1	1	1.00	-3.50	Low -
Impact on Water	A1	Construction	-1	2	1	3	3	-2.25	2	-4.5	Medium to low -	-1	2	1	2	2	-1.75	2	-3.5	Low -	High	1	1	1.00	-3.50	Low -
Impact on Water	A1	Operation	-1	2	4	4	3	-3.25	2	-6.5	Medium to low -	-1	2	3	2	1	-2	2	-4	Low -	High	1	1	1.00	-4.00	Low -
Residual Impacts on Water	A1	Decommissioning	-1	2	4	4	3	-3.25	2	-6.5	Medium to low -	-1	2	1	2	2	-1.75	2	-3.5	Low -	High	1	1	1.00	-3.50	Low -
Impact on Air	A1	Construction	-1	2	1	2	2	-1.75	4	-7	Medium to low -	-1	2	1	1	2	-1.5	2	-3	Low -	Low	1	1	1.00	-3.00	Low -
Impact on Air	A1	Operation	-1	2	3	2	2	-2.25	4	-9	Medium to high -	-1	2	3	1	2	-2	2	-4	Low -	Low	1	1	1.00	-4.00	Low -
Visual Impacts	A1	Construction	-1	2	1	2	3	-2	3	-6	Medium to low -	-1	2	1	2	2	-1.75	2	-3.5	Low -	Medium	1	1	1.00	-3.50	Low -

9 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

The Environmental Impact Assessment (EIA) will evaluate the proposed project by assessing various alternatives, including the "no-go" option, and defining a clear scope of assessment. Specialist studies will address specific environmental aspects, while a defined methodology will assess the duration and significance of potential impacts. Throughout the process, the competent authority (the DAERL) will be consulted at key stages, and a public participation process will ensure stakeholder engagement. The EIA will outline the tasks to be undertaken, and ultimately, identify suitable mitigation measures to minimize impacts and determine residual risks, providing a thorough analysis for informed decision-making.

9.1 PROJECT ALTERNATIVES

Only incremental and layout alternatives will be considered further going into the EIA phase. 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. The evaluation of site layout alternatives for agricultural pivot developments typically examines various spatial configurations to optimize irrigation efficiency and land utilization. These will be investigated further during the EIA phase and will form part of the EMPr.

9.2 SCOPE OF ASSESSMENT

The following aspects will be assessed further during the EIA phase investigations to be undertaken:

- It is the EAP and specialist's opinion that no additional specialist studies will have to be considered during the EIA phase. EIA level specialist studies were done during this scoping phase for biodiversity, heritage, and palaeontology.
- An overall sensitivity map of the proposed project will be created to rank the different site sensitivities.
- Incremental and layout alternatives may be further assessed during the EIA phase.
- Any comments received from the competent authority, I&APs and other stakeholders will be taken into account and assessed during the EIA phase.

9.3 SPECIALIST ASSESSMENTS

EIA level biodiversity, heritage and palaeontological specialist studies have already been undertaken for the proposed project during this scoping phase assessment. The impacts and their ratings as identified by the specialists and the EAP is unlikely to change during the impact assessment phase of this study. However, comments as received by the competent authority, I&APs and other stakeholders will be considered during the EIA phase and the impact ratings adjusted if necessary.

9.4 IMPACT ASSESSMENT METHODOLOGY

EIA level specialist studies, assessing the environmental aspects, were already done for biodiversity, heritage and palaeontology. No additional specialist studies were considered necessary. It is unlikely that any additional specialist assessment of environmental aspects will be required however, any comments received from the competent authority, I&AP's and other stakeholders with regards to environmental aspects will be taken in consideration.

Further to the above-mentioned environmental sensitivity mapping will be conducted during the EIA phase. 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 as well as

desktop input where required. Therefore, the sensitivity mapping exercise assists in the identification of low, medium and highly sensitive areas within and surrounding the proposed development footprint area. The sensitivity/ composite map will only consist of information as received from the specialist as well as desktop information where specialist studies were considered unnecessary relating to the proposed project

9.4.1 PROPOSED METHOD FOR ASSESSING SIGNIFICANCE

As done is this Scoping phase assessment, the significance of environmental impacts will be rated before and after the implementation of mitigation measures. These mitigation measures may be existing measures or additional measures that may arise from the public participation process. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation. The proposed method for the assessment of environmental issues is set out in the **Section 8**. This assessment methodology enables the assessment of environmental issues including: the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

9.5 AUTHORITY CONSULTATION

Competent authorities were notified of the proposed project during the initial notification period of the scoping phase and will further be included and notified of the project proceedings during the EIA phase. This Scoping report was also sent to the competent authorities for comment, as will the EIA report. If and/ or when an authority requires a meeting, one will be arranged. Should a meeting be required, the date, time, and venue of the meeting will be scheduled post dissemination of the project notification documents. The purpose of an authority meeting would be to explain the project in detail to authorities and clarify the process going forward if uncertainties exist.

9.6 STAKEHOLDER ENGAGEMENT

The proposed public participation process to be followed for the EIA phase is provided below.

- The commenting periods that will be provided to the I&AP's (and the competent authorities) will be 30 days as per the relevant legislative requirements.
- The dates of the review and commenting period for the draft EIA and EMPr will be determined at a later date and communicated to all registered I&AP's through faxes, emails, SMS's and/or registered letters.
- The location at which the hard copy of the EIA report will be made available is at the same public places in the project area that the Scoping Report was made available (refer to **Section 6.2.4**), sent electronically to stakeholders who request a copy, and placed on the EIMS website: www.eims.co.za.
- The public participation will be undertaken in compliance with NEMA GNR 982 (Chapter 6).
- If requested, a public meeting will be held during the review period for the EIA report.
- All comments and issues raised during the comment periods will be incorporated into the final EIA Report.

9.7 TASKS TO BE UNDERTAKEN DURING EIA PHASE

The plan of study detailed in the above sections and is summarised below. The following tasks will be undertaken as part of the EIA phase of the project:

- Public consultation:
    - Notification of the availability of the EIA Report for review and comment to all registered I&AP's;
    - Public meetings (if requested).

- Authority consultation:
    - Consultation with DAERL and the commenting authorities; and
    - Authority consultation (including meetings where necessary) to provide authorities with project related information and obtain their feedback.
- Document compilation:
    - The EIA and EMPr will be compiled in line with the requirements of Appendix 3 and 4 of the NEMA EIA Regulations.
    - The EIA and EMPr will be made available for public comment for a period of 30 days.
    - The EIA and EMPr will be finalised and submitted to the DAERL for adjudication and decision making.

9.8 IMPACTS AND MITIGATIONS ASSESSMENT

All comments received from I&APs during the Scoping Report review will be taken into consideration and where applicable inform the high-level mitigation measures. Detailed mitigation measures will be further developed as part of the EIA phase. The potential impacts will further be assessed in terms of the mitigation potential, taking into consideration the following:

- Reversibility of impact:
    - Reversible;
    - Partially reversible.; and
    - Irreversible.
- Irreplaceable loss of resources:
    - Replaceable;
    - Partially replaceable; and
    - Irreplaceable.
- Potential of impacts to be mitigated:
    - High;
    - Medium; and
    - Low.

More detailed assessment findings for each identified impact taking the above into consideration will be provided in the EIA Report and associated EMPr.

10 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

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

- Unless specifically noted, the environmental attributes for the receiving environment have been obtained from best available spatial and scientific data sources. Whilst reasonable effort has been taken to obtain the most recent and relevant data, there may be gaps in baseline data, leading to uncertainties in impact predictions. Where uncertainty exists, efforts are made to indicate this in the assessment.
- This study is based on activity information provided by the applicant (including engineering designs, specifications, services reports, etc). The accuracy of this information has not been verified, and it is assumed that no significant changes or deviations to the final designs will occur. Should such occur the significance of the potential impacts may require reassessment and where relevant formal amendment processes.
- The information presented in this report is based on the information available at the time of compilation of the report.
- Whilst reasonable effort has been made to identify all potential environmental impacts, some impacts may not be reasonably foreseeable or may emerge only after project implementation.
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report will be correctly and effectively implemented and managed throughout the life of the project.

11 UNDERTAKINGS

11.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, Jolene Webber, 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

(Signed 2025/05/29)

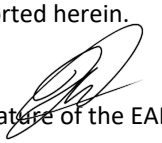
I, Monica Niehof, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report.

Signature of the EAP

(Signed 2025/05/29)

11.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, Jolene Webber, 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

(Signed 2025/05/29)

I, Monica Niehof, 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

(Signed 2025/05/29)

12 REFERENCES

Department of Water Affairs. (2012). Aquifer Classification of South Africa.

Department of Water Affairs. (2012). Groundwater Quality of South Africa.

Department of Water & Sanitation (DWS), South Africa. (2022). Investigation of Groundwater and Surface Water Interaction for the Protection of Water Resources in the Lower Vaal Catchment: Main-Report. Prepared by WSM Leshika Consulting. Report no: RDM/WMA05/00/GWSW/0423.

Dreyer, W. (2024). Semi Detail Soil Survey of the Farm Witpan, Kimberley District, Northern Cape. Precision Farming Services.

Driver, A. H. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Pretoria: SANBI.

Frances Baard District Municipality. (2021). Spatial Development Framework.

Gustaven, G. (2021). Sustainability and Potato Consumption. *Potato Research*, 571-586.

Kriel, G. (2015). High yield with less water : SA potato growers excel : farming for tomorrow. *Farmer's Weekly*.

Le Maitre, D., Seyler, H., Holland, M., Smith-Adao, L., Maherry, A., Nel, J., and Witthüser, K. (2018). Identification, Delineation and Importance of Strategic Water Source Areas of South Africa, Lesotho and Swaziland for Surface Water and Groundwater. Report No. TT 743/1/18, Water Research Commission, Pretoria.

Mucina, L. and Rutherford, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. South African National Biodiversity Institute, Pretoria, South Africa.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. & Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801

Oosthuysen, E. & Geldenhuys, L. (2024). *Northern Cape Biodiversity Spatial Plan: Technical Report*. Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform, Springbok.

SANBI. (2023). *Strategic Water Source Areas count says Stats SA report*. https://www.sanbi.org/media/strategic-water-source-areas-count-says-stats-sa-report/. Accessed 16 May 2025.

SANBI. (2017). *Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning*. First Edition (Beta Version), June 2017. Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria.

Sol Plaatje Local Municipality. (2022). Spatial Development Framework.

Stats SA Census. (2022). Census - Frances Baard. Retrieved from StatsSA: https://census.statssa.gov.za/#/province/3/2

Weather & Climate. (2025, March 18). Kimberley Weather and Climate: A comprehensive Guide. Retrieved from Weather & Climate: https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,kimberley-northern-cape-za,South-Africa

Weatherbase. (2025, March 18). Kimberley Northern Cape South Africa. Retrieved from Weatherbase: https://weatherbase.com/weather/weather-summary.php3?s=83486&cityname=Kimberley%2C+Northern+Cape%2C+South+Africa&units=

13 APPENDICES

Appendix D: Copy of EA application form