

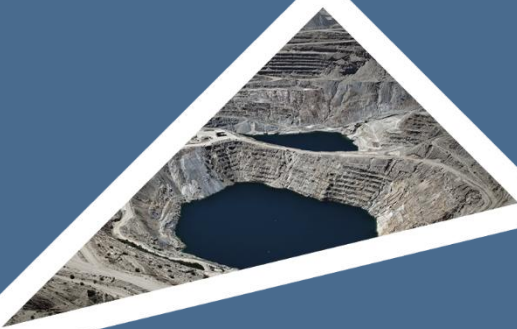


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ENVIRONMENTAL IMPACT REPORT

AQUA FARMING DROOGFONTEIN PIVOT AGRICULTURE EIA
DAERL REFERENCE: NC/EIA/04/FB/SOL/KIM2/2025





DOCUMENT DETAILS

EIMS REFERENCE:	1680
DAERL REFERENCE:	NC/EIA/04/FB/SOL/KIM2/2025
DOCUMENT TITLE:	Environmental Impact Report: Aqua Farming Droogfontein Pivot Agriculture EIA

DOCUMENT CONTROL

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REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2025/07/23	ORIGINAL DOCUMENT	ENVIRONMENTAL IMPACT REPORT FOR PUBLIC REVIEW

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Appendix 6: Specialist Assessment Reports.

Appendix 7: Impact Assessment Matrix.

Appendix 8: Application Form.

Appendix 9: Environmental Management Programme.

List of Abbreviations

AEL	Atmospheric Emission Licence
ASAPA	Association of Southern African Professional Archaeologists
BA	Basic Assessment
BPG	Best Practice Guideline
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CDNGI	Chief Directorate: National Geo-spatial Information
COGHSTA	Northern Cape Department of Co-operative Governance, Human Settlement and Traditional Affairs
CSA	Conservation South Africa
DAERL	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
DEA	Department of Environmental Affairs
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DGDS	District Municipality Growth and Development Strategy
DHSWS	Department of Human Settlements, Water and Sanitation



DMRE	National Department of Mineral Resources & Energy
DRNC DR&PW	Northern Cape Department of Roads & Public Works
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECA	Environment Conservation Act
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIMS	Environmental Impact Management Services (Pty) Ltd
EMPr	Environmental Management Programme
FBDM	Frances Baard District Municipality
FEPA	Freshwater Ecosystem Priority Area
FSPHRA	Free State Heritage Resources Authority
GA	General Authorisation
GDP	Gross Domestic Product
GIS	Geographic Information system
GLADA	Global Assessment of Land Degradation
GN	Government Notice
GNR	Government Notice Regulation
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPM	Integrated Pest Management
ISO	International Organisation for Standardisation



ISRIC	International Soil Reference and Information System
LED	Municipal Economic Development
LM	Local Municipality
LSA	Later Stone Age
LUS	Land Use Schemes
MEC	Member of the Executive Council
NC	Northern cape
NCEDA	Northern Cape Economic Development, Trade and Investment Promotion Agency
NCHRA	Northern Cape Heritage Resources Authority
NCR	Noise Control Regulations
NDP	National Development Plan
NEM: AQA	National Environmental Management: Air Quality Act
NEM: BA	National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2004);
NEM: PAA	National Environmental Management: Protected Areas Act
NEMA	National Environmental Management Act
NFA	National Forests Act
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NWA	National Water Act
PP	Public Participation
PPP	Public Participation Process
REDZ	Renewable Energy Development Zone
SA	South Africa
SACAA	South African Civil Aviation Authority
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute



SANParks	South African National Park
SANRAL	South African National Roads Agency Limited
SAR	South African Railways
SAS	Suid-Afrikaanse Spoorweë
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessments
SEMA	Specific Environmental Management Acts
SMME	Small, Medium, and Micro Enterprises
SPLM	Sol Plaatje Local Municipality
SPLUMA	Spatial Planning and Land Use management Act
SSVR	Site Sensitivity Verification Report
UGB	Urban Growth Boundary
VOC	Volatile organic compounds
WESSA	Wildlife & Environmental Society of South Africa
WML	Waste Management Licence
WUL	Water Use Licence



EXECUTIVE SUMMARY

Aqua Farming (Pty) Ltd (the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of an application for:

- Environmental Authorisation in accordance with the NEMA- Listed activity/ies:
 - 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 purposed undertaken in accordance with a maintenance management plan.”*
 - NEMA GN R. 985, Activity 12: *“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan;
 - ii. Within critical biodiversity areas identified in bioregional plans.”*
 - NEMA GN R. 985, Activity 26: *“Phased activities for all activities-
 - i. listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice;”*
- Water Use Licence (WUL) amendment in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses:
 - Section 21(a), *“Taking water from a water resource”*.
- Water Use Licence (WUL) in accordance with the NWA:
 - Section 21(b), *“Storing water”*.
 - Section 21(c) & (i), *“Impeding or diverting the flow of water in a watercourse”* and *“Altering the bed, banks, courses or characteristics of a watercourse”* respectively.
 - A separate application for a Water Use Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use activity 21(c) & (i).

The project will involve the development of agricultural activities on the following properties: Portion 16 of the Farm Droogfontein 62, Portion 2 of the Farm Eerste Aanleg 50, the remainder of the Farm Bulpan 51 and the remainder of the Farm Witpan 52. The applicant is planning on developing approximately 33 new pivots that will require the clearance of approximately 1050 ha of indigenous vegetation in total, primarily for the growing of potatoes. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years, a total of 1050 Ha will have been cleared. An alternative pivot layout is discussed in Section 5.2, where an alternative option would be to reduce the number of pivots and reshuffle the position and size of the remaining pivots, which would reduce the amount of vegetation clearing by approximately 330 ha and in so doing reduce the number of protected trees affected. The priority would be to remove approximately 10 pivots from the areas of high sensitivity (high tree densities). Crop rotation will be done by planting potatoes, onions, Sorghum Sudan grass or Smuts finger grass, followed by a fallow period where livestock will be allowed to graze on the pivots systematically.

The irrigation water will be sourced from the Vaal River. The current existing water use licence allows for the abstraction of 519 152 m³/annum from the Vaal River, however, the licence will need to be amended to include the additional farms and farm portions designated for irrigation activities. An additional 500 000m³/annum



volume of water is required to irrigate the pivot farms to be developed over the course of 7 years. A buffer dam will also be constructed to store 49 000 m³ of water.

The proposed project is located along the N12, approximately 20 km north of Kimberley and 3 km southwest of Riverton, in the Sol Plaatje Local Municipality, Frances Baard District Municipality in the Northern Cape. The centre point of the site is: 28°33'33.48"S and 24°45'1.94"E.

PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

According to the EIA regulations (GN R982, 2014), Appendix 3:

"The objective of the EIA process is to, through a consultative process-

- (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;*
- (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;*

[Para. (b) substituted by GN 326/2017]

- (c) identify the location of the development footprint within the approved site as contemplated in the accepted coping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;*

[Para. (c) substituted by GN 326/2017]

- (d) determine the-*
 - (i). nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and*
 - (ii). degree to which these impacts-*
 - (aa) can be reversed;*
 - (bb) may cause irreplaceable loss of resources, and*
 - (cc) can be avoided, managed or mitigated;*
- (e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;*

[Para. (e) substituted by GN 326/2017]

- (f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;*

[Para. (f) substituted by GN 326/2017]

- (g) identify suitable measures to avoid, manage or mitigate identified impacts; and*
- (h) identify 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 National Environmental Management Act (NEMA) in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on the 12th of February 2025 with an initial notification and call to register to interested and affected parties (I&APs). The comments received from I&APs during the



initial call to register and commenting period to date have been captured in the Public Participation Report in Appendix 3. To date, the following comments have been received:

- I&AP registration
- Request for project description, shapefile, and locality map.
- Comments from NC DAERL
- Comment from DFFE: Directorate: Forest Resource Protection (NC)
- Request for a site visit from DFFE: Biodiversity and Conservation branch

Comments received during this Environmental Impact Assessment Report review period will be included in the finalised Report to be submitted to the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL). This Environmental Impact Assessment Report are being made available for public review and comment for a period of 30 days from the **3rd of September 2025 until the 4th of October 2025**. 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: Mbali Tshabalala
- Email: aqua@eims.co.za

ENVIRONMENTAL SPECIALIST STUDIES

Three specialist studies were undertaken to address the key issues that required further investigation, namely the impact on ecology and wetlands, surface water, and heritage resources.

The specialist studies involved the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. These impacts were then assessed according to pre-defined rating scales (see Section 8.1). Specialists also recommended appropriate mitigation/control or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. The specialists appointed for this project included:

- Heritage and Archaeology Assessment - Dr. Lucien James (EIMS (Pty) Ltd)
- Palaeontology Assessment - Mrs. Elize Butler (Banzai (Pty) Ltd)
- Biodiversity and Ecology Assessment - Dr. Natalie Birch (EMS (Pty) Ltd)

HERITAGE IMPACT ASSESSMENT

Section 7.9 of the report details the heritage and cultural status of the proposed development, in accordance with the National Heritage Resources Act (NHRA). While the area has a low overall heritage sensitivity according to the national screening tool, a Heritage Impact Assessment (HIA) was required due to the nature of the development.

The assessment identified several features of potential heritage value:

- A historical grave site: A single grave was identified and confirmed through a 1941 topographic map and cadastral data. It is believed to be on a small, specifically demarcated piece of government property and is considered to be of potentially high heritage significance (Grade III A). The project has planned to avoid this site, and a 50-meter buffer zone is recommended around it.
- An Archaeological Site: A single Later Stone Age (LSA) site was found, containing at least six lithic pieces. It is rated as having medium heritage significance (Grade IV B), requiring documentation before any potential destruction. The proposed activities are not expected to impact this site.



- Ox-wagon ruts: Historical ruts were identified, providing context about past transport routes. These features are not protected under the NHRA.
- Recent historical items: Finds from the 20th century, including a metal plate with "SAR" and "SAS" inscriptions, were located outside the development footprint and are not considered to be of significant heritage value.

The overall conclusion is that while several heritage sites were identified, the project's layout has been designed to avoid them, minimizing any potential negative impact. No further action is required for the ox-wagon ruts or 20th-century finds. The LSA site requires recording, and the grave site will be protected by a designated buffer zone.

PALAEONTOLOGY IMPACT ASSESSMENT

The proposed agricultural development near Kimberley is underlain by several geological formations, namely, quaternary sands, calcrete, Jurassic dolerite, and the Allanridge Formation. A DFFE screening report rates the project area as having high paleontological sensitivity, which is driven by the presence of specific formations.

Section 7.3 discusses the key geological formations and palaeontological features, as well as their sensitivities:

- **Quaternary Sands:** These are the youngest deposits, consisting of unconsolidated sand, gravel, and clay. They are rated with medium paleontological sensitivity and have been found to contain Late Stone Age tools and fossils of terrestrial plants and animals.
- **Calcrete:** This deposit has a high paleontological sensitivity due to its potential to preserve fossils like bones, teeth, tortoise remains, and trace fossils.
- **Allanridge Formation:** Part of the Ventersdorp Supergroup, this formation consists of volcanic and pyroclastic rocks. It is rated with low sensitivity because it contains lacustrine stromatolites and potential microfossils.
- **Jurassic Dolerite:** These igneous intrusions are considered unfossiliferous and have a zero paleontological sensitivity.

The overall paleontological sensitivity of the project area is high, primarily due to the presence of calcrete and Quaternary sands. While the Allanridge Formation and dolerite are less sensitive, the project must account for the potential discovery of significant fossil finds within the more sensitive geological layers. Mitigation measures are put forth in Section 8.2 and the EMPr.

BIODIVERSITY AND ECOLOGICAL IMPACT ASSESSMENT

Sections 7.6 to 7.8 discusses the findings of the specialist assessment for the proposed development. The assessment highlights key concerns regarding floral, faunal, and general biodiversity, as well as the presence of invasive alien species. The DFFE Screening Tool identified the area as having high sensitivity for animal species and medium sensitivity for plant species.

A number of protected plant species, including one with medium sensitivity (*Species 257*), have the potential to be found on site, the species are listed in Table 10. The proposed project is located within the Least Threatened Kimberley Thornveld vegetation type, but this area is a Critical Biodiversity Area 2 (CBA2), which is considered an optimal zone for meeting biodiversity conservation targets.

Although a full inventory was not possible, a habitat assessment and field observations identified the presence of grassland and bushveld avifauna. Critically endangered African White-backed Vultures are a significant concern. While no nests were found on the property, the site is approximately 4 km north of the Dronfield Important Bird Area (IBA), which has seen a notable increase in vulture breeding pairs. Other protected reptiles and birds may also be present, although no red data amphibians or specific reptiles were confirmed. Table 11 provides a comprehensive list of species of conservation concern.

The site is located within a Critical Biodiversity Area 2 (CBA2), which is crucial for achieving biodiversity goals related to threatened bird habitat and vegetation conservation. The project area also borders a River Freshwater



Ecosystem Priority Area (FEPA), though the development is not within the FEPA itself. The area is not a threatened ecosystem or an IBA, but its proximity to the Dronfield IBA is a key consideration.

The management of invasive alien species is governed by several laws, including the National Environmental Management: Biodiversity Act (NEMBA). The report outlines four categories of invasive species (Category 1a, 1b, 2, and 3), each with specific control and management regulations. This framework requires the developer to actively manage and eradicate any invasive species found on site to prevent their spread. Invasive species found on site are provided in Table 12.

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

A scoping assessment and an EIA were undertaken to identify all the potential risks and impacts associated with each phase of the proposed pivot expansion activities as well as potentially feasible alternatives. After considering the broad range of alternative types that exist (i.e. location, process, technology, and activity options), no other feasible alternatives other than the preferred and No-Go alternatives could be identified. Certain incremental alternatives such as the pivot layout have been considered during the EIA phase, refer to Section 5.2.

Background information review on the surrounding areas, the heritage and palaeontological specialist assessment reports (Appendix 6) as well as the Department of Forestry, Fisheries and Environment (DFFE) Screening Tool Report (Appendix 4) helped to guide the identification of potential impacts. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria (see Section 8.1 for the EIMS Impact Assessment Methodology) include the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources. The most significant risks and impacts identified were those that remain high in terms of significance even post mitigation measures being considered.

Table 1 summarises the identified impacts and mitigations. The identified potential impacts, where required, have been assessed and potential mitigation measures have been identified and discussed in Section 8. The associated EMP, identifies appropriate mitigation mechanisms for avoidance, minimisation and/or management of the negative impacts and enhancement of the positive impacts.

ENVIRONMENTAL IMPACT STATEMENT

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



Table 1: Summary of impacts and mitigations.

Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
1	Increased vehicle traffic to survey location	Planning	-6	<ul style="list-style-type: none"> – Prioritize communication and coordination between contractors and landowners; and – minimise vehicle traffic and implement access restrictions; 	-5.00
2	Temporary disturbance of wildlife	Planning	-6	<ul style="list-style-type: none"> – Conduct thorough site assessments to identify existing survey locations and sensitive areas; – training and awareness; and – monitoring and reporting. 	-5.00
3	Community concerns	Planning	-3	<ul style="list-style-type: none"> – Utilise community networks; – promote equity; – invest in workforce development; and – support local food security. 	-3.00
4	Employment opportunities	Planning	6	<ul style="list-style-type: none"> – Prioritise local employment; – invest in workforce development; 	7.50
5	Soil erosion and compaction of soil on the access roads, loss of topsoil, soil contamination from spills.	Construction	-12	<ul style="list-style-type: none"> – compaction prevention; and – soil and groundwater contamination prevention. 	-9.28
6	Increased runoff, sedimentation of water bodies, potential groundwater	Construction	-12	<ul style="list-style-type: none"> – Soil and groundwater contamination prevention. 	-8.44



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	contamination, reduced water quality.				
7	Dust generation, vehicle emissions, noise pollution.	Construction	-11	<ul style="list-style-type: none"> – Dust control; – maintain access roads; – speed limit of 30 km/h; – construction to take place preferably on non-windy days; – vehicle emissions control; and – ensure that all vehicles used during construction are serviced and in a good working condition. 	-8.44
8	Alteration of drainage patterns.	Construction	-8.25	<ul style="list-style-type: none"> – Drainage management. 	-7.59
9	Littering.	Construction	-11	<ul style="list-style-type: none"> – Dedicated waste bins to be placed near construction sites. 	-4.00
10	Community concerns.	Construction	-4.5	<ul style="list-style-type: none"> – Employ local work force; – utilise existing community structure; – opportunities to be given previously disadvantaged individuals; – training and awareness; and – support local food security. 	-4.00
11	Employment opportunities.	Construction	8.25	<ul style="list-style-type: none"> – Employ local work force; – utilise existing community structure; – opportunities to be given previously disadvantaged individuals; – training and awareness; and 	9.38



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
				<ul style="list-style-type: none"> – support local food security. 	
12	Visual impact	Construction	-12	<ul style="list-style-type: none"> – 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. 	-6.75
13	Anthropogenic disturbances, intentional and/or accidental killing of fauna.	Construction	-15	<ul style="list-style-type: none"> – training and awareness. 	-9.38
14	Fire damage.	Construction	-12	<ul style="list-style-type: none"> – Ensure vehicles are equipped with firefighting equipment; – firefighting equipment training; – no open fires; – no smoking; and – firebreaks around each pivot. 	-4.5
15	Soil salinization, nutrient depletion, soil compaction, pesticide and fertilizer accumulation.	Operation	-14	<ul style="list-style-type: none"> – Implement sustainable irrigation systems; – implement integrated pest management; – training on safe pesticide handling and application; – establish buffer zones around sprayed areas; – utilise slow-release fertilizers; – implement irrigation scheduling; 	-6.19



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
				<ul style="list-style-type: none"> – prevent soil salinization; and – prevent nutrient depletion in soils. 	
16	Soil quality.	Operation	-12	<ul style="list-style-type: none"> – Routine soil tests to monitor salinity levels and identify areas of accumulation; – Periodic leaching practices by applying excess water to flush accumulated salts below the root zone; – Implement IPM strategies to minimize pesticide use; – 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. – Incorporate organic matter, such as compost or cover crops, into the soil to improve soil structure and reduce compaction, where possible. – Where possible, consider intercropping, i.e. planting multiple crops simultaneously to increase soil biodiversity and nutrient utilisation. – 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 undertaken in accordance with the regulations. 	15



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
17	Erosion on access roads.	Operation	-13	<ul style="list-style-type: none"> – Prevent soil compaction; and – maintain access roads. 	-7.50
18	Pesticide drift, dust generation during harvesting, emissions from farm machinery.	Operation	-13	<ul style="list-style-type: none"> – Implement sustainable irrigation systems; – training on safe pesticide handling and application; – establish buffer zones around sprayed areas; – implement irrigation scheduling; – prevent soil salinization; – prevent nutrient depletion in soils; – implement crop rotation and intercropping; – avoid clearing natural vegetation outside of the irrigated area; – maintain vehicles; and – speed limit of 30 km/h. 	-10.13
19	Anthropogenic disturbances, intentional and/or accidental killing of fauna.	Operation	-13	<ul style="list-style-type: none"> – Environmental training and awareness. 	-11.25
20	Contribution to food security.	Operation	13	<ul style="list-style-type: none"> – It is proposed that the product also be sold locally if viable, to contribute to local food security. 	16.25



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
21	Increased agriculture production.	Operation	14	<ul style="list-style-type: none"> Sourcing local employment will contribute to the development of agricultural activities, as per the Sol Plaatje District Municipality SDF, and the local economy. 	19.25
22	Potential for long-term job creation.	Operation	13	<ul style="list-style-type: none"> Sourcing local employment will contribute to the development of the Sol Plaatje District Municipality SDF and the local economy 	17.50
23	Potential health risks from pesticide exposure.	Operation	-10	<ul style="list-style-type: none"> Implement Integrated Pest Management (IPM) strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications Implement strict protocols for the handling, storage, and disposal of fertilizers and pesticides to prevent soil contamination. 	-4
24	Increased energy consumption for pumping water.	Operation	-9	<ul style="list-style-type: none"> Maintain pumps. 	-10.13
25	Visual impact.	Operation	-12	<ul style="list-style-type: none"> Preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; and limit vegetation clearance to access roads, pivots and infrastructure. 	-7.50



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
26	Fire damage.	Operation	-13	<ul style="list-style-type: none"> – Ensure vehicles are equipped with firefighting equipment; – firefighting equipment training; – no open fires; – no smoking; and – firebreaks around each pivot. 	-4.50
27	Noise nuisance.	Operation	-6.75	<ul style="list-style-type: none"> – Operation of vehicles and machinery on the pivots to be undertaken during the day, from 06:00 until 18:00. 	-4.50
28	Oil/ fuel spillages causing soil and groundwater contamination.	Operation	-12	<ul style="list-style-type: none"> – Spill prevention kits. 	-6.75
29	Littering.	Operation	-12	<ul style="list-style-type: none"> – Dedicated waste bins. 	-4.50
30	Potential for residual soil contamination, compaction.	Rehab and Closure	-10.5	<ul style="list-style-type: none"> – Residue contamination assessment and monitoring; and – de-compaction of soil. 	-8.75
31	Potential for residual contamination of groundwater or surface water.	Rehab and Closure	-10.5	<ul style="list-style-type: none"> – Water monitoring. 	-8.75
32	Visual.	Rehab and Closure	7	<ul style="list-style-type: none"> – Remove all surface infrastructure and debris. 	11.00
Specialist Impacts					



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
33	Destruction or disturbance of potentially important grave site.	Construction	-17	<ul style="list-style-type: none"> – Site should be avoided considering a 50-meter buffer; and – the Heritage Protocol or Chance Find Procedure is advised to be followed should additional heritage finds or sites be encountered. 	-2.81
34	Destruction or disturbance of undiscovered below-ground heritage features.	Construction	-7.5	<ul style="list-style-type: none"> – A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered. 	-3.94
35	Loss of fossil Heritage.	Construction	-10.5	<ul style="list-style-type: none"> – The EAP and ECO must be notified that the whole study area has a High Palaeontological Sensitivity. A “Chance Find Protocol” must be implemented during the proposed activities and incorporated in the EMP; and – if fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (e.g. documented and collection) can be undertaken by a professional palaeontologist. 	-3.75



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
36	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2 (original layout)	Construction and Operation	-16.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; – implement a search and rescue procedure. – Vegetation clearing should be restricted to areas of the pivots only. – A management plan must be drawn up for the ecological corridor and other undeveloped portions of the property to best support the biodiversity and ecosystem connectivity in the area. – The Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA. – The avoidance of the no-go areas must be strictly enforced. 	-8.44
37	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2 (preferred alternative layout)	Construction and Operation	-8.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; – implement a search and rescue procedure. – Vegetation clearing should be restricted to areas of the pivots only. – A management plan must be drawn up for the ecological corridor and other undeveloped portions of the property to best support the biodiversity and ecosystem connectivity in the area. 	-6.75



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
				<ul style="list-style-type: none"> – The Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA. – The avoidance of the no-go areas must be strictly enforced. 	
38	Loss of species of conservation concern (original layout)	Construction and Operation	-16.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – limit vegetation clearance to access roads, pivots and infrastructure; – alien vegetation control 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. – Where possible trees should be avoided as much as possible, i.e. access roads between pivots can be re-routed to avoid clearing specific trees 	-13.50
39	Loss of species of conservation concern (preferred alternative layout)	Construction and Operation	-8.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – limit vegetation clearance to access roads, pivots and infrastructure; – alien vegetation control 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. – Where possible trees should be avoided as much as possible, i.e. access roads between pivots can be re-routed to avoid clearing specific trees 	-7.50



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Anthropogenic Disturbances, Intentional and/or accidental killing of fauna (original layout)	Construction and Operation	-5.25	<ul style="list-style-type: none"> – There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. – 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. 	-3.94
	Anthropogenic Disturbances, Intentional and/or accidental killing of fauna (preferred alternative layout)	Construction and Operation	-4	<ul style="list-style-type: none"> – There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. – 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. 	-3.5



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Sedimentation, contamination and disruption of freshwater ecosystems (original layout)	Construction and Operation	-5.5	<ul style="list-style-type: none">– Only the pivot footprint must be cleared and the lands planted as soon as possible after clearing.– Erosion control measures must be in place to aid in the prevention of wash.– Spot treatments of pesticide and herbicides reduce the risk of runoff and contamination of surrounding areas– Implement sustainable irrigation systems– Implement integrated pest management– Training on safe pesticide handling and application– Establish buffer zones around sprayed areas– Utilise slow-release fertilizers– Implement irrigation scheduling– Prevent soil salinization– Prevent nutrient depletion in soils	-4.5



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Sedimentation, contamination and disruption of freshwater ecosystems (preferred alternative layout)	Construction and Operation	-5	<ul style="list-style-type: none"> – Only the pivot footprint must be cleared and the lands planted as soon as possible after clearing. – Erosion control measures must be in place to aid in the prevention of wash. – Spot treatments of pesticide and herbicides reduce the risk of runoff and contamination of surrounding areas – Implement sustainable irrigation systems – Implement integrated pest management – Training on safe pesticide handling and application – Establish buffer zones around sprayed areas – Utilise slow-release fertilizers – Implement irrigation scheduling – Prevent soil salinization – Prevent nutrient depletion in soils 	-4
40	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2.	Rehab and Closure	-13	<ul style="list-style-type: none"> – Biodiversity monitoring; – alien vegetation management; and – pivot footprints to be revegetated with local indigenous species. 	-6



1 INTRODUCTION

Aqua Farming (Pty) Ltd (the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for:

- Environmental Authorisation in accordance with the NEMA- Listed activity/ies:
 - 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 purposed undertaken in accordance with a maintenance management plan.”*
 - NEMA GN R. 985, Activity 12: “*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan;*
 - iii. *Within critical biodiversity areas identified in bioregional plans.”*
 - NEMA GN R. 985, Activity 26: “*Phased activities for all activities-*
 - ii. *listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice;”*
- Water Use Licence (WUL) amendment in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses:
 - Section 21(a), “*Taking water from a water resource”*.
 - Section 21(b), “*Storing water”*.
 - Section 21(c) & (i), “*(c) Impeding or diverting the flow of water in a watercourse”, and “(i) Altering the bed, banks, courses or characteristics of a watercourse”, respectively.*

The project will involve the development of agricultural activities on the farms; portion 16 of Farm Droogfontein 62, portion 2 of Farm Eerste Aanleg 50, the remainder portion of Farm Bulpan 51 and the remainder portion of Farm Witpan 52, by developing approximately 33 new pivots that will require the clearance of approximately 1050 ha of indigenous vegetation in total, primarily for the growing of potatoes. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years a total of 1050 Ha will have been cleared. Crop rotation will be done thereafter by planting potatoes, onions, Sorghum Sudan grass or Smuts finger grass, followed by a fallow period where livestock will be allowed to graze on the pivots systematically.

The irrigation water will be sourced from the Vaal River. The current existing water use licence allows for the abstraction of 519 152 m³/annum from the Vaal River, however, the licence will need to be amended to include the additional farms and farm portions designated irrigation activities. An additional 500 000m³/annum volume of water is required to irrigate the pivot farms to be developed over the course of 7 years. A buffer dam will also be constructed to store 49 000 m³ of water.

The proposed project is located along the N12, approximately 20 km north of Kimberley and 3 km southwest of Riverton, in the Sol Plaatje Local Municipality, Frances Baard District Municipality in the Northern Cape. The centre point of the site is: 28°33'33.48"S and 24°45'1.94"E.



1.1 REPORT STRUCTURE

Table 2: Report structure.

Regulations	Description	Section in Report
NEMA GN R. 982, Appendix 3 Section 3(1)(a)	Details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Section 1.2 Appendix 1
NEMA GN R. 982, Appendix 3 Section 3(1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2
NEMA GN R. 982, Appendix 3 Section 3(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;	Section 2
NEMA GN R. 982, Appendix 3 Section 3(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;	Section 2
NEMA GN R. 982, Appendix 3 Section 3(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 frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 3
NEMA GN R. 982, Appendix 3 Section 3(1)(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 4
NEMA GN R. 982, Appendix 3 Section 3(1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 5.3



Regulations	Description	Section in Report
NEMA GN R. 982, Appendix 3 Section 3(1)(h)	<p>A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including-</p> <ul style="list-style-type: none"> (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; (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; (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- <ul style="list-style-type: none"> (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) 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 location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report; 	Sections 5, 6 and 9
NEMA GN R. 982, Appendix 3	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint	Section 7



Regulations	Description	Section in Report
Section 3(1)(i)	on the approved site as contemplated in the accepted scoping report through the life of the activity, including- <ul style="list-style-type: none"> (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	
NEMA GN R. 982, Appendix 3 Section 3(1)(j)	An assessment of each identified potentially significant impact and risk, including- <ul style="list-style-type: none"> (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated; 	Section 7
NEMA GN R. 982, Appendix 3 Section 3(1)(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 7 Appendix 6
NEMA GN R. 982, Appendix 3 Section 3(1)(l)	An environmental impact statement which contains- <ul style="list-style-type: none"> (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (i) (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; 	Sections 9 and 10
NEMA GN R. 982, Appendix 3 Section 3(1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Sections 8 and 10



Regulations	Description	Section in Report
NEMA GN R. 982, Appendix 3 Section 3(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Sections 5 and 10
NEMA GN R. 982, Appendix 3 Section 3(1)(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 10
NEMA GN R. 982, Appendix 3 Section 3(1)(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 11
NEMA GN R. 982, Appendix 3 Section 3(1)(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 10
NEMA GN R. 982, Appendix 3 Section 3(1)(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	The proposed activity includes operational aspects and therefore the validity period of the EA should be "indefinite".
NEMA GN R. 982, Appendix 3 Section 3(1)(s)	An undertaking under oath or affirmation by the EAP in relation to- (ii) the correctness of the information provided in the reports; (iii) the inclusion of comments and inputs from stakeholders and I&APs; (iv) the inclusion of inputs and recommendations from the specialist reports where relevant; and (v) 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;	Section 12
NEMA GN R. 982, Appendix 3 Section 3(1)(t)	<i>[Para. (t) substituted by GN 326/2017 and deleted by GN 517/2021]</i>	N/A
NEMA GN R. 982, Appendix 3 Section 3(1)(u)	An indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	No deviations from the approved scoping report exist.



Regulations	Description	Section in Report
	(ii) a motivation for the deviation;	
NEMA GN R. 982, Appendix 3 Section 3(1)(v)	Any specific information that may be required by the competent authority; and	N/A
NEMA GN R. 982, Appendix 3 Section 3(1)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A
NEMA GN R. 982, Appendix 3 Section 3(2)	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	N/A

1.2 DETAILS OF THE EAP AND SPECIALISTS

Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed by Aqua Farming 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 Droogfontein Pivot Agriculture 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 EIAs;
- 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 3: EAP details.

Practitioners	Jessica Jordaan (EAP)	Monica Niehof (EAP)
Tel. No.:	+27 11 789 7170	+27 11 789 7170
Fax No.:	+27 86 571 9047	+27 86 571 9047
E-mail:	jessica@eims.co.za	monica@eims.co.za
Professional Registrations	SACNASP – Candidate Sci. Nat (Soil Science), 124758. EAPASA – Candidate EAP, 2023/7087.	EAPASA – Registered EAP, 2024/8835



1.2.1 EXPERTISE OF THE EAP/S

Ms Jessica Jordaan serves as an Environmental Assessment Practitioner, responsible for the comprehensive management of diverse environmental projects. Jessica obtained her BSc in Geology and her BSc Hons in Soil science at the University of Pretoria. Her core responsibilities encompass the preparation of a wide range of environmental documentation, including screening reports, scoping reports, Environmental Impact Assessment (EIA) and Basic Assessment (BA) reports, environmental monitoring reports, Environmental Management Plans, and Financial Provisions Reports. In addition to her role as an EAP, Jessica is a Candidate Soil Specialist, enabling her to conduct agricultural compliance statements and assessments. Furthermore, she is a qualified auditor, proficient in performing both internal and external audits. Her auditing expertise includes Environmental Authorisation audits, Water Use Licence and General Authorisation audits, and audits of Environmental Management Systems according to ISO 14001:2015 standards.

Jessica's selected project experience highlights her expertise in various sectors. Notable projects include the Basic Assessments for Tetra4 (Pty) Ltd and multiple Basic Assessments for African Exploration and Mining Finance Corporation (Soc) Ltd. She has also conducted ISO 14001:2015 audits for several Harmony mines, and various ECO and WUL audits for companies such as ENEL Green Power and Sterkfontein Poultry (Pty) Ltd. Her experience also extends to financial provisioning for Tetra4 Virginia and Elandsfontein Colliery.

Ms Jordaan has been assisted and guided by Ms Monica Niehof. Ms 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 1 of this report.

1.2.2 SPECIALIST CONSULTANTS

In accordance with section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and Regulation 16 (1)(b)(v) of the EIA Regulations 2014, as amended, a Screening Tool Report was generated using the Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Environmental Screening Tool. This report, included within the Application for Environmental Authorisation (EA), utilised the Screening Tool to identify environmental sensitivities associated with the proposed development site.

The Screening Tool provided a preliminary list of specialist studies recommended for inclusion in the subsequent Scoping and Environmental Impact Assessment (EIA) process. Following the screening, a Site Sensitivity Verification Report (SSVR) was compiled. This report served to validate the recommendations of the DFFE Screening Tool Report and to provide a rationale for the selection of specialist studies, aligning with the Plan of Study for EIA presented in the Scoping Report. Along with the desktop study, an on-site investigation was conducted on the 29th of January 2025, which confirmed the redundancy of several studies as identified by the tool. Table 4 details the specialist studies identified by the Screening Tool, alongside the EAP's verified sensitivities for each theme identified. The table also provides reasons for excluding specific sensitivities from the assessments required.

Table 4: Specialist studies identified in the Screening Tool Report and Motivation for inclusion.

Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Motivation
Agriculture Impact Assessment	High	High	The sensitivity remains high, however, due to the nature of the activity being agricultural, it is making use of the agricultural potential of the land and, therefore, it is the opinion of the EAP that an agricultural potential impact assessment and / or Compliance Statement



Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Motivation
			<p>from an agricultural specialist is not required in this instance. However, the client has undertaken a soil assessment, and this assessment has been considered during the EIA.</p> <p>In addition, crop rotation and conservational agriculture methods will be applied to keep the current level of agricultural potential or maybe even increase it.</p>
Archaeological and Cultural Heritage Impact Assessment	Low	Low	<p>During the preliminary site visit, minimal heritage features and archaeological artefacts were observed, and the EAP confirms the low sensitivity. Following the DFFE Screening tool and SSVR, assessment has been undertaken by the relevant specialists.</p> <p>Where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.</p>
Palaeontology Impact Assessment	High	Medium	<p>The proposed project's impact will be limited to the surface, with a maximum depth of approximately 0.5 m from ploughing. In addition, the activities will take place within areas designated as medium sensitivity. Therefore, the palaeontology will not be severely impacted, and a medium sensitivity level is suggested. A desktop study is to be undertaken by a specialist to confirm this.</p> <p>Where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.</p>
Terrestrial Biodiversity Impact Assessment	Very High	Very High	<p>The proposed project area falls within a Critical Biodiversity Area (CBA) 1 and CBA 2 area. The project's activities will have a severe impact on the terrestrial biodiversity, however, crop rotation and conservational agriculture methods will be applied to minimise the impact. A full assessment has been undertaken by a specialist.</p>



Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Motivation
Aquatic Biodiversity Impact Assessment	Very High	Low	<p>A portion of the project area falls within a Freshwater Ecosystem Priority Area (FEPA) sub-catchment as per the DFFE Screening report. Additionally, a section of the project area lies within the Eastern Kalahari Bushveld Bioregion.</p> <p>A preliminary desktop screening identified a wetland adjacent to the project area. However, a subsequent site visit confirmed the wetland's artificial origin, resulting from the deposition of municipal wastewater into the sub-catchment. This discharge has since ceased, rendering the discharge dam defunct. The area is now characterized by dense vegetation, consisting primarily of weed species.</p> <p>Due to the limited extent of overlap between the project area and the FEPA sub-catchment and Eastern Kalahari Bushveld Bioregion, a low sensitivity level is recommended. However, a full assessment will still be conducted by a specialist to confirm this finding.</p>
Plant Species Assessment	Medium	High	<p>The screening tool has indicated the Species of Conservation Concern (SCC) sensitivity level to be medium, a high sensitivity level is suggested due to the nature of the species of the plants and the nature of the project. A full assessment has been conducted, and confirmation of the species is provided by a specialist.</p> <p>a. Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.</p> <p>b. Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Plant Species Compliance Statement must be submitted.</p>
Animal Species Assessment	High	Medium	<p>The screening report identified two highly sensitive species, <i>Neotis ludwigii</i> (Ludwig's Bustard) and <i>Gyps africanus</i> (African White-backed Vulture), as potentially occurring within the project area. The nature of the project may result in a potentially significant impact on these species. A specialist</p>



Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Motivation
			<p>assessment has been conducted to further evaluate and address potential impacts.</p> <p>a. Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.</p> <p>b. Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.</p>
Landscape / Visual Impact Assessment	<p>The proposed pivot agriculture project is situated within a region characterised by extensive existing agricultural land use. Consequently, the introduction of pivot irrigation is anticipated to result in minimal alteration to the prevailing visual characteristics of the landscape.</p> <p>Furthermore, the project site is located within a remote area exhibiting limited public accessibility and few sensitive visual receptors, such as residential areas or designated scenic viewpoints. This would suggest a low potential for significant visual impacts.</p> <p>Based on these site-specific characteristics, namely the pre-existing agricultural landscape and the site's remoteness and limited visual receptors, it is the Environmental Assessment Practitioner's (EAP) professional opinion that a dedicated Landscape/Visual Impact Assessment is not warranted for this project.</p>		
Hydrology Assessment	<p>The proposed project is anticipated to result in minimal alteration to existing surface runoff patterns. This is primarily attributed to the project's location within established agricultural land, which inherently exhibits high infiltration capacity. Consequently, the development is not expected to significantly increase or alter the volume or rate of surface water discharge.</p> <p>Furthermore, the proposed pivot irrigation infrastructure is situated approximately 3 kilometres from the nearest river course (Vaal River), placing the pivot development outside any identified floodlines and significantly reduces contribution to flood risks.</p> <p>Therefore, it is the EAP's professional opinion that a comprehensive hydrology assessment is not needed. The anticipated impact on surface runoff and flood risk is considered negligible due to the project's design and location.</p>		
Socio-Economic Assessment	<p>Based on the project's location within a pre-existing, commercially focused agricultural area and the nature of the project, i.e. development of pivots, it is the EAP's professional opinion that a dedicated socio-economic assessment is not warranted for this project. This determination is based on the anticipated minimal impact on the prevailing socio-economic environment.</p>		

The biodiversity and heritage specialist studies involved the gathering of desktop data and an on-site inspection to identify and assess any environmental impacts that may occur because of the proposed farming expansion project. The palaeontological specialist assessment was conducted by undertaking a desktop study. These impacts were then assessed according to the EIMS pre-defined impact significance rating methodology (Section



8.1). These specialists also recommended appropriate mitigation / management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. The specialist's declaration of independence is included in the specialist reports presented in Appendix 6. The specialists who were appointed to undertake specialist studies are listed in Table 5.

Table 5: Specialist details.

Specialist Study	Specialist	Company
Heritage and Archaeology Assessment	Dr. Lucien James	EIMS (Pty) Ltd
Palaeontology Assessment	Mrs. Elize Butler	Banzai (Pty) Ltd
Terrestrial and Aquatic Biodiversity Assessment, including animal and plant species assessments.	Dr. Natalie Birch	EMS (Pty) Ltd

2 DESCRIPTION AND SCOPE OF PROPOSED PROJECT

This section details the precise location and scope of the proposed activity, ensuring compliance with regulatory requirements. It provides comprehensive spatial information, encompassing cadastral land parcel identification through 21-digit Surveyor General codes, physical addresses, farm names, and where necessary, boundary coordinates. Furthermore, it includes a detailed plan illustrating the activity's location at an appropriate scale. Finally, this section outlines the scope of the proposed activity, explicitly identifying all triggered listed and specified activities and providing a comprehensive description of the activities to be undertaken, including associated structures and infrastructure.

2.1 PROJECT LOCALITY

Aqua Farming wishes to undertake the proposed project within the Sol Plaatje local municipality, Northern Cape province, on various farms as listed in the table below. The details regarding the location are presented in Table 6 below and a locality map is provided as Figure 1.

Table 6: Project Locality Details.

Property/ies	Farm Droogfontein 62, portion 16
	Farm Eerste Aanleg 50, portion 2
	Farm Bulpan 51, the remainder portion
	Farm Witpan 52, the remainder portion
21-digit Surveyor General Code/s (respectively)	C03700000000006200016
	C03700000000005000002
	C03700000000005100000
	C03700000000005200000
Application Area (Ha)	1 050 Ha
District Municipality	Frances Baard District Municipality, Northern Cape
Local Municipality	Sol Plaatje Local Municipality



Distance and direction from nearest towns	<p>~20 km north of Kimberley</p> <p>~3 km southwest of Riverton</p>
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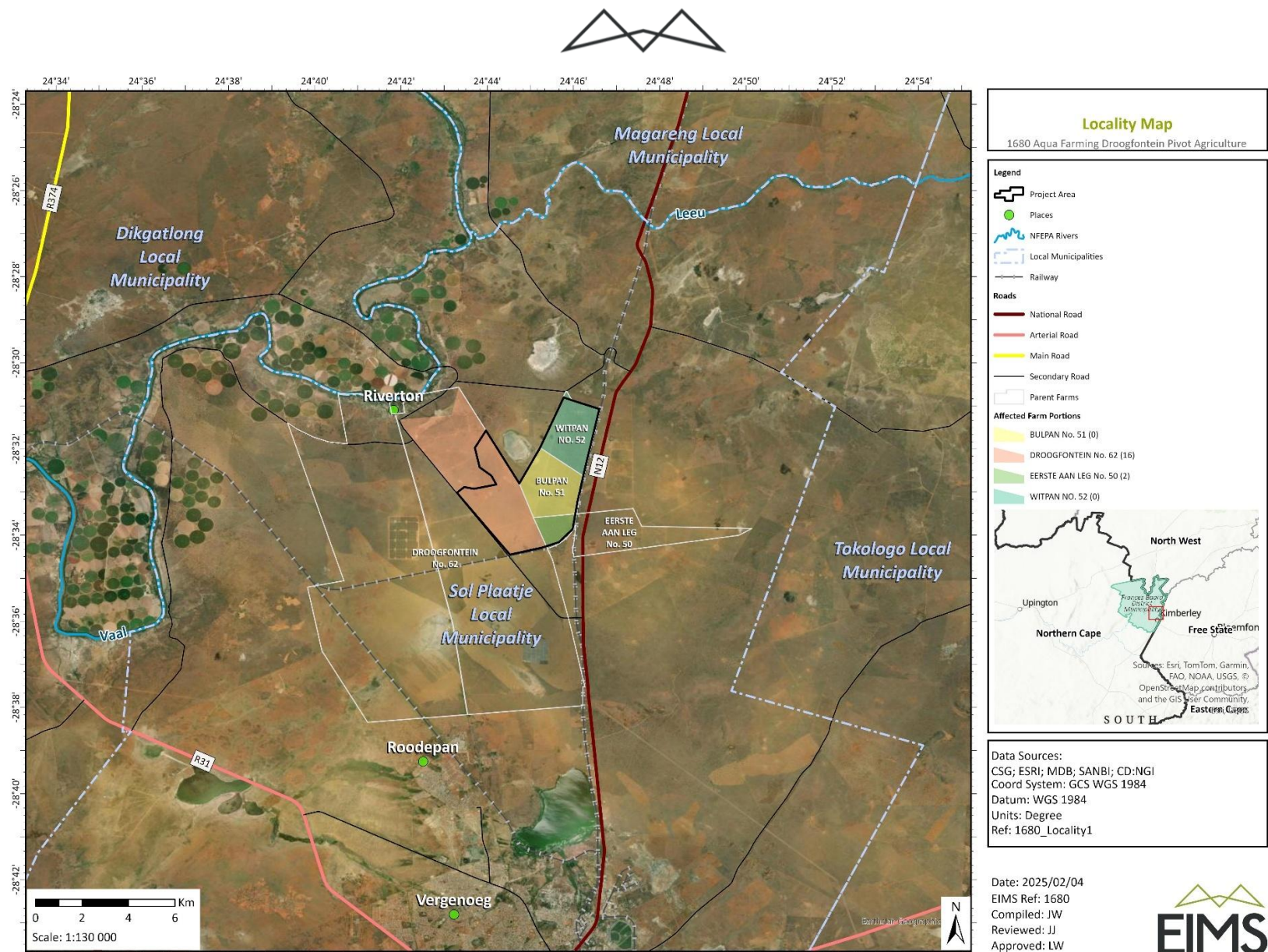


Figure 1: Locality map.



2.2 PROJECT DESCRIPTION

The applicant wishes to develop pivot irrigation systems for the cultivation of seed potatoes, potatoes, onions, and various grass-feed crops. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years a total of 1050 Ha will have been cleared, Figure 2 provides the layout of the pivots once the development is complete in approximately 7 years. The total area that will need to be assessed in support of the Environmental Authorisation application for the project is 1800 ha, however the application will be for the clearance of 1050 ha. The proposed project is located approximately 20 km North from Kimberley, on the Remainder of the Farm Bulpan 51, the Remainder of the Farm Witpan 52, Portion 2 of the Farm Eerste Aan Leg 50 and a section of Portion 16 of the Farm Droogfontein 62, in the Sol Plaatje Local Municipality, Frances Baard District Municipality, Northern Cape Province.

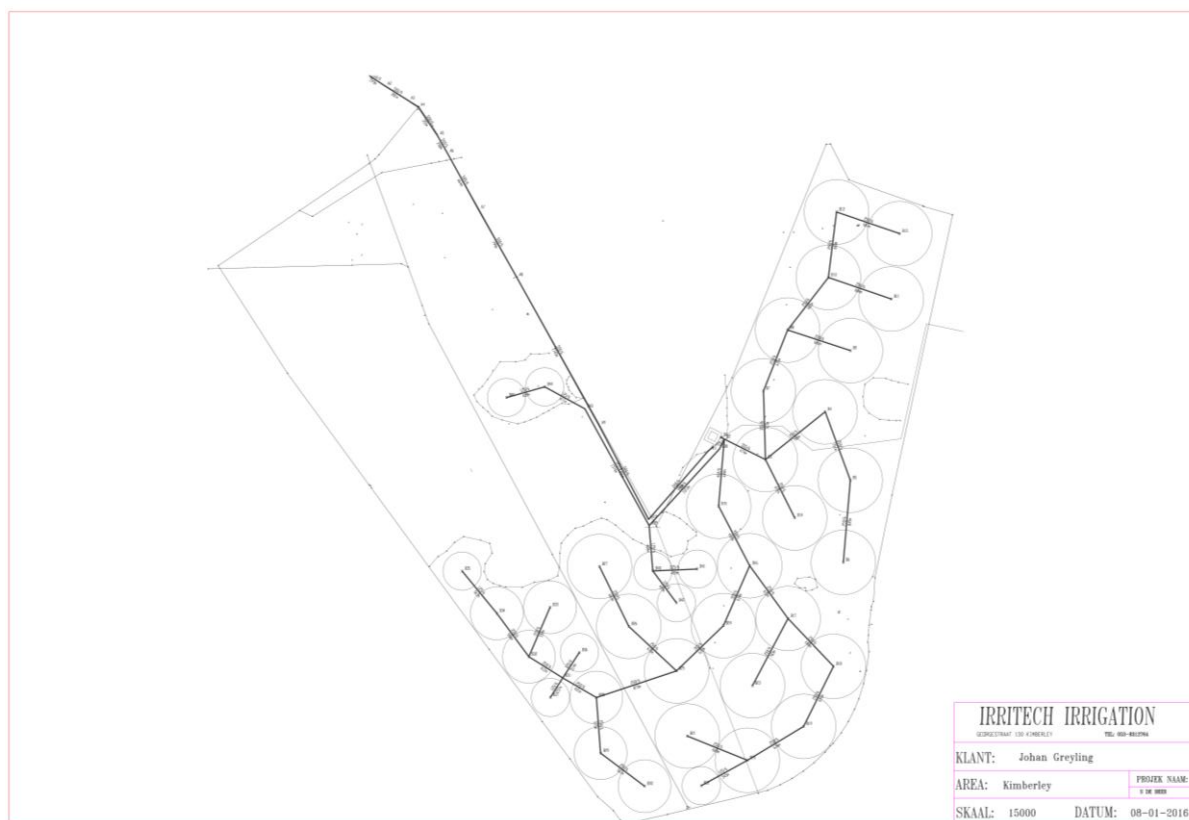


Figure 2: Original proposed pivot layout.

The applicant will be applying crop rotation, a systematic practice of varying the types of crops cultivated in a specific sequence on the same land. An example of a typical crop rotation is represented in Figure 3. The planned rotation of potatoes, onions, and various grass-feeds offers several key benefits namely:

- Disrupting pest and disease cycles specific to individual crops, reducing the need for chemical interventions;
- optimising nutrient utilisation and replenishment within the soil, since different crops have varying nutrient requirements;
- the inclusion of grass-feeds contributing to soil structure improvement and organic matter enrichment; and
- enhancing overall soil health and long-term productivity, promoting sustainable agricultural practices.



Figure 3: Example of a crop rotation process.

The applicant currently holds an existing Water Use Licence (08/C33C/A/8367) for Farm Droogfontein 62, Portion 13, authorising the abstraction of 519 152 m³/annum from the Vaal River. To facilitate the irrigation of all planned future pivot systems being applied for, an additional water allocation of 578 848 m³/annum is required. Additionally, the applicant wishes to build a buffer dam as a reservoir for irrigation water with a capacity of 49 000 m³ of water, a typical buffer dam with the pumping station is shown in Figure 4 and Figure 5. The proposed project will source irrigation water from the Vaal River. This will necessitate the construction of dedicated pumping infrastructure along the river. Consequently, applications will also be submitted for water uses as defined under sections 21 (c) and (i) of the NWA. The current existing water use licence will need to be amended to include the additional farms and farm portions designated irrigation activities, the additional 500 000m³/a volume of water to be taken from the Vaal River as well as the storage of 49 000 m³ of water within a buffer dam. Figure 4 provides an illustrative example of the proposed pumping station configuration for the irrigation water systems and Figure 5 provides an example of the proposed buffer dam configuration to be built on Farm Bulpan 51.



Figure 4: Water pumping station.



Figure 5: Buffer dam.

2.3 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 2017 and 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:

- **EIA Regulations (NEMA GN R 982, 2014)** 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 (NEMA GN R 983, as amended)** defines activities which will trigger the need for a Basic Assessment process;
- **Listing Notice 2 (NEMA GN R 984, as amended)** defines activities which trigger an Scoping and 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 (NEMA GN R 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 7 and the applicant will require an Environmental Authorisation (EA) and Water Use



Licence (WUL) in terms of GN R. 984 Listing Notice 2 of the NEMA EIA Regulations 2014 as amended, and the NWA. A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended. A WUL amendment application will be undertaken in line with the NWA and relevant regulations.

Table 7: NEMA listed activities relevant to proposed project.

Activity/ies No.	Activity description	Proposed project activity
NEMA GN R. 984, Activity 15	<i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</i> <i>(i) the undertaking of a linear activity; or</i> <i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan</i>	Total clearance of 1050 ha indigenous vegetation for the purpose of developing irrigation pivots, over the course of approximately 7 years.
NEMA GN R. 985, Activity 12	<i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan;</i> <i>ii. Within critical biodiversity areas identified in bioregional plans.</i>	Total clearance of 1050 ha indigenous vegetation for the purpose of developing irrigation pivots, over the course of approximately 7 years, within a critical biodiversity area as indicated by the DFFE Screening tool (CBA 1 and CBA 2).
NEMA GN R. 985, Activity 26	<i>Phased activities for all activities-</i> <i>i. listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice;</i>	The pivots will be developed in phases over the course of 7 years, of which a portion of the pivots will be developed within a critical biodiversity area (GN R. 985, Activity 12).
NWA Section 21(a)	<i>Taking of water from a water course.</i>	Taking water for irrigation purposes from the Vaal River.
NWA Section 21(b)	<i>Storage of water.</i>	Construction of buffer dam with a capacity of 49 000m ³ .
NWA Section 21(c) & (i)	<i>(c) Impeding or diverting the flow of water in a watercourse.</i> <i>(i) Altering the bed, banks, courses or characteristics of a watercourse</i>	Construction of water pumping infrastructure within a watercourse.

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act, NEMA (Act 107 of 1998- as amended), GN R. 984,2014 (Listing Notice 2) and GN R. 985, 2014 (Listing Notice 3); and
- Water Use Licence (WUL) for various relevant water uses in accordance with the National Water Act – NWA (Act 36 of 1998).



3 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL) in accordance with the requirements of the NEMA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed project. More detail on the legislative framework is presented in Section 3.1.

3.1 NATIONAL LEGISLATION

This section provides an overview of the governing legislation identified which may relate to the proposed project. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the DAERL, in accordance with the requirements of the NEMA EIA Regulations 2014, as amended. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards and guidelines 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. The contents of this report are based on a review of the information that was available at the time of the compilation of the report. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the proposed project.

3.1.1 THE 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, EIAs 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 several times between 2010 and 2022. The 2014 NEMA EIA Regulations (as amended) are applicable to this project.

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

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIAs in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity. The Regulations differentiate between a simpler Basic Assessment Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete EIA process (activities listed in GN R. 984). In the case of the proposed farm expansion activities, there are activities triggered under GN R. 984 and as such a full EIA process is necessary. Table 7 presents all the anticipated listed activities under the NEMA 2014 EIA Regulations (as amended) that are applicable to this project.



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 6 below provides a graphic representation of all the components of a full EIA process.

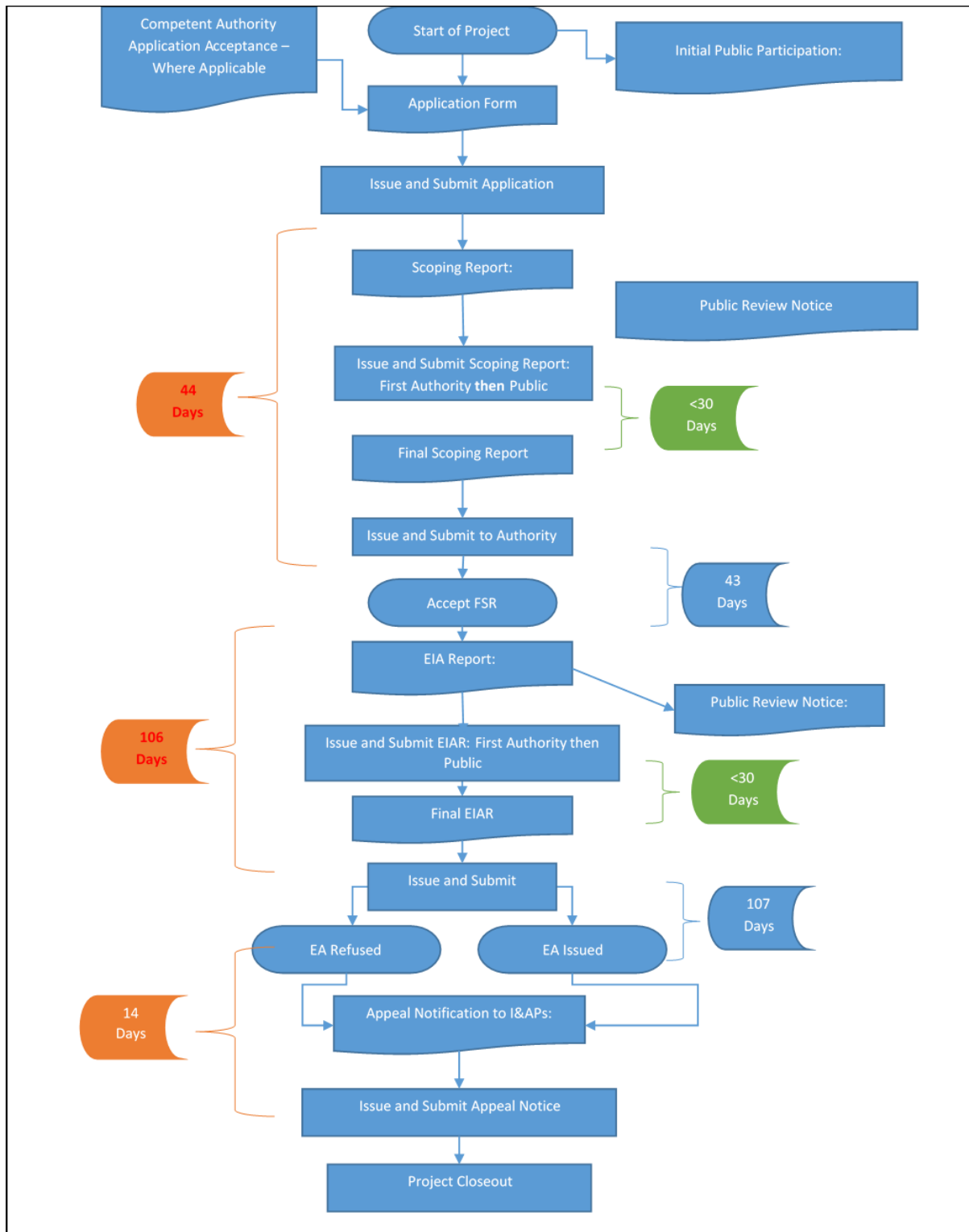


Figure 6: EIA process diagram.



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).

The key principles of NEMA, as outlined in Chapter 3 of the Act, can be summarised as follows:

- Sustainability must be pursued in all developments to ensure that biophysical and socio-economic aspects are protected; or
- there must be equal access to environmental resources, services and benefits for all citizens including the disadvantaged and the vulnerable. Adverse environmental impacts shall be distributed fairly among all citizens;
- environmental governance must include the participation of all interested and affected parties who must be catered for to allow their effective participation;
- environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and
- the polluter pays principle must be applied in all cases where any person has caused pollution or undertaken any action that led to the degradation of the environment.

3.1.1.1 NEMA ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED

In terms of section 24(2) of NEMA, the Minister and or any 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, 2014 and 2021 regulations. The scoping and EIA process for the proposed project is undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

3.1.1.2 THE NATIONAL WEB-BASED ENVIRONMENT SCREENING TOOL, 2019

On the 5th of July 2019, the Department of Forestry, Fisheries and the Environment (DFFE) issued a Notice of the requirement to submit a report generated by the National Web-based Environmental Screening Tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and Regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended. The submission of this report is compulsory when applying for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 effective from the 4th of October 2019. The DFFE Screening Tool Report was generated on the 3rd of December 2024. The Screening report is provided in Appendix 4 of this report. The environmental sensitivities identified in screening report for the proposed development footprint are indicated on Table 8.

Table 8: Environmental sensitivity of project area.

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture Theme			X	



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

The information collected by the specialists and EAP's assessment may be used to confirm or dispute (as may be applicable) the environmental sensitivity ratings identified by the National Screening Tool. The Heritage and Palaeontology Assessments were undertaken during the Scoping phase, whilst the Biodiversity Assessments were undertaken during the EIA phase. The EAP has undertaken a site sensitivity verification (Appendix 5) and the EAP's assessments/theme and sensitivity ratings identified by the Screening Tool are summarized in Table 4.

The DFFE Screening Report indicates that certain Specialist Assessments must be undertaken for the proposed development. There is however an allowance of the EAP to motivate for the reasons for not including certain assessments in the assessment report. Table 4 presents these Specialist Assessments/Studies as well as the motivations behind the EAP's decision of recommending or not recommending the undertaking of certain Specialist Assessments.

3.1.2 THE NATIONAL WATER ACT, 1998

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. These water use processes are described in Figure 7. A person may use water if the use is –

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

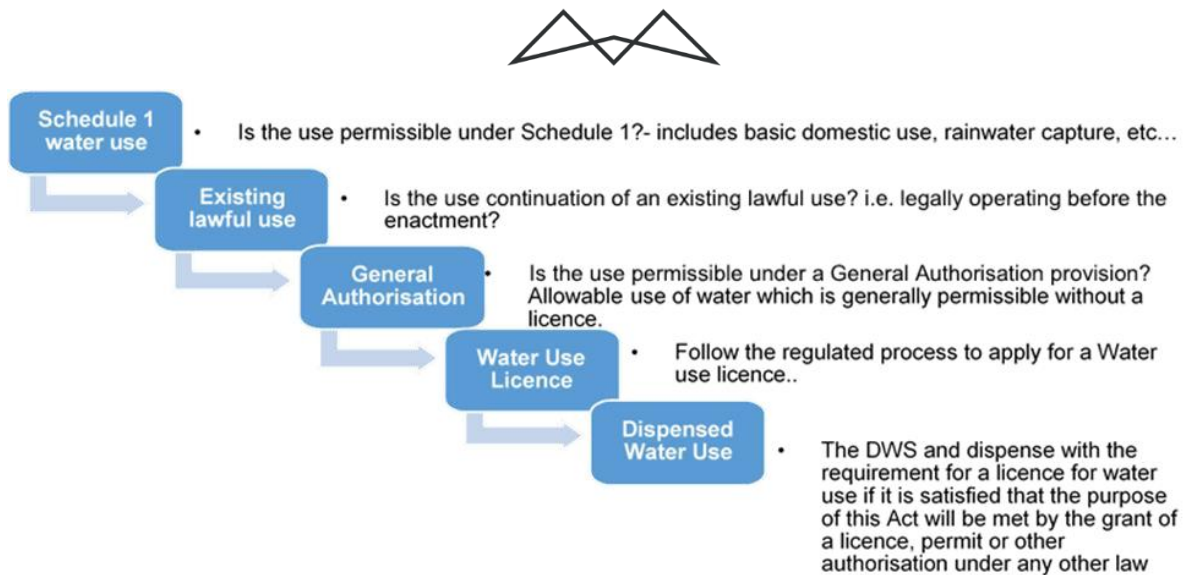


Figure 7: Authorisation Process for new water uses.

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways that take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the Department of Water and Sanitation (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 review of the NWA Section 21 activities was undertaken to assess if the proposed development triggers any activity. Based on the information provided by the applicant, the proposed development triggers Section 21(a) and Section 21(b) of the NWA. Subsequently, a Water Use Licence Application is concurrently underway for the project with the Department of Water and Sanitation, Northern Cape Region.

3.1.3 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT, 2013

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

3.1.4 NOISE CONTROL REGULATIONS, 1992

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, however noise may have an impact on the fauna and therefore mitigation measures are included in this report as well as the EMPr.

3.1.5 ENVIRONMENTAL CONSERVATION ACT, 1989

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance. Noise nuisance is not anticipated as part of the proposed farming activities, however noise may have an impact on the fauna and therefore mitigation measures are included in this report as well as the EMPr.



3.1.6 NATIONAL HERITAGE RESOURCES ACT, 1999

The National Heritage Resources Act (NHRA) (Act 25 of 1999) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states:

“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 last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA. This change requires us to evaluate the Section of these Acts relevant to heritage. The NEMA 23(2)(b) 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). Several Heritage resources have been identified by a Heritage Specialist (Section 7.9 and Appendix 6) and the relevant impacts and mitigations have been included in this report (Section 8.2) and the EMPr (Appendix 9).

3.1.7 CONSERVATION OF AGRICULTURE RESOURCES ACT, 1983

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

3.1.7.1 CARA REGULATIONS (GN R 1048, 1984)

Since the proposed project includes cultivation activities on virgin soils (i.e., land which has, at no time during the preceding ten years, been cultivated), an application for a Plough Certificate has been submitted to the relevant authorities, in terms of the CARA regulations (GN R 1048/84), section 2:

"2. Cultivation of virgin soil

- (1) Except on authority of a written permission by the executive officer, no land user shall cultivate any virgin soil, Provided that such authority shall not be required in respect of virgin land for which an approval has been granted in terms of section 4A of the Forest Act, 1972 (Act 68 of 1972).*
- (2) An application for a permission referred to in subregulation (1) shall be made on a form obtainable from an extension office for this purpose.*
- (3) Such application form shall be completed by the land user of the farm unit on which such virgin soil is situated and shall be lodged at the extension office for the area within which the farm unit concerned is situated at least three months prior to the intended date of cultivation.*
- (4) An officer may, for the purposes of an investigation deemed necessary to consider such application, direct a land user to dig such soil profile pits as such officer may determine and to take such other steps as that officer may determine."*

3.1.8 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008

The National Environmental Management: Waste Act, no 59 of 2008 (NEM: WA) came into effect on the 1st of July 2009. The Waste Act places a general duty on a holder of waste to avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger the health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening the Act; and prevent the waste from being used for an unauthorised purpose. Section 16 of the NEMWA must also be considered which states the following:

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."*

These general principles of responsible waste management will be incorporated into the requirements in the EMP to be implemented for this project.



Waste can be defined as either hazardous or general in accordance with Schedule 3 of the NEM: WA (2014) as amended. “Schedule 3: Defined Wastes” has been broken down into two categories – Category A being hazardous waste; and Category B being general waste. In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means “*any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.*”
- General waste: means “*waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69.*”

The NEM: WA provides the overarching legal framework that mandates responsible waste management throughout the lifecycle of both land clearance and farming operations, ensuring that environmental and health impacts are minimised.

3.1.9 THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004

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.

3.1.9.1 THE LIST OF ECOSYSTEMS THAT ARE THREATENED AND NEED OF PROTECTION, 2011

The NEM: BA provides 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.

3.1.9.2 THE THREATENED OR PROTECTED SPECIES REGULATIONS, 2007

The purpose of these regulations is 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.

3.1.9.3 THE ALIEN AND INVASIVE SPECIES LIST, 2020

This Act is applicable since it protects 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:* 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;
- *Category 1b Listed Invasive Species:* 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;
- *Category 2 Listed Invasive Species:* 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; and
- *Category 3 Listed Invasive Species:* Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

Based on desktop information including the National Web-Based Environmental Screening Tool Report, the study area was assessed to be located within a Critical Biodiversity Area (CBA) 1 and CBA 2, Ecological Support Area (ESA) 1 and ESA 2 as well as within a National Protected Area Expansion Strategy (NPAES) within the *Least Concern* Gauteng Shale Mountain Bushveld vegetation. A Terrestrial Biodiversity Assessment (flora, fauna and avifaunal) was considered necessary and has been undertaken during this EIA Phase. The study identified Threatened Ecosystems, Sensitive and Vulnerable Ecosystems, Critical Biodiversity Areas, Ecological Support Areas, Conservation Targets and Ecological Drivers of the ecosystem as well as alien and invasive species. Where sensitive species or ecosystem drivers were identified, relevant mitigation measures have been put forward to prevent or minimise the impacts. The findings and impact assessment are discussed in Section 8.2, as well as Appendix 6 in the specialist's report. It must be noted that permits for protected species under the NEMBA may also be required.

3.1.10 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT, 2004

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEM: AQA) is the main legislative tool for the management of air pollution and related activities. The Objective of the Act is:

To protect the environment by providing reasonable measures for –

- i. the protection and enhancement of the quality of air in the republic;
- ii. the prevention of air pollution and ecological degradation; and
- iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
- iv. Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEM: AQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd of November 2013 (Government Gazette No. 37054).



According to the NEM: AQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

While the anticipated air quality impacts from the listed activities are not projected to be significant, adherence to the NEM: AQA and the National Dust Control Regulations, where relevant, remains a requirement.

3.1.10.1 THE NATIONAL DUST CONTROL REGULATIONS, 2013

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. Dust that may be created from the proposed land clearance and agriculture activities and appropriate mitigation measures are recommended to minimise the impact.

3.1.11 THE NATIONAL FORESTS ACT, 1998

The National Forests Act (NFA, Act 84 of 1998) provides for the protection of forests as well as specific tree species, as noted in Section 15 of the Act:

“15. Effect of declaration of protected trees

(1) No person may-

(a) cut, disturb, damage or destroy any protected tree; or

(b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree,

except-

(i) under a license granted by the Minister;

(ii) in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette on the advice of the Council.”

A permit will be required should a protected tree species be required to be destroyed, transported, or transplanted. 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. The Ecology Specialist has identified a number of protected tree species on-site that will need to be removed as part of the land clearance activities, and will therefore require a permit (refer to Section 8.2 and Appendix 6).

3.1.12 THE OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

The Occupational Health and Safety Act (Act 85 of 1993 - OHSA) is designed to provide for the health and safety of persons at work and in connection with the use of plant and machinery. Its primary objective is to protect employees and other individuals from hazards arising from or associated with activities at workplaces.

Key provisions of the OHSA establish a shared responsibility model, obligating both employers and employees to actively contribute to minimising workplace risks. Employers are mandated to provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of their employees. This includes, but is not limited to:



- Identifying and eliminating or mitigating hazards.
- Providing and maintaining safe systems of work, plant, and machinery.
- Ensuring the safe production, processing, use, handling, storage, and transport of articles and substances.
- Providing necessary information, instructions, training, and supervision.
- Establishing and maintaining a health and safety policy, often signed by the Chief Executive Officer, outlining the organization's commitment.
- Conducting regular risk assessments to identify and evaluate potential hazards and implement control measures.
- Providing appropriate Personal Protective Equipment (PPE) free of charge and ensuring its correct use and maintenance.

Employees, in turn, are responsible for taking reasonable care of their own health and safety and that of others who may be affected by their actions or omissions. They must comply with health and safety rules and procedures, report unsafe conditions, and cooperate with employers to fulfil the Act's requirements.

The OHSA also provides for the establishment of Health and Safety Representatives and Committees in workplaces with more than 20 employees, fostering a collaborative approach to safety management. The Department of Employment and Labour enforces the Act, with inspectors empowered to conduct unannounced visits, request documentation, and investigate incidents. Non-compliance can lead to legal repercussions, including criminal liability for negligence.

The OHSA aims to proactively prevent work-related injuries, illnesses, and fatalities by setting legally enforceable standards and fostering a culture of health and safety awareness and accountability across all sectors, excluding mining (which is governed by separate legislation).



4 NEED AND DESIRABILITY OF PROPOSED PROJECT

The need 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 9 below presents the need and desirability analysis undertaken for the proposed pivot development.

Table 9: Need and Desirability of the proposed project.

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.	<p>After running the DFFE screening tool, specialist studies that were identified included:</p> <ul style="list-style-type: none"> • Heritage Impact Assessment; • Palaeontological Impact Assessment; • Biodiversity Impact Assessment; • Agricultural Impact Assessment; • Landscape/ Visual Impact Assessment; • Aquatic Biodiversity Impact Assessment; • Hydrology Assessment; and • Socio-Economic Assessment. <p>In terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended, the required DFFE Screening Report is provided as Appendix 4. Only the Heritage, Palaeontological and Biodiversity specialist assessments were deemed necessary by the EAP and were conducted by the relevant specialists. These were the only specialist studies considered because of the proposed location and type of activities which form part of the pivot development project. A desktop study and an on-site investigation was conducted on the 29th of January 2025, which confirmed the redundancy of additional specialists’ studies to be done.</p> <p>Three pans were identified within the site or within the 500m assessment zone around the boundary of the project area. Most of the footprint falls on old lands, previously grazing land that was allowed to reform into a semi-natural state consisting of two distinct vegetation type units, an open grassland and a Mixed Vachellia Savannah. Additionally, the proposed activity, pivot irrigation, will visually fit in with the surrounding area because of the presence of other pivots in the project’s vicinity. The</p>



Ref No.	Question	Answer
		biodiversity, heritage and palaeontological specialist studies (Appendix 6) involved the gathering of desktop data and an on-site inspection to identify and assess any environmental impacts that may occur because of the proposed farming expansion project. These impacts were assessed according to the EIMS pre-defined impact significance rating methodology (Section 8.1). The specialists have also recommended appropriate mitigation/ management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.
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 Sections 7.6 and 7.7, and the impact assessment and mitigation measures in Section 8.2 of this Report. Efforts have been 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 Sections 7.6 and 7.7, and the impact assessment and mitigation measures in Section 8.2 of this 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 8.2 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 6 for the specialist report. The possible impacts and associated mitigation measures as identified by the specialist was also included as part of Section 8.2.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure	It is anticipated that no non-renewable natural resources will be impacted on. Crop rotation is the growing of different crops in succession on a



Ref No.	Question	Answer
	responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	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. In year 1, potato seeds will be planted on Pivot 1, and in year 2 potato seeds will be planted on pivot 2. Thereafter potato seeds will be planted on pivot 3, 4, 5 and 6 in years 3, 4, 5 and 6 respectively. Following each harvest, a crop rotation strategy will be implemented (see Figure 3), involving the planting of either onions or various grasses on the pivots, and will include designated fallow periods for livestock grazing. Soil supplementation will be conducted based on the results of soil testing, with only the necessary chemical inputs applied to optimize crop yield.
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?	<p>For the foreseeable future, the proposed pivots will only cover an area of 1050 ha on which crops will be planted. The main natural resource required is the initial soil area on which the crops will be planted as well as additional chemicals from time-to-time, when needed, to supplement the soil. An increase of resources will not be required to maintain economic growth as the crops planted over the 1050 ha area should not depreciate in value over time. If the applicant wants to expand his pivot operations in the future, it will consume more resources, in the form of additional soil area.</p> <p>Water abstracted from the Vaal River will have an impact on the stream flow as well as reduction in a water resource. This impact will be managed through the Water Use Licence process and mitigations are provided in Section 8.2.3.2.</p>
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. dematerialised growth)?	The area for development of the proposed pivots mostly consists of old game land, whereas most of the animals have been removed since the purchase of the property, which has over time developed into a semi-natural state and is currently used as grazing land for cattle. The proposed area for development is currently. For this reason and considering that the major surrounding land-use is agriculture, the proposed pivots do constitute the best use of the natural resources/ area. The alternative will be for the area to remain undeveloped.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The area for development of the proposed pivots mostly consists of old land, which has over time developed into a semi-natural state. The proposed area for development is currently uneconomical and not used. For this reason and considering that the major surrounding land-use is agriculture, the proposed pivots do constitute the best use of the



Ref No.	Question	Answer
		natural resources/ area. The alternative will be for the area to remain undeveloped.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed pivots will mostly be located on old lands (previously cultivated area) within the property of the applicant. While the proposed project will not reduce the dependency on natural resources, the output of the proposed pivots will result in an increase in employment and food security.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The exact number and location of 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 a possibility. A chance find protocol was developed by the heritage/ palaeontology specialist.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The uncertainties mentioned in 1.8.1 above are mitigated in the EMPr, which if followed, will attribute a low risk to any uncertainties.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Sufficient information was gathered prior to the onset of this process to indicate that positive impacts will outweigh low risk for the proposed project. The proposed project will positively influence the local economy through job creation and food security.
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 8.2 of this Report. In summary, because of the preferred location alternative, the proposed project will not negatively affect public amenity or have any high negative visual impacts, as the proposed pivots are within the applicant's property and aligns with surrounding land-use. Mitigations are put forward to manage potential impacts on water quality, including groundwater and the Vaal River.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report.



Ref No.	Question	Answer
	or water quality, etc. What measures were taken to enhance positive impacts?	In summary, positive impacts will be to the local economy as a result of job creation and contribution to food security.
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 Sections 7.6 and 7.7, and the impact assessment and mitigation measures in Section 8.2 of this Report. No dependencies are expected to be negatively impacted on because the proposed development will be on the applicant's property. The pivots will not negatively impact on any water sources that might be used by the surrounding communities. If any cultural or heritage resources are identified during development, a chance find procedure as described by the heritage specialist will be implemented to mitigate any negative impacts.
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 8.2 of this Report. The DFFE Screening Tool report has identified this project area to fall within a CBA1 and CBA2 area. Overall, the proposed project will result in the loss of natural vegetation, the impact is anticipated to be high. A comprehensive biodiversity specialist assessment has been conducted. This assessment aims to evaluate the potential impacts of the proposed project on local fauna and flora. Particular attention has been given to the project's proximity to known breeding zones of protected species to ascertain and quantify any potential adverse effects, as well as the impacts on protected species identified on-site.
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 Report for the advantages and disadvantages of the proposed activity. The only viable alternative assessed for the proposed pivots is the no-go option.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to the identified impacts, including cumulative impacts their assessment and recommended mitigation measures in Section 8.2 of this Report. The proposed project will contribute to the loss of natural vegetation and could potentially impact on cultural resources if a chance find occurs. The proposed pivot development is consistent with the surrounding land use activities in the area, which



Ref No.	Question	Answer
		include other similar agricultural activities such as grazing and pivot irrigation. Mitigation measures are in place for the impacts on the ecological and biophysical environment, to minimise the impacts, however, given the size of the land clearance, the proposed activity may have a significant cumulative impact for loss of indigenous vegetation and habitat. This impact has been fully assessed during the EIA phase by a suitably qualified specialist. 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 protected 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 this resource from the area (refer to Appendix 6 for the Biodiversity Specialist 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 Integrated Development Plan, IDP, (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area,	<p>The Frances Baard District Municipality (FBDM) experienced a population increase from 382,086 in 2011 to 434,343 in the 2022 census. The demographic profile is characterized by a female majority (52.1%) and a predominantly Black African population (67%), followed by Coloured (24%) and White (8%) (Stats SA Census, 2022). A significant portion of the population (26.8%) is economically inactive.</p> <p>Despite these challenges, the FBDM represents the strongest economic region in the Northern Cape Province, contributing 36% to the provincial GDP. Its economy is diversified across the primary (14%), secondary (9%), and tertiary (77%) sectors. However, economic growth within the FBDM has been volatile, exhibiting fluctuations influenced by global economic events and domestic growth patterns.</p> <p>The district faces a substantial unemployment rate of 39.4%, with notable variations across local municipalities, including high rates in Phokwane (47.8%), Magareng (53.9%), Dikgatlong (44%), and Sol Plaatje (36.2%). The FBDM is actively pursuing local economic development initiatives to mitigate unemployment and enhance economic conditions within the district.</p> <p>The Sol Plaatje Local Municipality (SPLM) had a total population of 270,078 in the 2022 census, an increase from 248,041 in 2011. The gender</p>



Ref No.	Question	Answer
		<p>distribution shows a female majority (52.1%) compared to males (47.9%) (Figure 18). The population demographic is predominantly Black African (62%), followed by Coloured (28%) and White (9%) (Figure 19, Stats SA Census, 2022). A substantial portion of the SPLM population (39%) is economically inactive, with youth unemployment contributing an additional 41.7% to this figure, indicating a significant challenge in economic participation (Sol Plaatje Local Municipality, 2022).</p> <p>In 2015, the labour force participation rate for the SPLM was 60.0%, similar to the 59.2% recorded in 2005. The unemployment rate decreased slightly from 36.6% in 2005 to 36.0% in 2015. However, the decreasing gap between the labour force participation rate and the unemployment rate suggests a negative outlook for employment within the SPLM.</p>
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	<p>The Sol Plaatje Spatial Development Framework proposes a defined Urban Growth Boundary (UGB) or Urban Edge, to curb urban sprawl and promote a more compact city form with intensified activity along public transport routes. Development outside this boundary will be restricted and considered based on specific land use criteria, including:</p> <ul style="list-style-type: none"> • agriculture (and related dwellings), • conservation areas/nature reserves (with related tourism/recreational facilities), • tourism and recreational facilities with a rural character, • social amenities serving nearby communities (that cannot be located within the urban area), • farm stalls, • rural residential uses, and • agricultural holdings. <p>These exceptions aim to accommodate essential rural activities while strictly limiting general urban expansion beyond the designated UGB. However, The Local Economic Development Strategy identifies the potential of expanding the agricultural sector by intensifying and expanding the range of crops under irrigation along the river.</p>
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	The preferred location for proposed pivots falls within a potential intensive irrigation agricultural area according to the Sol Plaatje LM SDF (2022-



Ref No.	Question	Answer
		2027). The proposed project aligns with the surrounding land uses.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The Local Economic Development Strategy for the Sol Plaatje LM identifies the potential of expanding the agricultural sector by intensifying and expanding the range of crops under irrigation along the river.
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?	<p>Job creation for local residents as far as reasonably possible.</p> <p>Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report.</p>
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	<p>The proposed development aligns and compliments the LED.</p> <p>The Frances Baard District Municipality Growth and Development Strategy (FBDM DGDS) is envisaged as a process of collective planning to improve alignment between spheres of government and other social partners to impact on poverty and accelerated shared growth. The FBDM DGDS provides an action plan to meet the development needs of the communities within the district. The DGDS aims to achieve this through the further development of leading economic sectors namely:</p> <ul style="list-style-type: none"> • Agriculture and Agro-Processing; • Mining and Mineral Processing; • Tourism; • Manufacturing; • Transport; • Services; • SMME Development; and • Institutional Capacity Building.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	<p>Refer to the public participation process undertaken to date in Section 6 of this Report. Public participation and consultation will continue during the EIA phase as described in Section Error! Reference source not found..</p> <p>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report.</p>
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?	The need for additional pivots will support the need for short-term and long-term food security through the provision of potato seeds, potatoes and onions. The proposed pivots will allow for favourable



Ref No.	Question	Answer
	Will the impact be socially and economically sustainable in the short- and long-term?	economic impacts on both the local and regional economy. Should the project proceed, additional jobs are anticipated to be created for the foreseeable future. Furthermore, as per the FBDM DGDS, the proposed pivots will support the emerging potato farmers through the provision of potato seeds among, others, and in turn will help increase the portion of crops that are beneficated locally.
2.5	In terms of location, describe how the placement of the proposed development will:	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	The proposed project site is located among agricultural land which is located approximately 20 km north of Kimberley and approximately 3 km southwest of Riverton. 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.
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 within an area classified as agricultural land.
2.5.7	Optimise the use of existing resources and infrastructure,	No existing infrastructure exists on the proposed site location, however pipelines from the Vaal River may be extended onto the properties being applied for.
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 2 of this Report.



Ref No.	Question	Answer
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 approximately 20 km north of Kimberley and approximately 3 km southwest of Riverton in an area zoned as agricultural land.
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,	The proposed pivots will mostly be located on old lands (previously used for grazing and game) within the property of the applicant. While the proposed project will not reduce the dependency on natural resources, the output of the proposed pivots will result in an increase in employment and food security. The proposed project also aligns with the SDFs proposed expansion of agricultural activities along the Vaal River.
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.
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.),	The proposed pivots will mostly be located on old lands (previously used for grazing and game) within the property of the applicant. While the proposed project will not reduce the dependency on natural resources, the output of the proposed pivots will result in an increase in employment and food security. The proposed project also aligns with the SDFs proposed expansion of agricultural activities along the Vaal River.
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 and local. 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	The proposed locality is natural semi-vegetated and in the middle of agricultural land. Therefore, no sense of history or heritage will be lost. The proposed pivots will fit in with the surroundings, having no negative impacts on the sense of place.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed locality is natural semi-vegetated and in the middle of agricultural land. The proposed pivots will fit in with the surroundings, having no negative impacts on the sense of place.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts	



Ref No.	Question	Answer
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	<p>The following gaps/ uncertainties are noted:</p> <p>The EIA process and report is based on the technical information and process description provided by the client; and</p> <p>The description of the baseline environment has been obtained from specialist studies and a desktop analysis.</p>
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to.
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	As the proposed project is a new development a cautious approach has been applied. An extensive public participation process was undertaken to ensure that the local community and relevant authorities were notified of the proposed project.
2.7	How will the socio-economic impacts be resulting from this development, impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8 of this Report. This aspect is discussed in It is expected that the project will not have significant social impacts.
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 8.2 of this Report. In summary, local employment will be prioritised.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this 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	Refer to the identified impacts, their assessment and recommended mitigation measures in Section



Ref No.	Question	Answer
	environmental option" in terms of socio-economic considerations?	8.2 of this Report. Additionally, see item 2.8 of this table (above).
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report. The preferred alternative is considered the best practicable environmental option as it is located in an area zoned as agricultural land and is adjacent to the existing pivots.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting a 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 8.2 of this Report.
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 8.2 of this Report.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to the public participation process undertaken to date in Section 6 of this Report. 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 Environmental Impact Assessment Report is made available at a local public place (Public Library) and the EIMS website after completion, and all registered I&APs are 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,	



Ref No.	Question	Answer
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,	
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 Report.
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Workers at the farm will be educated on a regular basis through toolbox talks on the environmental and health risks that may occur within their work environment, and adequate measures will be taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in as well as the requirements of their job.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	The project pivots are located approximately 20 km north of Kimberley and approximately 3 km southwest of Riverton. It is anticipated that workers currently employed or to be employed will travel from the surrounding towns and farming communities. Local employment is prioritised and included in the mitigations, as well as skill development of the local workforce.
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).	
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	What measures were taken to ensure:	



Ref No.	Question	Answer
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	
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 8 of this Report. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report. The impacts have been explored in the EIA phase and findings thereof are presented in this EIA Report and EMPr. Potatoes, onions and potato seeds 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 8.2 of this Report. The impacts have been explored in the EIA phase and findings thereof are presented in this 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 EMPr associated with this EIA (Appendix 9).
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 Report.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 8.2 of this Report.



5 PROJECT ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. An alternative is defined as:

“...in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

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

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess in the EIA phase. There are, however, some significant constraints that have to be considered when identifying alternatives for a project with this scope. Such constraints include social, financial and environmental issues, which are discussed as part of the evaluation of the alternatives for this project. In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the EIA Process and each role is detailed as follows:

- The role of the environmental assessment practitioner is to:
 - encourage the proponent to consider all feasible alternatives;
 - identify reasonable alternatives;
 - provide opportunities for stakeholder input to the identification and evaluation of alternatives;
 - document the process of identification and selection of alternatives;
 - provide a comprehensive consideration of the impacts of each of the alternatives; and
 - document the process of evaluation of alternatives.
- The role of the proponent is to:
 - assist in the identification of alternatives, particularly where these may be of a technical nature;
 - disclose all information relevant to the identification and evaluation of alternatives;
 - be open to the consideration of all reasonable alternatives; and
 - be prepared for possible modifications to the project proposal before settling on a preferred option.
- The role of the public is to:
 - assist in the identification of alternatives, particularly where local knowledge is required;
 - be open to the consideration of all reasonable alternatives; and



- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. As mentioned in Section 4 of this Report, the need for the proposed project includes the following key drivers:

- The need for employment opportunities, which the project will create.
- The project will contribute to food security (crops will be sold locally as well as nationally).
- The need for integrated and zoned land-uses.

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

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

5.1 NO-GO ALTERNATIVE

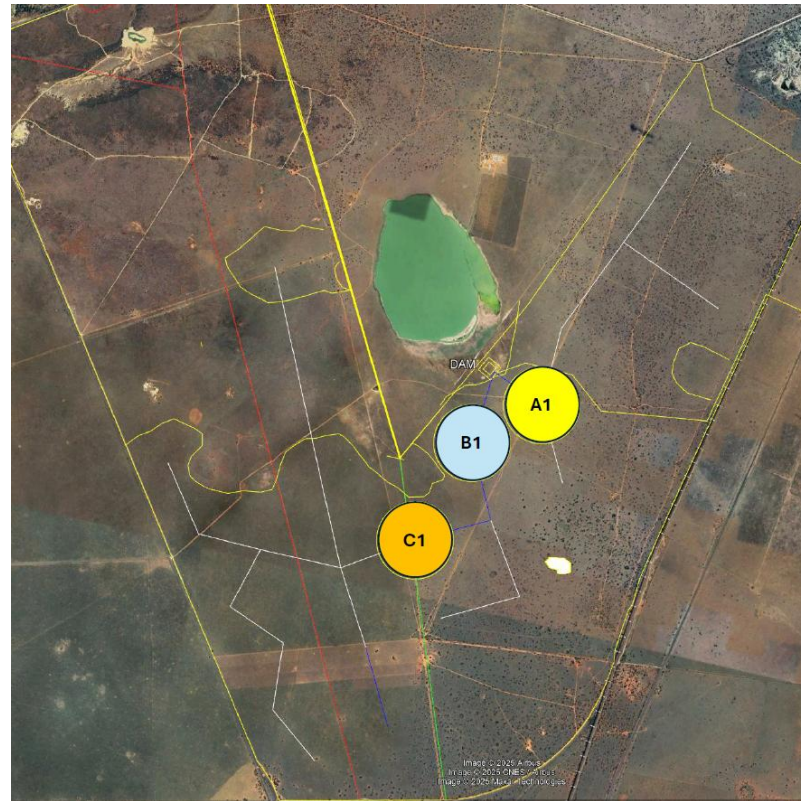
The no-go alternative option means 'do nothing' or the option of not undertaking the proposed preferred activities, consequently leading to the continuation of the current land-use, which is leaving the location as a vegetated area. As such, the 'do nothing' alternative or keeping the current status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

5.2 PROJECT LAYOUT

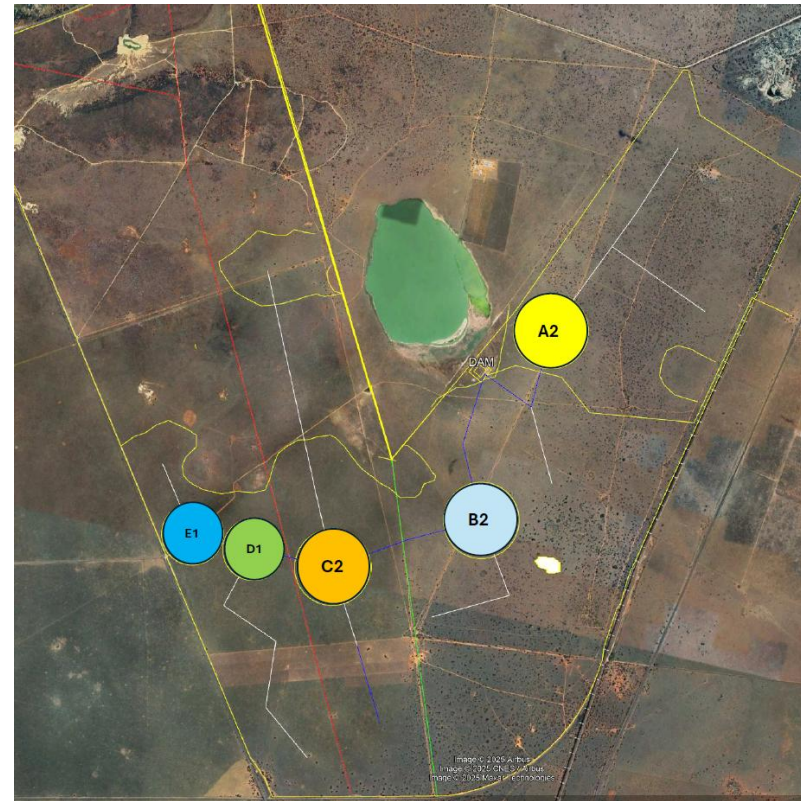
The density survey of the protected trees (Species 257) determined that the proposed pivot layout would result in the loss of approximately 4 803 protected trees. Given the significant number of trees affected and the location of several pivots within areas of high environmental sensitivity, an alternative layout is necessary to reduce impacts on protected vegetation.

Soil analysis conducted as part of the ploughing certificate application indicates that suitable soils for irrigation are unevenly distributed across the proposed development area. This limits the potential layout options, as not all areas are suitable for irrigation development. Additional constraints relate to the economic viability and crop rotation requirements for potato farming. The production system depends on a critical interval between potato crops to minimise disease risk. A longer rest cycle between crops increases the sustainability of production, whereas an interval that is too short could result in system failure and render the area unsuitable for potato farming. The cycle and planted area must also remain financially viable.

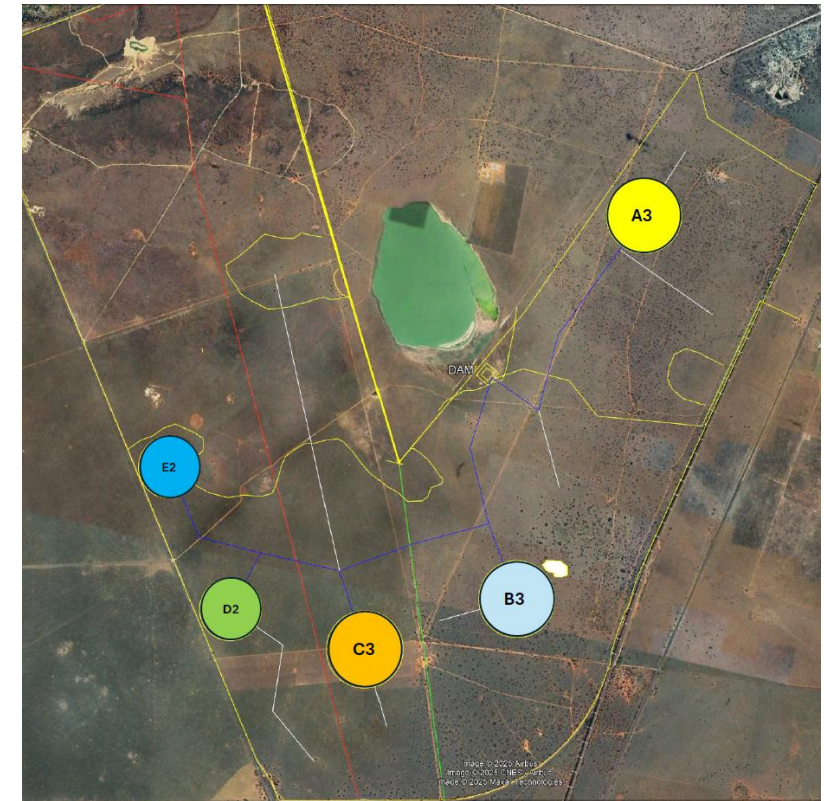
As an alternative, it is proposed to reduce the number of pivots and adjust the position and size of the remaining pivots. This approach would decrease vegetation clearance and the number of protected trees impacted, with priority given to removing pivots from high-sensitivity areas. The revised layout (Figure 8 and Figure 9) illustrates the proposed arrangement, including the operational schedule for each phase of the crop cycle. Under this alternative, ten pivots have been removed from high-sensitivity, high-tree-density zones.



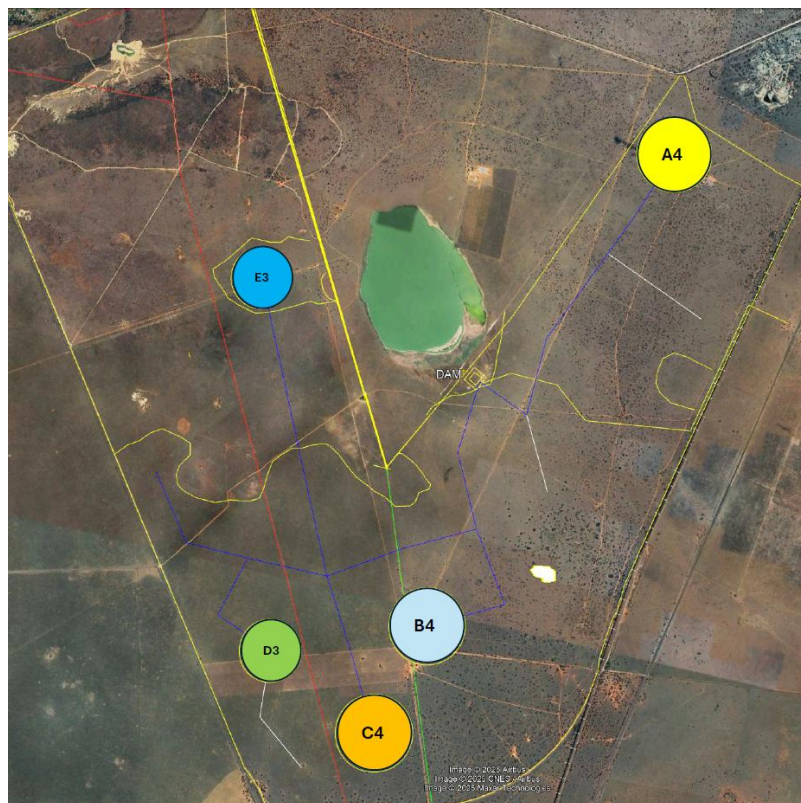
Phase 1



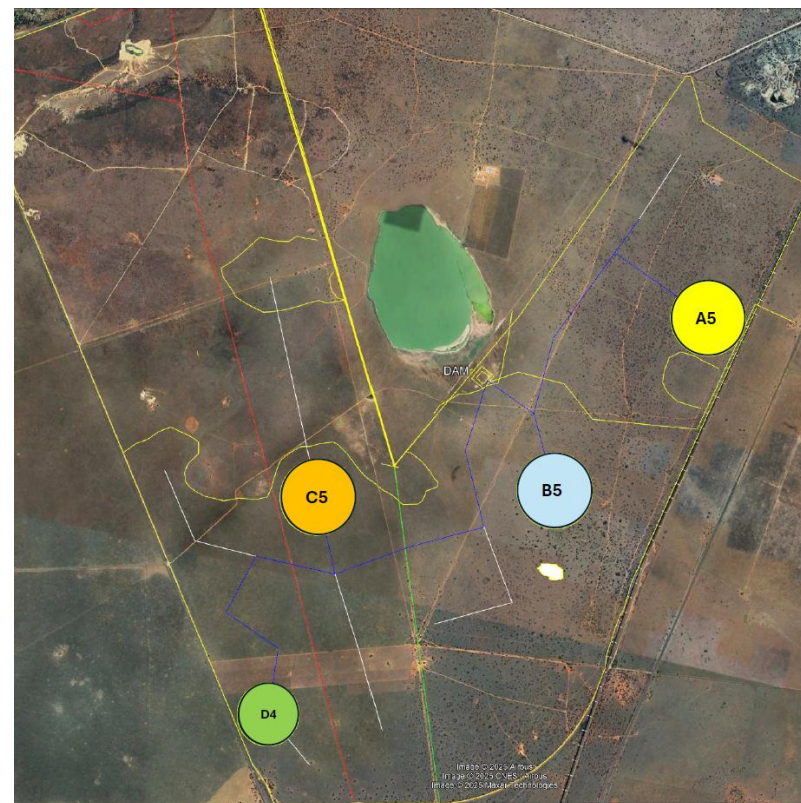
Phase 2



Phase 3



Phase 4



Phase 5



Phase 6

Figure 8: Alternative proposed layout of active pivots over the six year cycle.

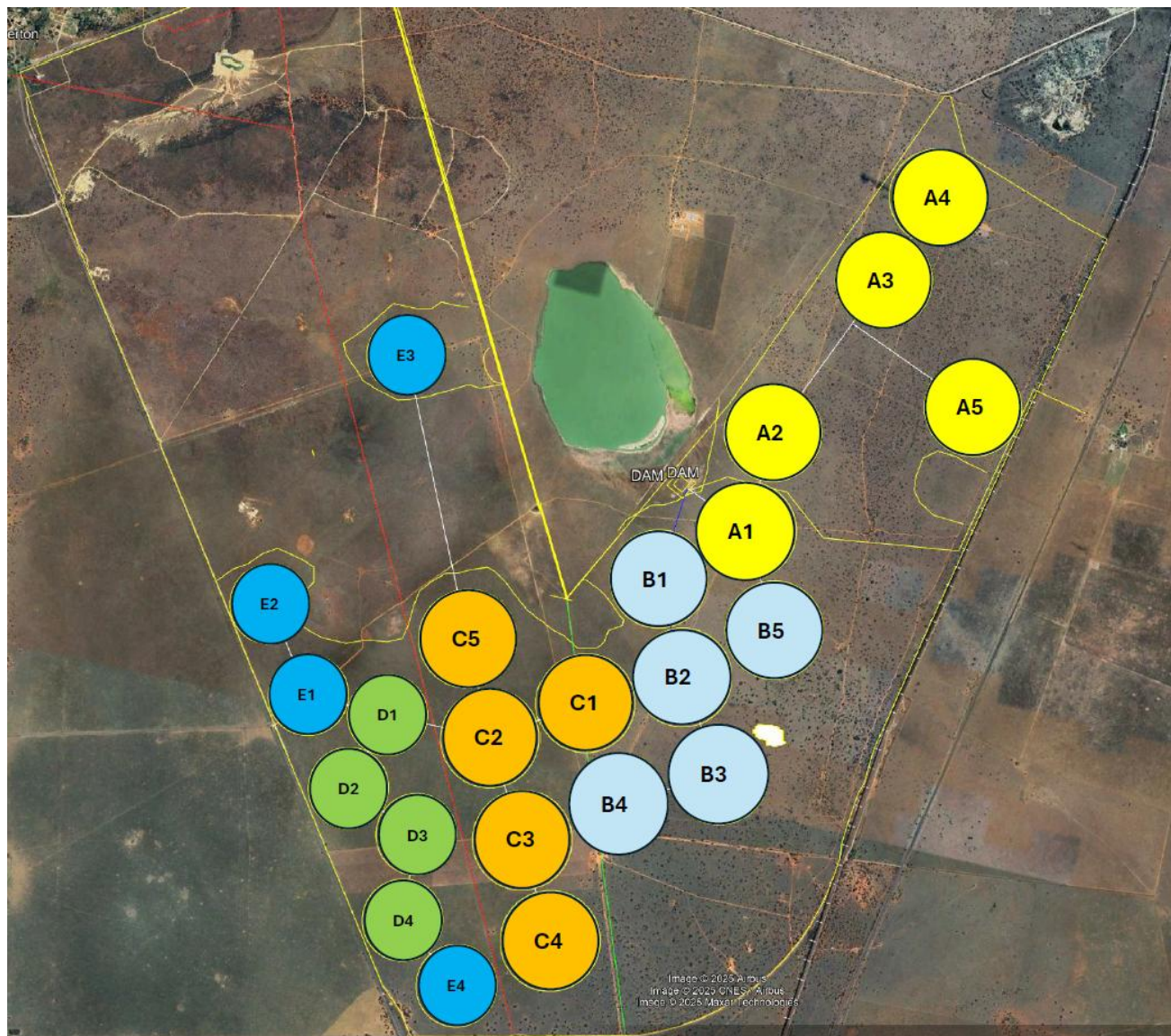


Figure 9: Pivot layout with all six phases of active pivots.

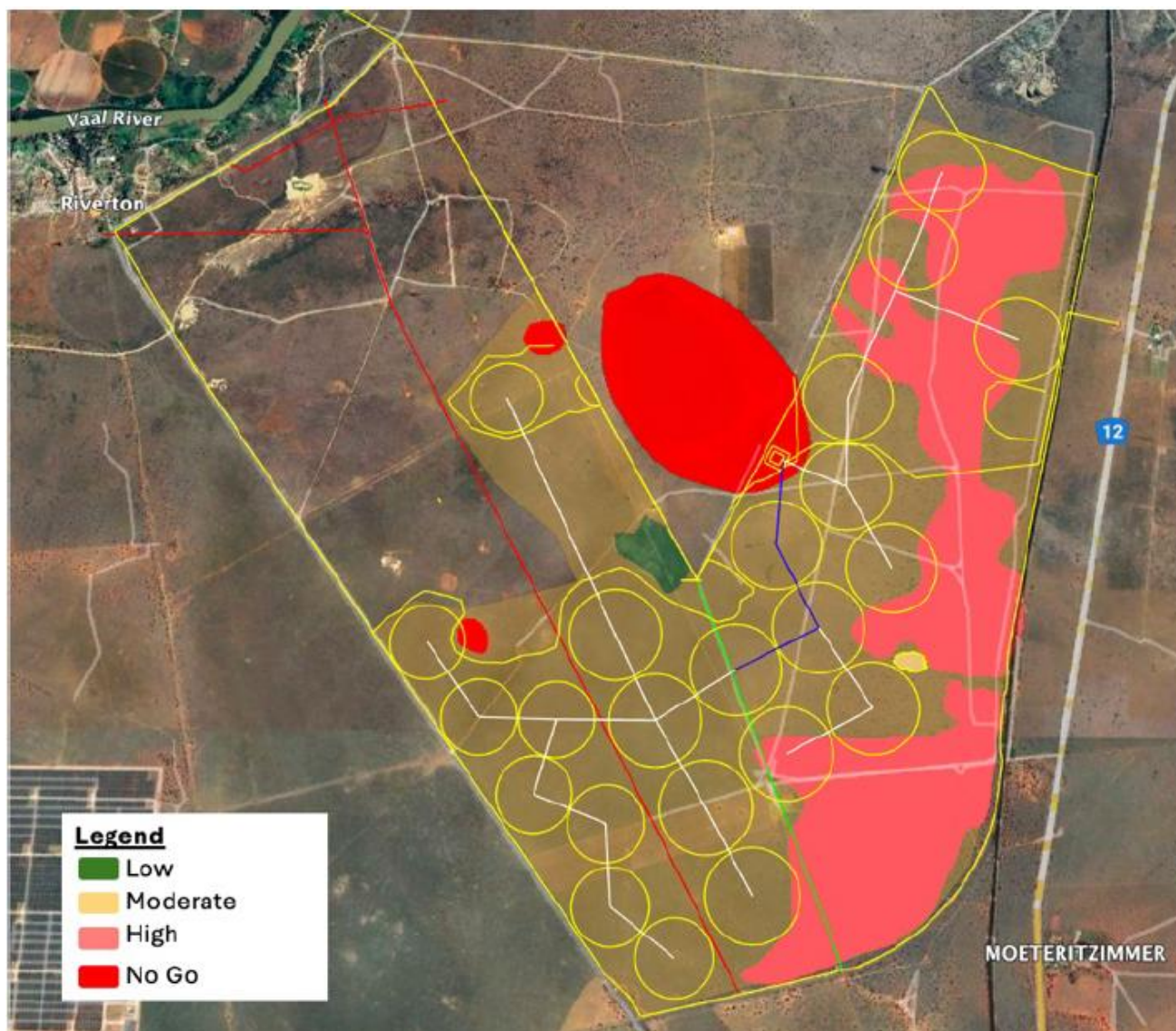


Figure 10: Site sensitivity map showing the alternative proposed pivot layout and ecological corridor (light red).



5.3 PREFERRED ALTERNATIVE

The preferred alternative will involve the pivot layout that accommodates an ecological corridor, by reducing the number of pivots and including no-go areas with high density protected trees (refer to Figure 10). The development of agricultural activities will remain on the farms; Farm Droogfontein 62 portion 16, Farm Eerste Aanleg 50 portion 2, Farm Bulpan 51 the remainder portion, Farm Witpan 52 the remainder portion, however approximately 23 new pivots will be developed instead of the originally proposed 33 pivots, and will require the clearance of approximately 720 ha of vegetation, approximately 330ha less than the original 1050ha proposed for vegetation clearance. The pivots are developed primarily for the growing of potatoes, onions and various grass-feed. The development of these pivots will occur in phases/seasons over the course of 7 years. With each phase/season, approximately 175 Ha will be cleared for the pivots. Therefore, after approximately 7 years a total of 720 Ha will have been cleared (refer to Figure 8). Crop rotation will be done after each potato harvest, by planting onion and then grass-feed.

Water for the pivots will be sourced from the Vaal River and pumped through an existing underground pipe, which will be extended toward the buffer dam located approximately 6 km from the river on Farm Bulpan 51. The applicant currently holds an existing Water Use Licence (08/C33C/A/8367) for Farm Droogfontein 62, Portion 13, authorising the abstraction of 519 152 m³/annum from the Vaal River. To facilitate the irrigation of all planned future pivot systems being applied for, an additional water allocation of 578 848 m³/annum is required. The irrigation water will be sourced from the Vaal River. The current existing water use licence will need to be amended to include the additional farms and farm portions designated irrigation activities, the additional 500 000m³/a volume of water to be taken from the Vaal River as well as the storage of 49 000 m³ of water within a buffer dam.

An alternative option would be to reduce the number of pivots and reshuffle the position and size of the remaining pivots, which would reduce the amount of vegetation clearing by approximately 330ha and in so doing reduce the number of protected trees affected. The priority would be to remove as many pivots as possible from the areas of high sensitivity. Figure 8 shows the alternative proposed layout, and which pivots will be active during each phase of the cycle. 10 pivots have been removed from the areas of high sensitivity (high tree density).

No other feasible alternatives other than the No-Go alternative could be identified. The proposed project is located on the applicant's property close to other pivots, mostly on previously cultivated lands. This makes it the ideal location as the area has been used previously for cultivation, and it fits in with the surrounding land uses. No significant negative environmental impacts are expected as because of the proposed project. No other land-uses seem more feasible within the proposed project area.



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 practices 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 ENVIRONMENTAL IMPACT ASSESSMENT 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 based on known key I&AP's, Windeed searches, and stakeholder databases provided by the mine. The I&AP database includes amongst others, landowners, communities, regulatory authorities and other special interest groups.

6.2.1 LIST OF PRE-IDENTIFIED ORGANS OF STATE / KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

A pre-notification register of key Interested and Affected Parties (I&APs) for the Environmental Authorisation Application was developed using I&AP databases from prior environmental authorisation processes in the project area. This database includes, but is not limited to, landowners, communities, regulatory authorities, and specialist interest groups. Subsequent registrations during the initial notification and call-to-register period have further expanded the database. The complete I&AP list can be found in Appendix 3.

6.2.1.1 LIST OF AUTHORITIES IDENTIFIED AND NOTIFIED

The following Government Authorities were notified of the proposed project:

- Agricultural Research Council;
- Council of Geoscience;
- 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 Energy Regulator of South Africa;
- 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 Settlements and Traditional Affairs (NC COGHSTA);
- 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;
- Sol Plaatje Local Municipality;
- Presidential Climate Commission;
- South African Civil Aviation Authority (SACAA);
- South African Heritage Resources Agency (SAHRA);
- South African National Parks;
- South African National Roads Agency Limited (SANRAL);
- Transnet SOC Limited; and
- Ward Councillors.



6.2.1.2 OTHER KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

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

- Eskom;
- Wildlife & Environmental Society of South Africa (WESSA);
- Northern Cape Wetland Forum
- South African National Biodiversity Institute (SANBI);
- Botanical Society;
- Conservation South Africa (CSA);
- Transnet Soc Ltd;
- South African Wetlands Society: Northwest;
- Endangered Wildlife Trust;
- Federation for a Sustainable Environment;
- Natural Justice;
- BirdLife South Africa;
- Centre for Environmental Rights;
- World Wildlife Fund;
- Agri SA;
- Agricultural Research Council;
- Northern Cape Provincial Heritage Resource Agency;
- South African National Parks (SANParks) (Senior General Manager); and
- Pre-identified and registered landowners and surrounding landowners..

6.2.2 INITIAL NOTIFICATION OF I&APS

The PPP commenced on the 12th of February 2025 with an initial notification and call to register. Initial call to register notifications were conducted as presented below.

6.2.2.1 REGISTERED LETTERS, FAXES AND EMAILS

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

- 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; and
- 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 3.

6.2.2.2 SITE NOTICES AND POSTERS

Three (3) Site notices were placed along, within and surrounding the perimeter of the proposed project area and its surroundings on 20th of February 2025. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;



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

Please refer Appendix 3 for proof of site notice and poster placement.

6.2.2.3 NEWSPAPER ADVERTISEMENTS AND THE GOVERNMENT GAZETTE

One advertisement (English and Afrikaans) was placed on the 14th of February 2025 in the Diamond Fields newspaper with circulation in the vicinity of the project area. The details of the advertisements are presented below:

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

As stated in sections above, I&APs were provided an opportunity from the 12th of February 2025 to register for the proposed project.

6.2.3 AVAILABILITY OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Notification regarding the availability of the Environmental Impact Assessment Report for public review was given in the following manner to all registered I&APs (which includes key stakeholders and landowners):

- Registered letters with details on where the Environmental Impact Assessment Report can be obtained and/or reviewed, public meeting date and time, EIMS contact details as well as the public review comment period;
- Facsimile notifications with information similar to that in the registered letter described above; and/or
- Email notifications with a letter attachment containing the information described above.

The Environmental Impact Assessment report was made available for public review from the 19th of August 2025 to the 18th of September 2025 for a period of 30 days.

6.2.4 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 3). To date, the following comments have been received:

- I&AP registration
- Request for project description, shapefile, and locality map.
- Comment from DFFE: Directorate: Forest Resource Protection (NC)
- Comments from NC DAERL
- Request for a site visit from DFFE: Biodiversity and Conservation branch

All comments and/or queries received to date are included in this report and presented in Appendix 3. Please refer to Appendix 3 for proof of correspondence.



7 ENVIRONMENTAL BASELINE ATTRIBUTES

This section of the 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

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 421.6 mm. w receives the highest average rainfall at approximately 80 mm, while July experiences the lowest, with an average of 5 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).

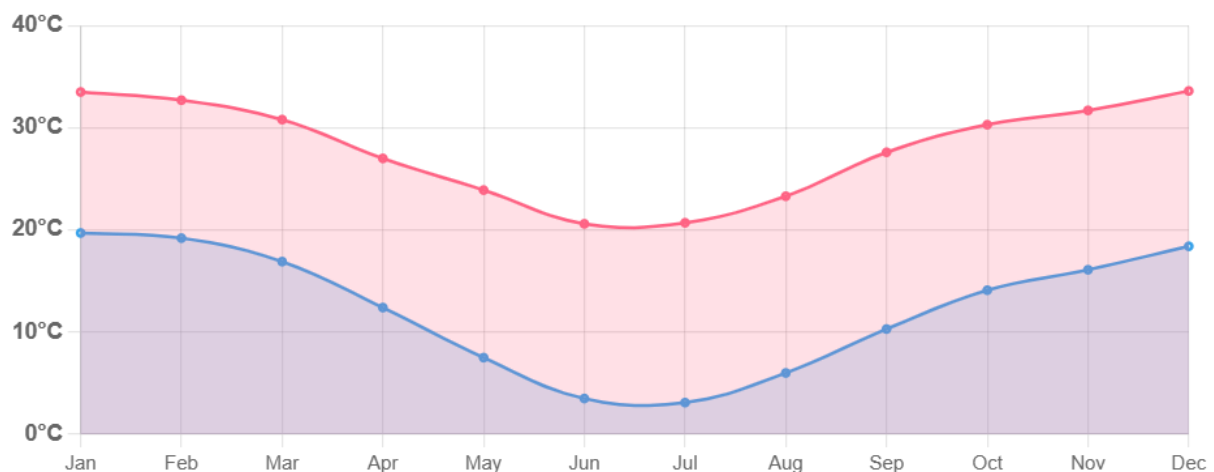


Figure 11: average maximum day and minimum night temperatures in Kimberley (Weather & Climate, 2025).

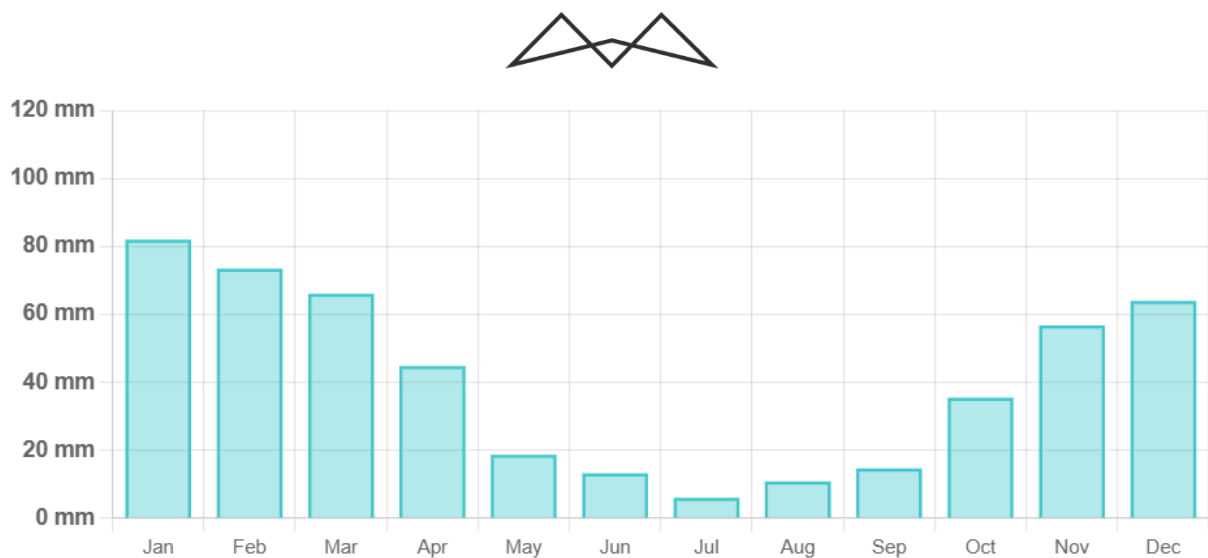


Figure 12: The mean monthly precipitation over the year, including rain, hail and snow (Weather & Climate, 2025).

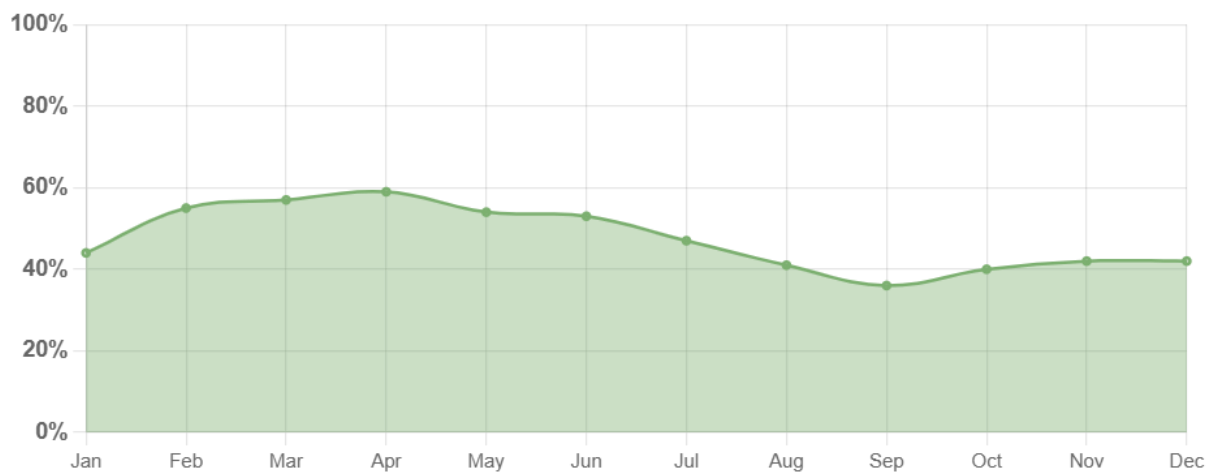


Figure 13: Relative humidity over the year (Weather & Climate, 2025).

7.2 TOPOGRAPHY

The topography of Kimberley and its surrounding area is characterized by predominantly flat terrain. Within the immediate urban area, there are no significant, naturally occurring hills, a feature that extends across much of the broader region.

A notable aspect of Kimberley's landscape is the presence of anthropogenic features resulting from extensive diamond mining. Prominent "hills" in the vicinity are mine dumps, exemplified by the area surrounding the "Big Hole," which constitute a significant element of the city's man-made topography. The rural areas surrounding Kimberley are comprised of expansive, relatively flat plains. These plains are punctuated by occasional hills, typically bedrock outcrops such as andesite or dolerite, and shallow pans.

Kimberley is situated within the Northern Cape Province, a region defined by vast, arid to semi-arid landscapes. Geologically, the area is located within the Karoo Basin, which is dominated by sedimentary rock formations.

The elevation profile (Figure 14) specific to the proposed project area shows a relatively flat topography with an average slope of 0.09% and an average elevation of 1154 masl. The topographic gradient of the area exhibits a general north-westerly decline towards the Vaal River, situated at approximately 1100 masl.

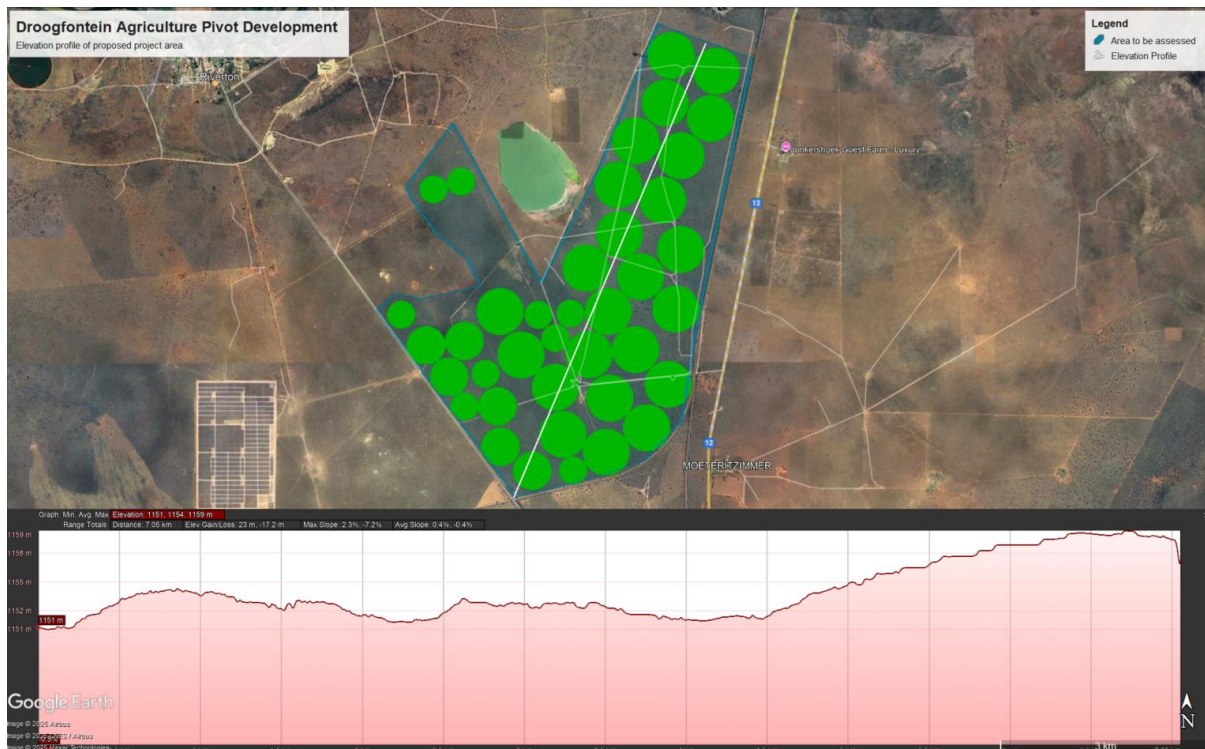


Figure 14: Elevation profile of proposed project area.

7.3 GEOLOGY AND PALAEOONTOLOGY

The proposed agricultural development near Kimberley in the Northern Cape is depicted on the 1: 250 000 Kimberley 2824 (1993) Geological Map in Figure 15. The proposed development is underlain by Quaternary to Recent red and grey aeolian dune sand (Qs, yellow) (Qs), Calcrete, calcified pandune and surface limestones (Qc, dark yellow), Jurassic dolerite (Jd, red) as well as the Allanridge Formation (Ventersdorp Supergroup).

According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Quaternary sands is Medium (green), that of the calcrete is High (orange), that of Jurassic dolerite is Zero (grey) while that of the Allanridge Formation is Low (blue) (Figure 16). The suggested location is classified as having a High (red) Palaeontology Theme Sensitivity in the DFFE Screening Report

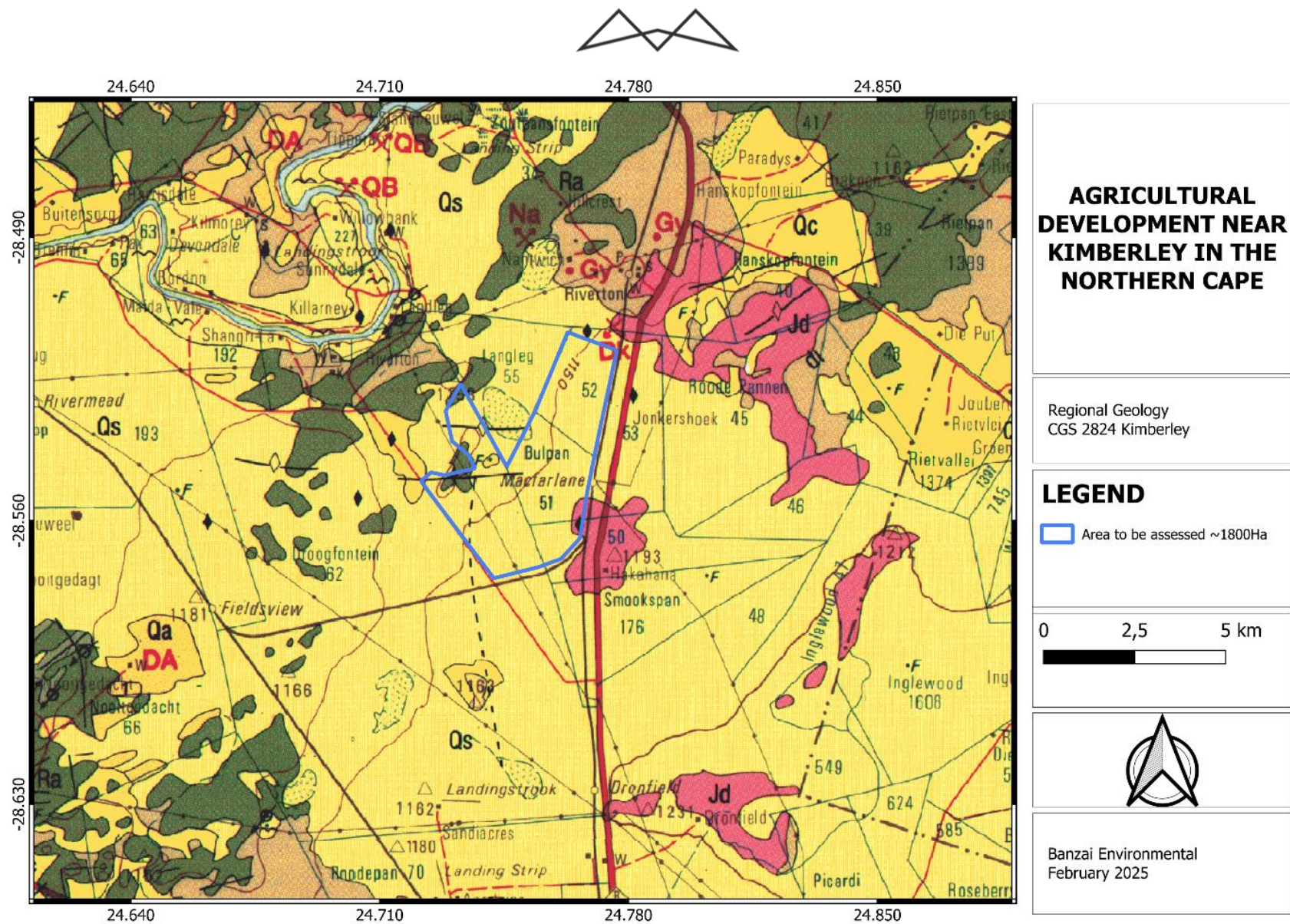


Figure 15: Extract of the 1:250 000 Kimberly 2824 (1986) Geological Map (Council for Geosciences, Pretoria) indicating the study area is underlain by Quaternary red and grey aeolian dune sand (Qs, yellow), Calcrete (Qc, dark yellow), Jurassic Dolerite (Jd, red) as well as the Allanridge Formation (Ra, green) of the Ventersdorp Supergroup.

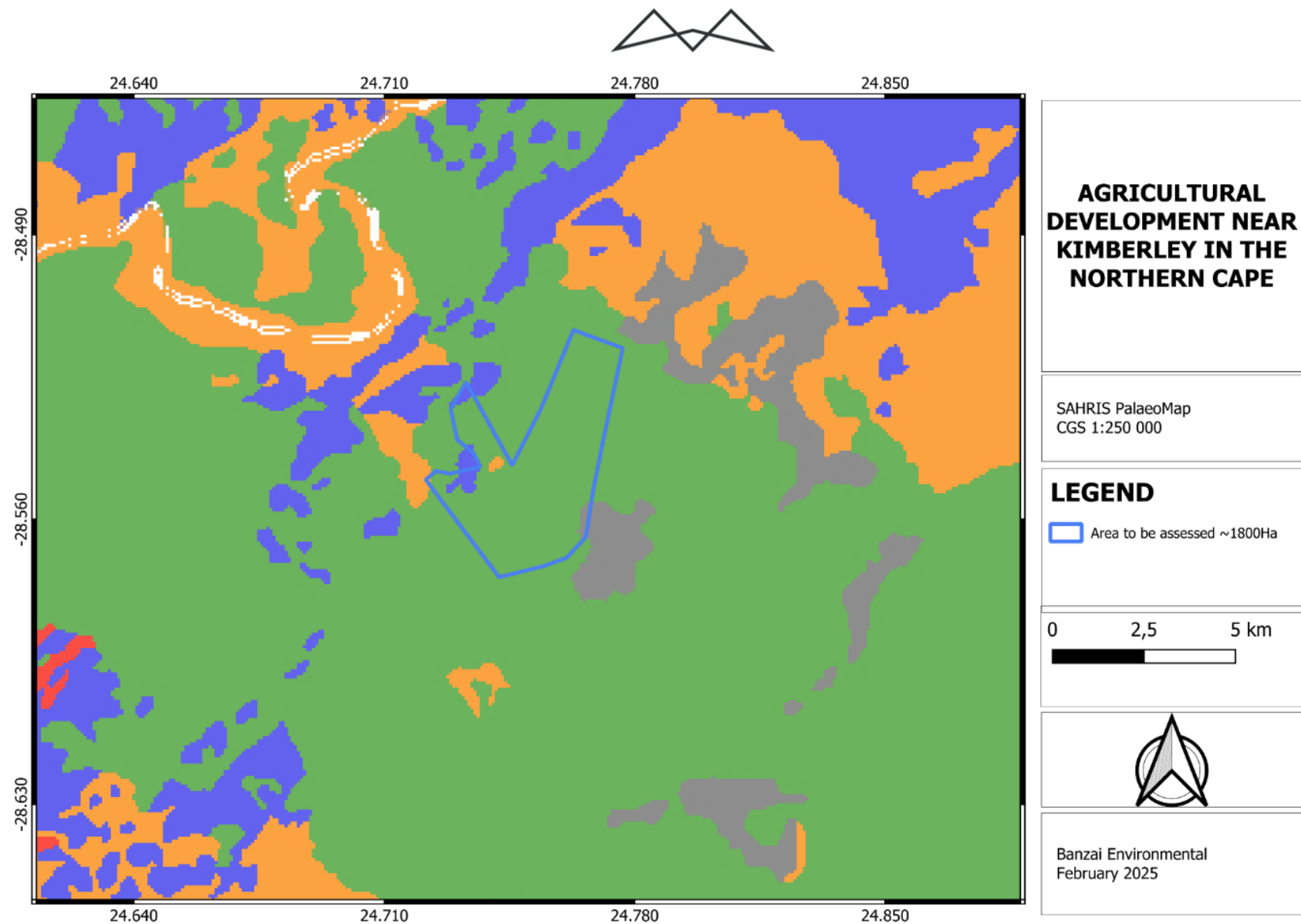


Figure 16: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicating the High (orange), Moderate (green), Zero (grey) and Low (blue) Palaeontological Sensitivity of the study area.



The best exposures of the Ventersdorp Supergroup are in the North West Province as well as in the Northern Cape Province, Gauteng, and southern Botswana. This Supergroup is divided in the Klipriviersberg Group (oldest) which is overlain by the Platberg Group followed by the sedimentary Bothaville Formation and the volcanic Allanridge Formation (uppermost Ventersdorp unit, youngest Formation).

The Platberg Group is subdivided in four formations namely the Kameeldoorns-, Goedgenoeg-, Makwassie-, and Rietgat Formations. These formations consist of heterogeneous rock varying from chemical and classic sediments, to felsic and mafic volcanics. These rocks were deposited in linear vault troughs during graben developments (Visser et al, 1975-1976, Buck, 1980). These deep intermontane grabens formed in older underlying andesitic terranes and formed areas of alluvial fan deposits and debris as well as scree flows. Ooids and stromatolites accumulated under lacustrine conditions in fine-grained chemical and terrigenous sediments. (Buck, 1980) Stromatolites were identified in the Rietgat Formation between Prieska and Britstown. In time fluvial processes prevailed causing widespread prograding of alluvial fans across basins (Buck, 1980).

The Platberg is mostly absent in the north-east of the Ventersdorp depository while the outcrops are erratic with changes in thickness. The type-area of the Platberg Group is between Welkom and Klerksdorp and was described by Winter (1976), while the Klerksdorp area was described by J.M. Myers (1990). The Rietgat Formation crops out in the, north, northwest, and southwest of Vryburg, south-southeast of Douglas, Taung-Hartswater area, west of Klerksdorp, T'Kuip in the Northern Cape Province and southwest of Ventersdorp. The Rietgat Formation consist of alternating sedimentary and volcanic rocks which varies in thickness across the basin.

The uppermost volcanic Allanridge Formation crops out in the North West, Northern Cape, and Free State Provinces. Witmer (1976) came to the conclusion that the Allanridge Formation has a conformable relationship with the Bothaville Formation (deeper parts of the basin) while Keyser (1998), found a very prominent unconformable relationship in the direction of the northwestern boundary of the Ventersdorp depository. The Allanridge formations consists primary of light green-grey porphyritic lava and pyroclastic rocks as well as dark-green amygdaloidal lava. The dark-green lava is the thickest unit in the Allanridge Formation. Both lava types consist of amygdaloids but is more widespread in the dark-green lava. A Low Sensitivity has been allocated to the Allanridge Formation as lacustrine stromatolites is preserved in carbonates with possible organic walled microfossils (Groenewald et al, 2014).

The development area is extensively intruded by dolerite dikes and sills of the Karoo Dolerite (Jd, red) of the Karoo Igneous Province. This Province in southern Africa is a classic continental flood basalt province that was formed during the Early Jurassic Period. This Suite is entirely unfossiliferous.

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).

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 cores 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.

7.4 HYDROLOGY

The project area is situated within the broader Vaal River catchment, specifically the quaternary drainage region C91D. The existing hydrological regime is characterised by low and erratic rainfall, high evapotranspiration rates, and limited surface water resources beyond the Vaal River itself. Local watercourses are likely ephemeral, influenced by sporadic rainfall events.

The proposed pivot irrigation development is situated above a minor aquifer (Department of Water Affairs, 2012), characterized as a moderately-yielding aquifer system exhibiting variable water quality. Baseline investigations indicate that the groundwater within the project area presents an electrical conductivity range of 150 to 370 mS/m (Department of Water Affairs, 2012). However, it is important to note that the project's irrigation requirements will be exclusively sourced from the Vaal River, and no groundwater abstraction is planned. Consequently, the potential hydrological impacts related to groundwater depletion and direct contamination are significantly reduced.

Nevertheless, the baseline data regarding groundwater quality remains relevant for assessing potential indirect impacts. The high electrical conductivity of the local aquifer highlights the importance of managing irrigation return flows and runoff effectively. While the project will utilise Vaal River water, there remains a risk that irrigation return flows and runoff, if not properly managed, could interact with the local aquifer, potentially impacting its existing water quality. Therefore, mitigation measures aimed at preventing soil salinisation and minimising the transport of agricultural chemicals into the subsurface environment are crucial to ensure the long-term integrity of both surface and groundwater resources in the project area.

7.5 SOIL

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 17). 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/km². 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. See Figure 17 for a soil map of the project area.

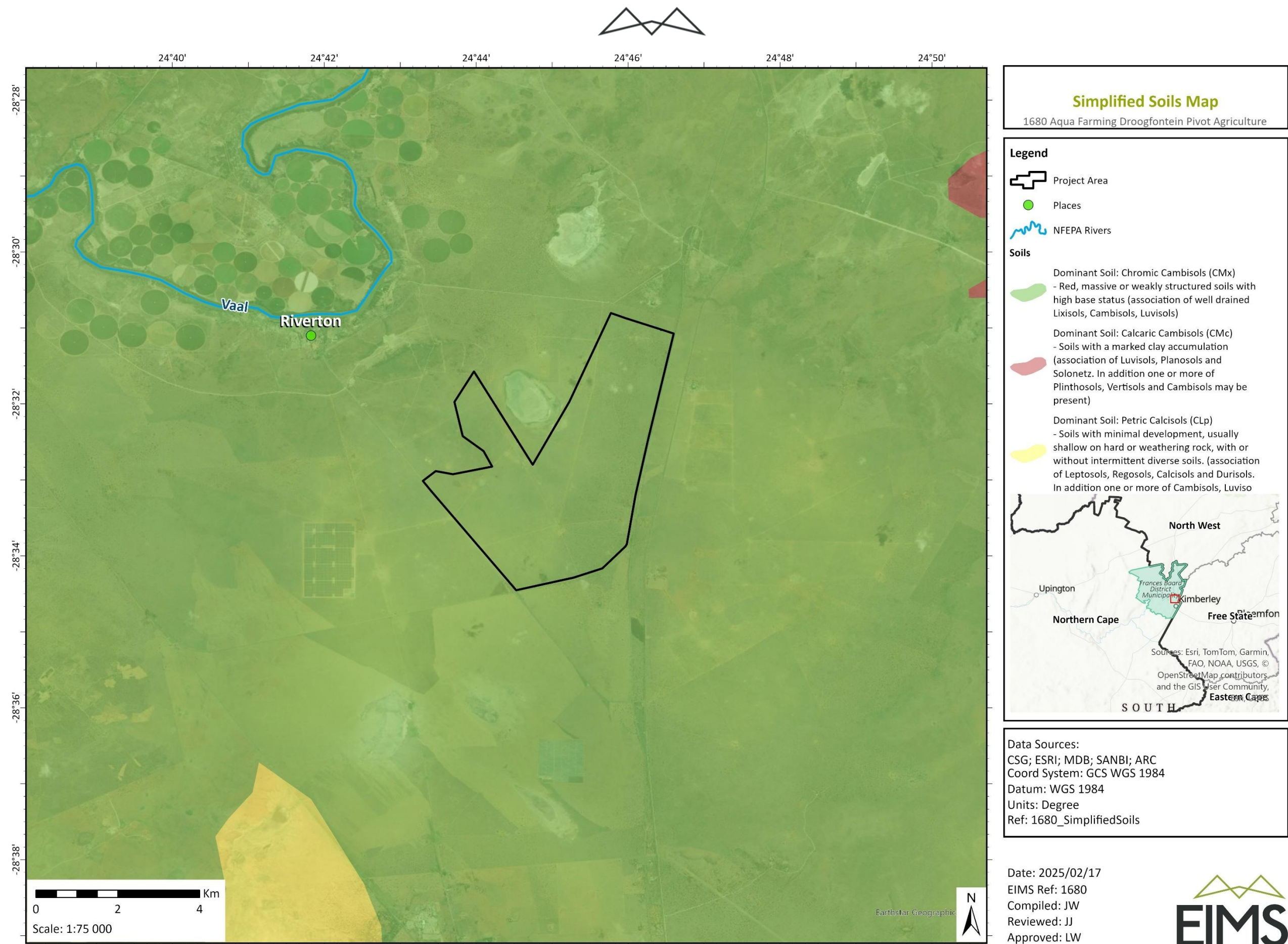


Figure 17: Soil types covering the study area.



A comprehensive soil survey was conducted within the proposed project area to evaluate its suitability for irrigation. The findings of this survey have been considered for this report to establish the baseline soil attributes (Dreyer, 2024). The dominant soil types identified within the project area are classified as Ermelo, Hutton, Vaalbos, and Carolina.

Textural analysis revealed a consistently low clay content, ranging between 5% and 15% in both topsoil and subsoil horizons. This sandy soil composition is considered highly favourable for irrigation purposes, as it facilitates efficient water infiltration. Furthermore, the survey indicated a high infiltration tempo, signifying rapid water percolation. This characteristic, coupled with the soil's inherent permeability, suggests excellent potential for the installation and effective operation of subsurface drainage systems, mitigating the risk of waterlogging and soil salinization associated with irrigation practices.

7.6 FAUNA AND FLORA

A terrestrial biodiversity assessment has been undertaken during this EIA phase. The DFFE Screening Tool has indicated that the Animal Species theme to be high, and the Plant Species theme to be medium. The Aquatic Biodiversity theme has a maximum sensitivity of very high, however the majority of the area falls within a low sensitivity.

7.6.1 FLORAL SPECIES

One protected species has been identified in the DFFE Screening Tool. The species is referred to as Species 257¹ and has a sensitivity of medium. A number of protected plant species have the potential to occur on site. These are species protected in terms of the National Forest Act 1998 and the Northern Cape Nature conservation Act, Schedule 1 & 2. Section 8.2 provides the impacts, as determined by the specialist, on the protected species.

Table 10: Potential flora within the project area.

Species	Legislation	Conservation Status	Potential of occurrence on site
<i>Species 257</i>	National Forests Act 1998	Protected	Recorded on property
<i>Trachyandra saltii</i>	NCNCA	Schedule 2	Recorded on property
<i>Plinthus sericeus</i>	NCNCA	Schedule 2	Recorded on property
<i>Harpagophytum procumbens</i>	NCNCA	Schedule 1	Not recorded during survey but very high possibility of occurrence in the area
<i>Jamesbrittenia foliolosa</i>	NCNCA	Schedule 2	Recorded on property
<i>Jamesbrittenia albiflora</i>	NCNCA	Schedule 2	Not recorded in development footprint
<i>Duthiastrum linifolium</i>	NCNCA	Schedule 2	Not recorded during survey but very high

¹ Certain Species of Conservation Concern (SCC) are vulnerable to illegal harvesting. To protect these species, their specific names have been omitted and replaced with unique identification numbers (Sensitive Plant Unique Number / Sensitive Animal Unique Number), in accordance with best practice guidelines. The names of these sensitive species are not to be disclosed in the final EIA report or any publicly released specialist reports.



Species	Legislation	Conservation Status	Potential of occurrence on site
			possibility of occurrence in the area
<i>Brunsvigia radulosa</i>	NCNCA	Schedule 2	Recorded on property
<i>Boophone disticha</i>	NCNCA	Schedule 2	Recorded on property
<i>Aloe hereroensis</i>	NCNCA	Schedule 2	Not recorded during survey but very high possibility of occurrence in the area
<i>Aloe grandidentata</i>	NCNCA	Schedule 2	Not recorded during survey but very high possibility of occurrence in the area

7.6.2 FAUNAL SPECIES

The property was previously managed as a game farming operation and supported a range of large and small game species. Since its acquisition, most of the game animals have been removed, and the area is currently utilized for limited cattle grazing. Human-induced disturbances that alter the natural environment can have two primary ecological impacts: the loss of certain species due to habitat destruction, and the introduction or proliferation of other species that were previously unable to establish themselves, either due to unsuitable habitat or competitive exclusion.

Due to time constraints during the field survey, a comprehensive species inventory could not be compiled. As a result, emphasis was placed on habitat assessment to determine the potential presence of various species. This evaluation also considered the surrounding landscape to assess the possibility of ecological corridors that may facilitate species movement and connectivity.

Bird species observed on-site indicate the presence of both grassland and bushveld avifauna. Additionally, the widespread occurrence of loose, sandy soils across the study area suggests suitability for burrowing mammals. The DFFE Screening Tool has identified two avifaunal species with high sensitivity, namely *Aves-Neotis ludwigii* and *Aves-Gyps africanus*, and two with medium sensitivity namely *Aves-Sagittarius serpentarius* and *Aves-Gyps africanus*. The specialist has additionally noted substantial activity of the White Backed Vulture, *Aves-Gyps africanus*, which are critically endangered. Additionally, the proposed project area is located approximately 3 km from the Dronfield Important Bird Area (IBA). Observations indicate that the months of April and May coincide with the species' pairing and nest construction phases, thereby representing an optimal period for monitoring potential nesting activity.

Over the past four years, there has been a significant increase in the number of White-backed Vultures (*Gyps africanus*) breeding in the Kimberley area. On Dronfield Nature Reserve alone, the number of breeding pairs has risen from 86 in 2021 to 138 in 2024 (A. Anthony, pers. comm.). This increase is believed to be largely attributable to the low levels of disturbance in potential breeding areas.

Although the property under assessment contains stands of mature *Species 257* woodland, which includes large trees suitable for vulture nesting, no evidence of nesting by African White-backed Vultures was observed during the site visit.

A group of approximately 10 to 15 vultures was observed circling from the southern boundary of the property. However, these birds were at least two kilometres south of the site and are likely associated with the Dronfield Nature Reserve. Long-term research at Dronfield over the past 30 years indicates a gradual northward expansion



of nesting activity along the N12 corridor. Despite this trend, no nests have been recorded north of the Dronfield West/East boundary on the adjacent Hakahana Farm (A. Anthony, pers. comm.).

A survey conducted in early May 2025 in the *Species 257* woodland located west of the railway line and south of the Droogfontein PV Farm identified two African White-backed Vulture nests—one active nest located on an Eskom transmission line pylon and one inactive nest in a tree, believed to be from the previous breeding season. These nests are situated approximately 5.5 km south of Droogfontein Farm’s southern boundary.

The property has previously been managed as a game farming operation. It was stocked with a variety of large and small game species, most of these animals have been removed since the purchase of the property, a limited amount of cattle is currently being grazed on the property. No red data terrapin, tortoises, snakes or lizards were identified as occurring in the quarter degree square, based on the distribution maps available, however some species of reptiles that may occur in the area are protected in terms of the NCNCA (Table 11). No red data amphibians were identified as occurring in the quarter degree squares. Fourteen red data bird species have been recorded for the quarter degree square, most of these species will utilise the site for foraging purposes but they may not be totally dependent on the site. The critically endangered, African White Backed Vulture is known to occur in the area, however, no signs were found of African Whitebacked vultures nesting in any of the trees on this property.

Table 11: List of Species of Conservation Concern.

Common Name	Scientific Name	Conservation Status (Regional, Global)
Avifaunal		
Blue Crane	<i>Anthropoides paradiseus</i>	Near Threatened Vulnerable
Kori Bustard	<i>Ardeotis kori</i>	Near Threatened Near Threatened
Greater Flamingo	<i>Phoenicopterus ruber</i>	Near Threatened Least Concerned
Lanner Falcon	<i>Falco biarmicus</i>	Vulnerable Least Concerned
Lesser Flamingo	<i>Phoenicopterus minor</i>	Near Threatened Near Threatened
Secretary bird	<i>Asagittarius serpentarius</i>	Vulnerable Vulnerable
African White backed Vulture	<i>Gyps africanus</i>	Critically endangered Critically endangered
Cape Vulture	<i>Gyps coprotheres</i>	Endangered Endangered
Martial Eagle	<i>Polemaetus bellicosus</i>	Endangered



Common Name	Scientific Name	Conservation Status (Regional, Global)
		Vulnerable
Verreaux's Eagle	<i>Aquila verreauxii</i>	Vulnerable Least Concern
Tawny Eagle	<i>Aquila rapax</i>	Endangered Vulnerable Protected (NEMBA)
Black stork	<i>Ciconia bigra</i>	Vulnerable Least Concern
Ludwig's Bustard	<i>Neotis ludwigii</i>	Endangered Endangered
Lappetfaced Vulture	<i>Torgos tracheliotos</i>	Endangered Endangered
Mammalians²		
South African hedgehog	<i>Atelerix frontalis</i>	Near Threatened
Brown hyaena	<i>Hyaena brunnea</i>	Near Threatened
Spotted-necked otter	<i>Lutra maculicollis</i>	Vulnerable
Dent's Horseshoe Bat	<i>Rhinolophus denti</i>	Near Threatened
Black-footed Cat	<i>Felis nigripes</i>	Vulnerable
Temminck's ground pangolin	<i>Smutsia temminckii</i>	Vulnerable
Reptiles		
Flap-necked chameleon	<i>Chamaeleo dilepis</i>	Schedule 1
Tent tortoise	<i>Psammobates tentorius</i>	Schedule 2
Leopard tortoise	<i>Geochelone pardalis</i>	Schedule 2
African house snake	<i>Lamprophis fuliginosus</i>	Schedule 2
Mole snake	<i>Pseudaspis cana</i>	Schedule 2
Sundevall's Shovel-snout	<i>Prosymna sundevalli</i>	Schedule 2
Amphibians		
African clawed frog	<i>Xenopus laevis</i>	Schedule 2

² Conservation status based on listing in the National Red List of Mammals 2016.



Common Name	Scientific Name	Conservation Status (Regional, Global)
Karoo toad	<i>Bufo gariepensis</i>	Schedule 2
Guttural toad	<i>Bufo gutturalis</i>	Schedule 2
Eastern Olive toad	<i>Bufo garmani</i>	Schedule 2
Common sand frog	<i>Tomopterna cryptotis</i>	Schedule 2
Angola river frog	<i>Rana angolensis</i>	Schedule 2
Cape river frog	<i>Rana fuscigula</i>	Schedule 2

7.7 BIODIVERSITY AND PROTECTED AREAS

The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool has identified a Critical Biodiversity Area (CBA) within the proposed project area, overlapping with a National Freshwater Ecosystem Priority Area (NFEPA), as is shown in Figure 18. During the Site Sensitivity Verification, a surface water body was observed outside the boundary of the proposed project area. This feature was identified as an anthropogenic dam, previously utilized by the municipality for wastewater disposal. This practice has ceased, rendering the dam inactive. The CBA encompasses both CBA1 and CBA2 categories, representing distinct levels of biodiversity importance (Driver, 2017):

- **CBA1 (Irreplaceable):** These areas are considered irreplaceable or near irreplaceable for achieving biodiversity targets. They exhibit high selection frequency, indicating limited alternative options for conserving the associated biodiversity features.
- **CBA2 (Optimal):** These areas represent the optimal choices for meeting biodiversity targets, selected based on factors such as complementarity, efficiency, connectivity, and minimizing conflicts with other land or resource uses.

The proposed development site falls within the Kimberley Thornveld vegetation type, which is currently classified as Least Threatened. Despite this classification, only 4.4% of this vegetation type is formally conserved, while approximately 26.4% has been transformed, primarily due to agricultural cultivation. Key threats to the integrity of this vegetation include bush encroachment, particularly by *Senegalia mellifera*, largely as a result of overgrazing, as well as cultivation and mining activities.

The site is located within a Critical Biodiversity Area 2 (CBA2), as identified in the relevant biodiversity spatial planning frameworks. CBA2 areas are designated as optimal zones for achieving biodiversity targets, based on principles such as complementarity, efficiency, connectivity, and minimizing conflict with other land uses. The CBA2 designation in this case is primarily due to the presence of threatened bird habitat and the area's role in achieving vegetation type conservation targets.

The study area is not considered a threatened ecosystem under the National Environmental Management: Biodiversity Act (NEM:BA). However, the proposed development site borders a River Freshwater Ecosystem Priority Area (FEPA). River FEPAs are identified to meet biodiversity objectives for river ecosystems and the conservation of threatened or near-threatened fish species. Although the entire sub-quaternary catchment is delineated as a FEPA, the FEPA status specifically applies to the river reach indicated on official mapping within that catchment.

The project area does not fall within a Strategic Groundwater Resource Area, nor is it situated within a designated Important Bird Area (IBA). However, it is located approximately 4 km north of the Dronfield Important Bird Area.



Additionally, the site does not fall within a National Protected Area Expansion Strategy (NPAES) focus area, but lies approximately 11 km northwest of the Tarentaalrand Safari Lodge Protected Area.).

7.8 ALIEN / INVASIVE SPECIES

The management and control of invasive alien species in South Africa are governed by several key legislative instruments:

- Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983);
- Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009); and
- National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004)

NEMBA provides a comprehensive national framework for the management and control of invasive species, including both flora and fauna. Invasive alien species (IAS) listed under NEMBA are categorised into four groups as detailed in Government Gazette Notice No. 40166 of July 2016. These categories determine the level of control and the types of activities permitted or prohibited in relation to each species, and are as follows:

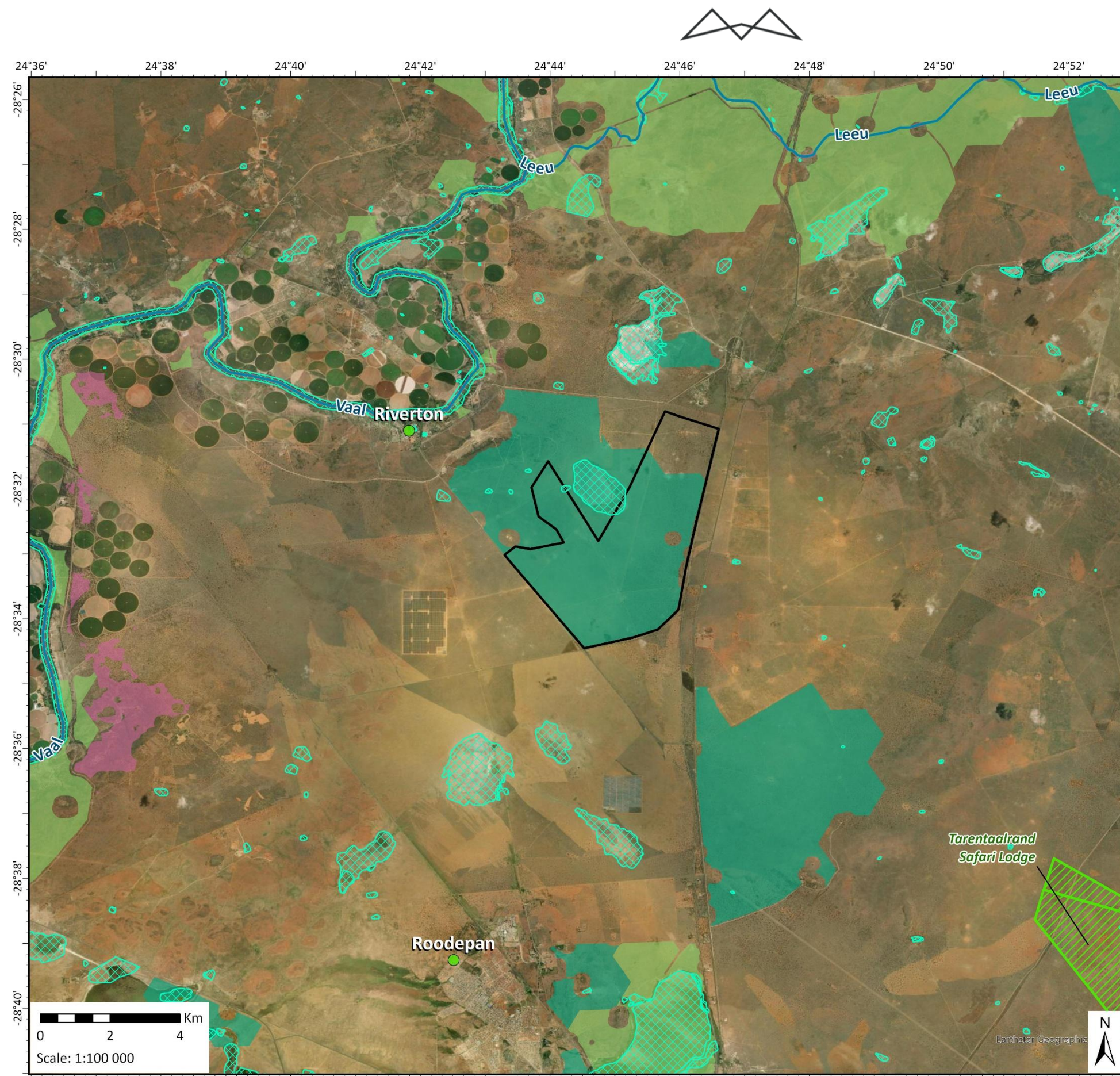
- **Category 1a (PROHIBITED): Listed Invasive Species**
 - A person in control of a Category 1a Listed Invasive Species must comply with the provisions of section 73(2) of the Act; immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of 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 (PROHIBITED / Exempted if in Possession or Under control): Listed Invasive Species**
 - A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. A person contemplated in subregulation (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 (PERMIT REQUIRED): Listed Invasive Species**
 - 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 (PROHIBITED): Listed Invasive Species**
 - Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice. Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the



purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

Table 12: Alien and invasive species identified in the proposed development footprint.

Species		Category
<i>Argemone mexicana</i>	Yellow flowered Mexican Poppy	1b
<i>Prosopis cf. glandulosa</i>	Mesquite	3
<i>Opuntia humifusa</i>	Prickly pear	1b
<i>Argemone ochroleuca</i>	White flowered Mexican poppy	1b
<i>Datura ferox</i>	Large thorn apple	1



Listing Notice 3 Applicability Map

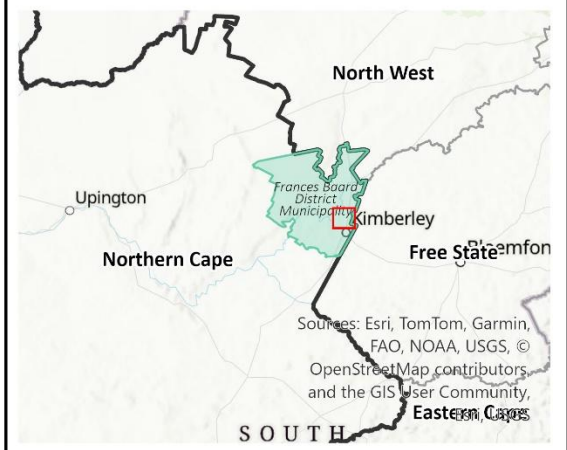
1680 Aqua Farming Droogfontein Pivot Agriculture

Legend

- Project Area
- Places
- NFEPA Rivers
- NFEPA Wetlands
- Protected Areas (SAPAD)

NC BSP: CBA Map 2024

- CBA1
- CBA2
- ESA



Data Sources:
CSG; ESRI; MDB; SANBI; CD:NGI; DAERL
Coord System: GCS WGS 1984
Datum: WGS 1984
Units: Degree
Ref: 1680_LN3

Date: 2025/04/16
EIMS Ref: 1680
Compiled: JW
Reviewed: JJ
Approved: LW



Figure 18: Listing Notice 3 (GN R. 985) applicability map.



7.9 HERITAGE AND CULTURAL ASPECTS

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The Act defines a 'heritage resource' as any place or object of cultural significance (aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance). The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. This section of the report presents the heritage status of the proposed project.

According to the national web-based environmental screening tool (DFFE Screening Tool Report), the proposed development is located within an area of low relative archaeological and cultural heritage theme sensitivity (see Figure 19). An assessment of the NHRA and preliminary project information revealed that the proposed development triggers Section 38(1) of the NHRA. Therefore, a Heritage Impact Assessment is required. The South African Heritage Resources Agency (SAHRA), the Free State Heritage Resources Authority (FSPHRA) and Association of Southern African Professional Archaeologists (ASAPA) are I&APs in the project and will be provided with a copy of the report for review and comment.

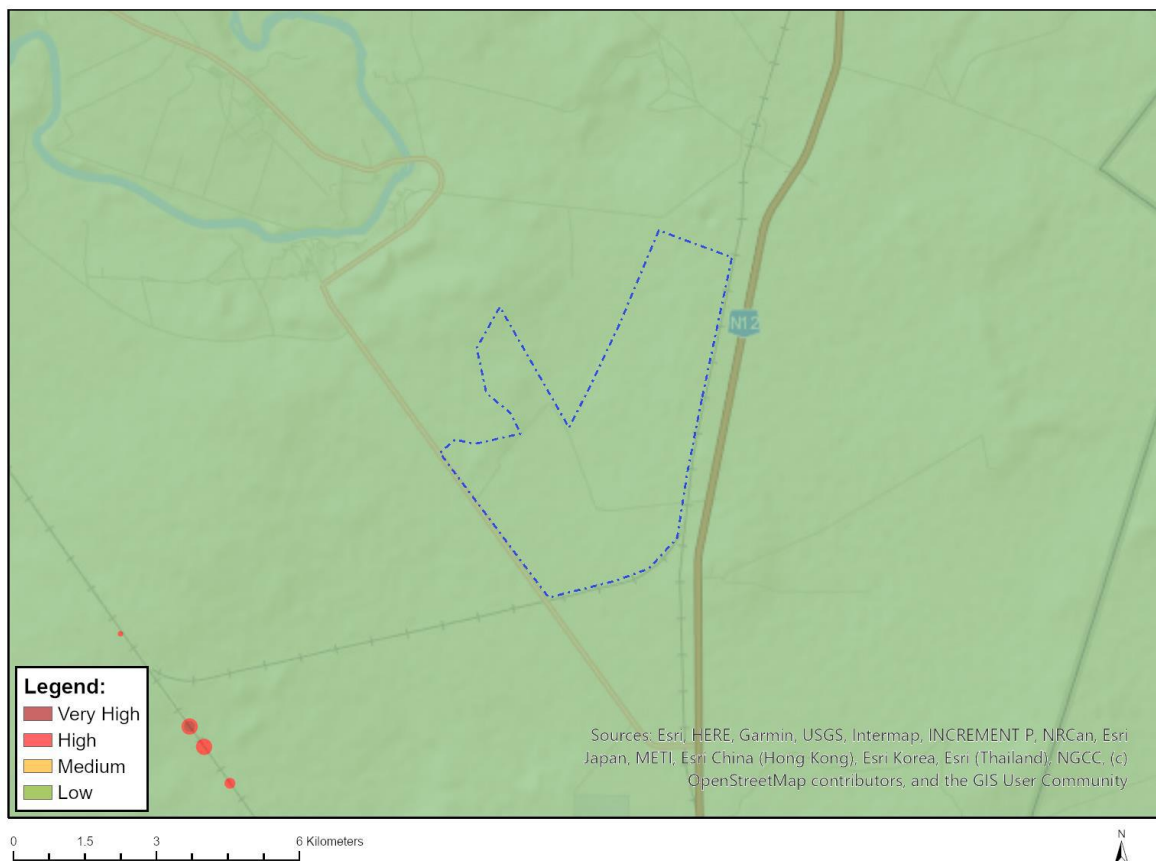


Figure 19: Map of relative Archaeology and cultural heritage theme sensitivity.

An archaeology and heritage assessments were conducted, and the full assessment can be found in Appendix 6. The affected area was assessed using Google Earth as well as available surveys and mapping resources via the CDNGI Geospatial Portal (<http://www.cdngiportal.co.za/cdngiportal/>). First Edition Topographic maps (2824DA and 2824DB) of the area were analysed. As the map was drawn in 1941, it would include information on observations within the footprint of the development. An assessment of the maps revealed several features marked outside and in proximity of the development footprint. Features outside the parameter of the development footprint include several ruins of old mine infrastructure as well as a grave. Three sites were identified in total as depicted in Figure 20. This included two ruins or structures, as well as a single grave.



A B C



Figure 20: Extract of the First Edition Topographic map dated 1941. Orange circles indicate features identified which are or may be of heritage value. (A) northernmost feature labelled “ruin”, (B) single grave feature identified, (C) eastern feature labelled “ruin”. Note the grave within the site of interest (site bordered in red)

Further investigation revealed that a small farm portion of the farm Witpan 52 corresponds with the location of the grave (Figure 21). This fact merited further investigation, and several details related to Witpan 52 Portion 1, and the potential grave were uncovered. Firstly, the small farm portion, approximately 80m² in size, is understood to be government property. Further, deed searches reveal that the property was registered in 1907 and is currently considered the property of “colonial government”. This suggests that the property was specifically isolated and demarcated for a specific purpose. It is here argued that because the First Edition Topographic Map and the cadastral information related to Witpan 52 Portion 1 align, this property represents the demarcated grave. It is further argued that the grave would likely pre-date the registration of the property. This feature, that is the property Witpan 52 Portion 1, is considered a key discovery of this study as has therefore been rated as a Grade III A feature, that is, a feature of potentially High heritage significance. A 50-meter buffer is therefore recommended around the entire property, given that the grave itself could not be located.



Figure 21: A scaled-up extract of the First Edition Topographic map, and the affected area. Note the correspondence between the point marked as "Grave" and the boundary of the development area. A small indent can be noted corresponding with the boundary between Witpan 52 remaining extent, and Witpan 52 Portion 1.

Of the three sites identified, only the identified grave (feature B) was considered of particular interest potentially being impacted on by the proposed activities and hence was further investigated through a study of aerial photography. Aerial photographs were also consulted to verify the absence or presence of the heritage feature. Aerial photographs consulted dated 1940 and 1984 respectively. Aerial photography did not reveal any sign or marker of the heritage feature, and therefore, on-site verification would be necessary to determine the presence and significance of the feature.

The area of the proposed development includes large farmlands some of which remain undisturbed by human activities. Several paths and roads cross the area, allowing for most of the land to be traversed by car. Large portions are currently used for cattle grazing, as noted to the south of the area. Access to certain areas is restricted by fences which are otherwise not noticeable in satellite or Google Earth imagery. The landscape is covered in different types of grass and tree species. Vegetation is denser towards the northern sections of the development area. The northern area is also less disturbed and showed little to no signs of past or present human activity.

Pertaining to the general heritage significance of the area, the area lies some kilometres from Kimberley itself. Some observations were made of surrounding features including the landscape's relationship to old ox-wagon routes which can be observed throughout the surrounding areas of Kimberley. Apart from observations and following engagement with stakeholders, there appeared to be very little perceivable heritage significance associated with the landscape itself. Some archaeological finds were discovered during the field survey conducted. These included the identification of a single LSA site, some singular LSA pieces, an array of different 20th century finds, as well as the verification of pre-identified graves to the south of the site, which have not yet been discussed or presented in this report.

An Archaeological Impact Assessment identified a single Later Stone Age (LSA) site (DR002) and three isolated lithic finds (DR003, DR004) within the project area. The LSA site (DR002) contained at least six lithic pieces within a 1x1m quadrant, including knapped and retouched lithics, chunks, and debitage. This site was disturbed by insect activity and has been rated as Grade IV B, indicating medium heritage significance warranting recording



prior to potential destruction. Two isolated finds, a retouched chert flake and two quartzite flakes, were located approximately 20 meters north and south of DR002, respectively. Due to their potentially disturbed context, these finds have been rated as Grade IV C, requiring no further recording. Importantly, it is assessed that the proposed project activities will not impact the identified archaeological site or finds.

Ox-wagon ruts, pre-dating modern infrastructure and historically connecting outlying areas with Kimberley, were identified traversing the project area from north to south. These features, visible on aerial imagery as shallow trenches, provide contextual information regarding historical transport routes. While significant for understanding past connectivity, the ruts do not constitute structures or archaeological objects as defined by the National Heritage Resources Act (NHRA) and have therefore not been graded or considered features protected under the Act.

Several historical items, dating no earlier than the 20th century, were documented along a dirt road south of the project area. These included glass bottle fragments and a metal plate inscribed with "SAR" and "SAS," which, through further research, were identified as abbreviations for "South African Railways" and "Suid Afrikaanse Spoorweë," respectively. The plate's inscription allowed for a dating of the finds to no earlier than 1973, suggesting an association with the nearby established railway line rather than the earlier ox-wagon ruts. Given their recent date and likely origin, these finds are not considered to be of significant heritage value. Furthermore, as the location of these finds is approximately 100m from the proposed development area, no impact on them is anticipated.

A grave site was identified in the southern portion of the project area through consultation with landowners and occupiers. Located near old farm infrastructure and densely vegetated, the site contains at least two unmarked graves covered with calcrete stones, with one featuring a potential headstone. Due to the lack of information regarding the interred individuals and the age of the graves, the site has been flagged as potentially being of high heritage significance (Grade IV A), necessitating mitigation should future destruction be unavoidable. Consequently, a 50-meter buffer zone has been recommended around this grave site. Importantly, the proposed project activities have been planned to avoid this site, ensuring no direct impact.

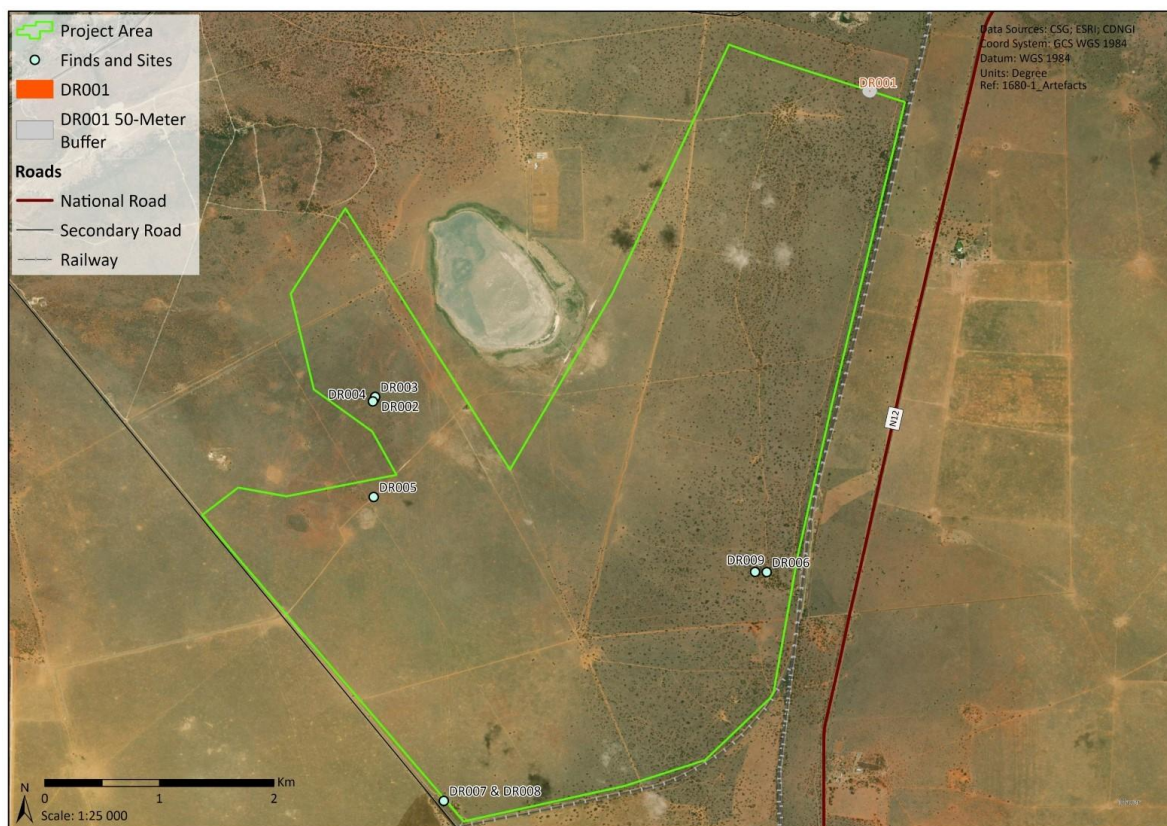


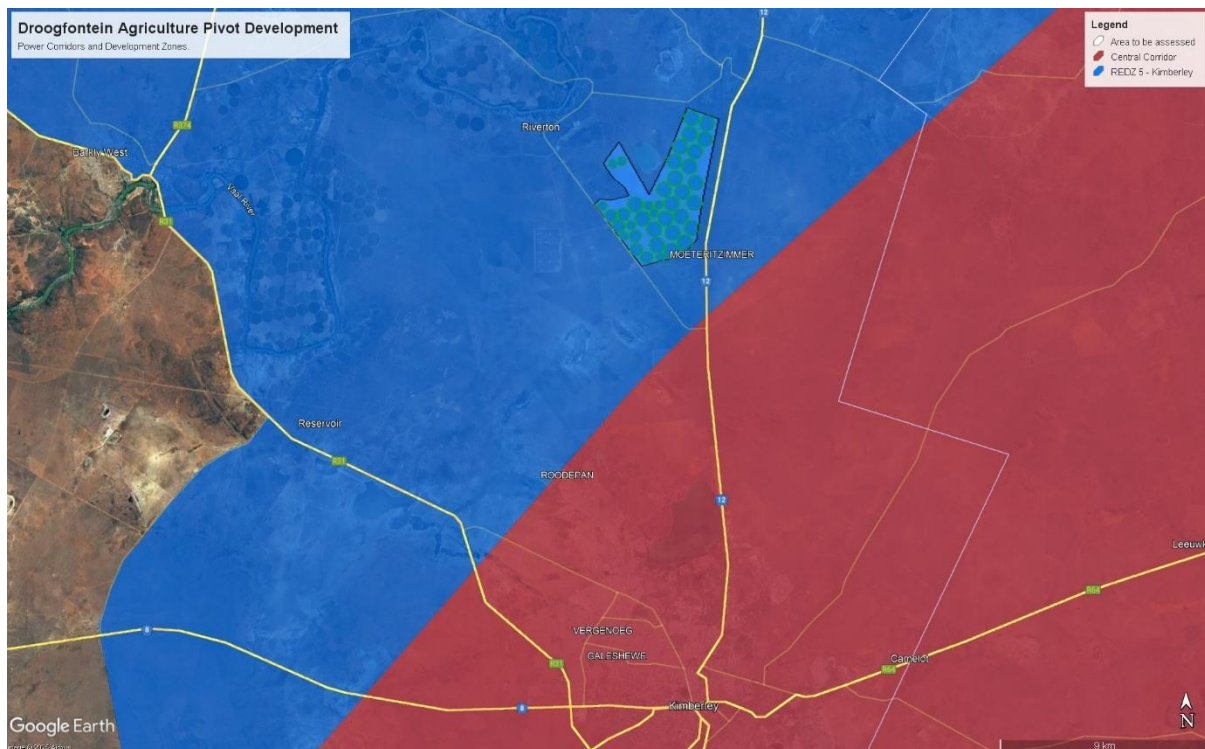
Figure 22: Identified heritage features.



7.10 SURROUNDING LAND USES

The current land use of the proposed pivot development area can be described as semi-natural, which is mostly made up of old cultivated lands where natural vegetation has re-established over the years. The proposed development is directly surrounded by natural areas and agricultural areas. The national road N12 (Transvaal Road) borders the property on its eastern boundary, providing direct access to Kimberley, located approximately 20 kilometres to the south. Just to the north, approximately 2 kilometres from the proposed project, is the Vaal River. This area surrounded by what is known as potential intensive irrigation agricultural areas, which comprises of mostly irrigation pivots. On a regional scale, Riverton is the nearest town to the proposed project area, located approximately 2 km northwest from the project area.

The project area is located approximately 3 km northwest from a transmission corridor, namely the Central Corridor. Transmission corridors are strategically identified geographical areas crucial for planning and developing electricity transmission and distribution infrastructure, including power lines and substations, and are subject to specific environmental authorisation procedures. Since the project is not within the Transmission Corridor, it is not applicable to this assessment, however, the project is located within the Renewable Energy Development Zone 5 (REDZ5-Kimberley). The REDZ5 indicates its strategic suitability for large-scale renewable energy developments.



REDZs are areas where Strategic Environmental Assessments (SEAs) have been conducted, streamlining the environmental authorisation process for renewable energy projects. This aims to expedite authorisation and encourage investment in renewable energy. However, notwithstanding the REDZ designation, the proposed pivot irrigation development will still be subject to the requirements of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), and will require an Environmental Impact Assessment (EIA). REDZs are primarily intended for renewable energy projects, such as solar and wind farms. The proposed pivot irrigation development may encounter land use conflicts if it impedes or competes with existing or planned renewable energy projects. During the desktop studies, no renewable energy projects were identified within the proposed project area. Consultation was undertaken with the DFFE to confirm that there are no authorised renewable energy projects taking place on the proposed project areas. Figure 23 indicates the current renewable energy projects surrounding the project area, and their EA application status.

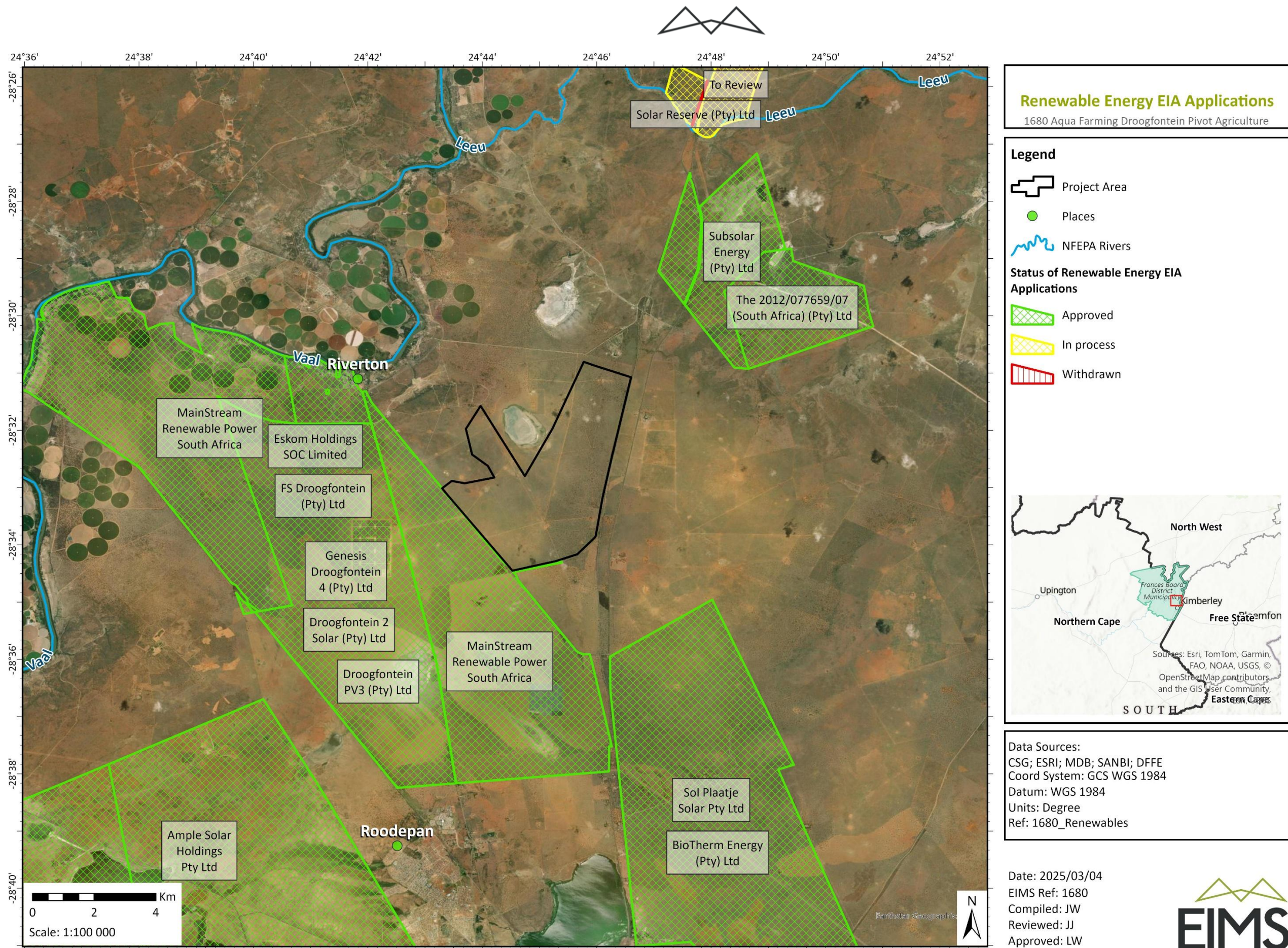


Figure 23: Map of Renewable Energy Projects EIAs.



7.11 SOCIO-ECONOMIC ASPECTS

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.

7.11.1 FRANCES BAARD DISTRICT MUNICIPALITY

This section presents an overview of the socio-economic aspects of the Frances Baard District Municipality (FBDM) in the Northern Cape Province (refer to Figure 24).

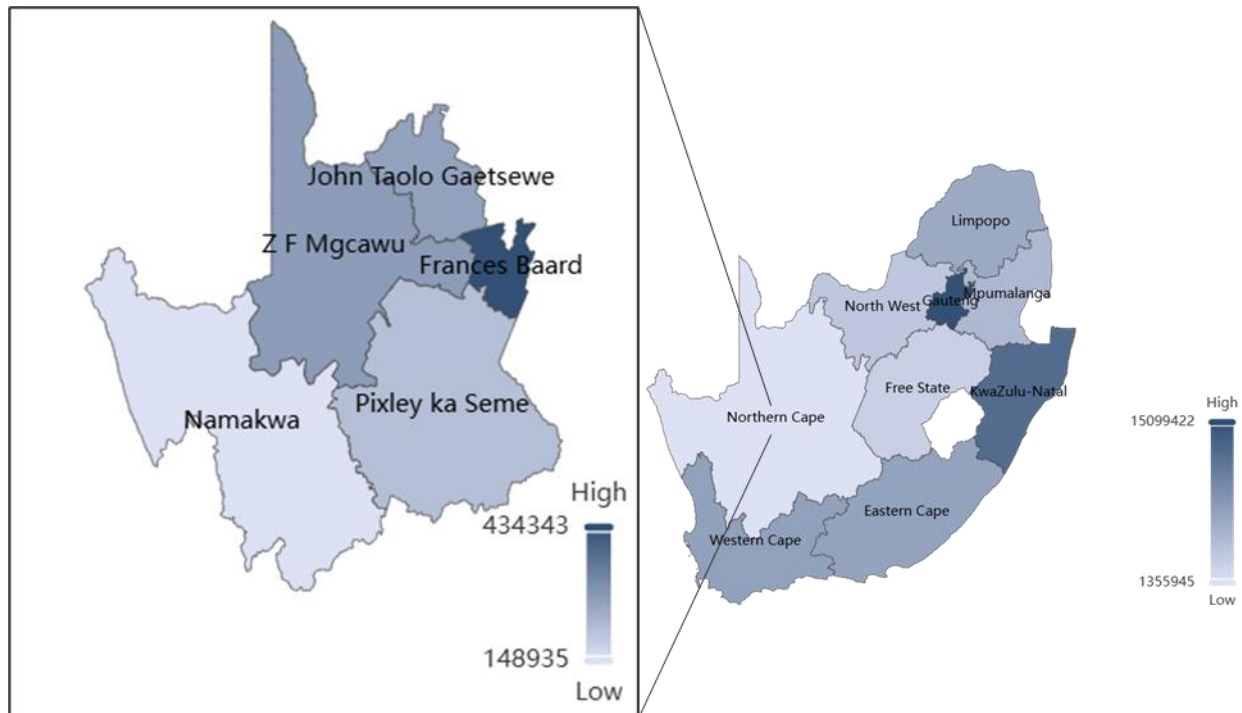


Figure 24: Locality of the Frances Baard District Municipality in the Northern Cape Province, with the population count (Stats SA Census, 2022).

The Frances Baard District Municipality (FBDM) 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 25, 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 26 (Stats SA Census, 2022).

A significant proportion of the FBDM population is economically inactive. As shown in Figure 27, 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).

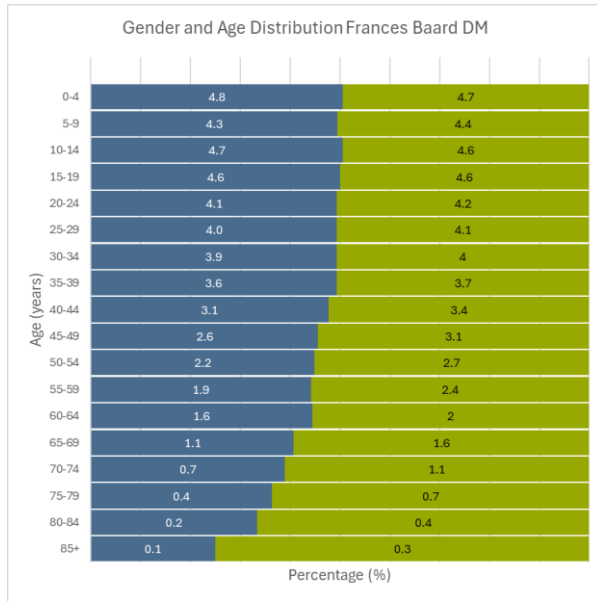


Figure 25: FBDM Gender and age distribution (Stats SA Census, 2022).

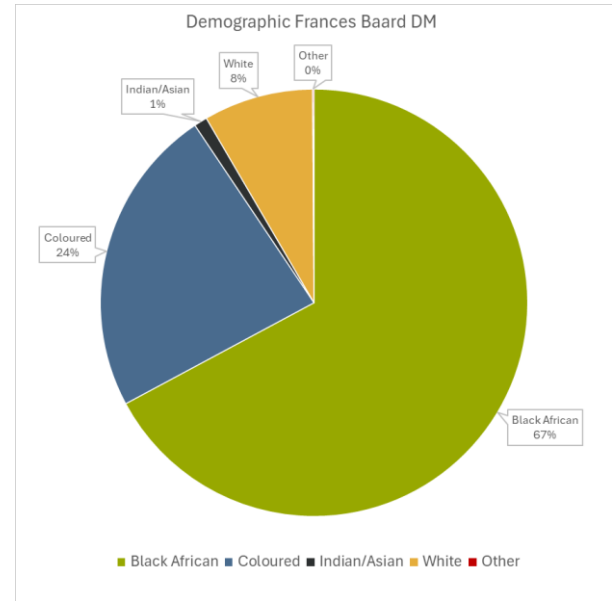


Figure 26: FBDM demographic (Stats SA Census, 2022).

EMPLOYMENT STATUS

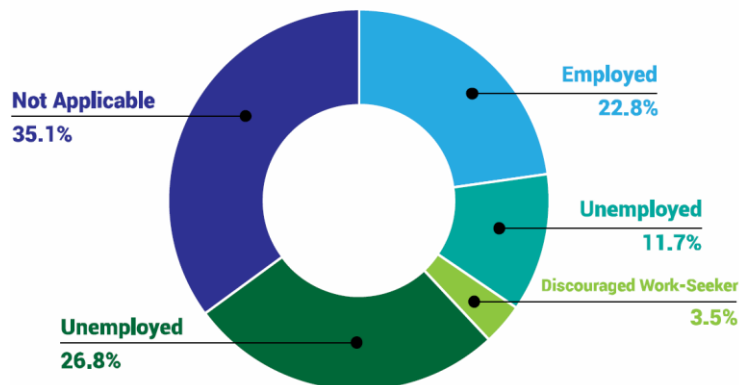


Figure 27: FBDM employment status (Frances Baard District Municipality, 2021).

The Frances Baard District Municipality (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).

7.11.2 SOL PLAATJE LOCAL MUNICIPALITY

This section presents an overview of the socio-economic aspects of the Sol Plaatje Local Municipality (FBDM) within the FBDM, in the Northern Cape Province (refer to Figure 28).

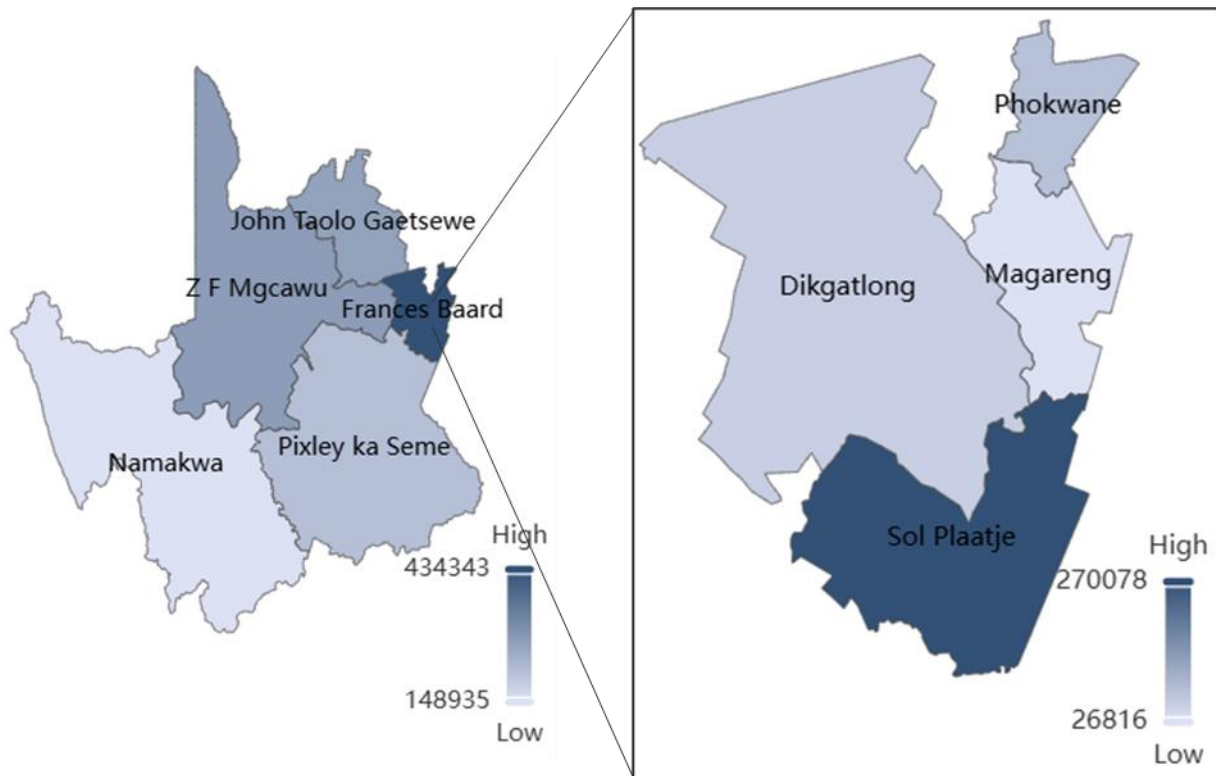


Figure 28: Locality of Sol Plaatje Local Municipality, with the population count (Stats SA Census, 2022).

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 29, 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 30 (Stats SA Census, 2022).

A significant proportion of the FBDM population is economically inactive. As shown in Figure 31, 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).

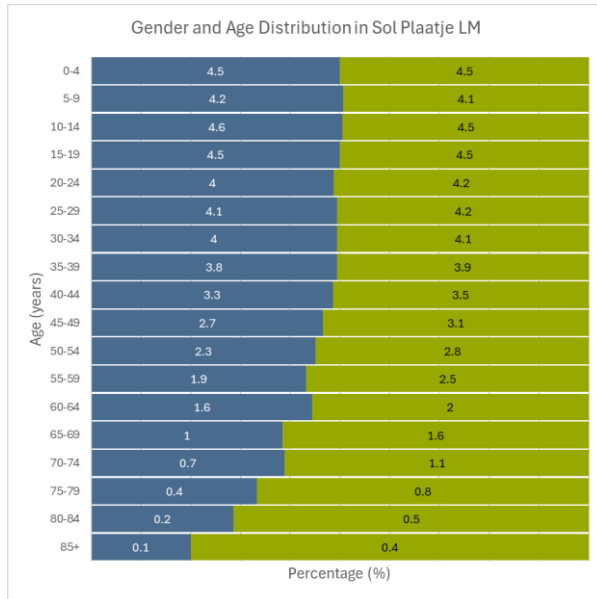


Figure 29: SPLM gender and age distribution (Stats SA Census, 2022).

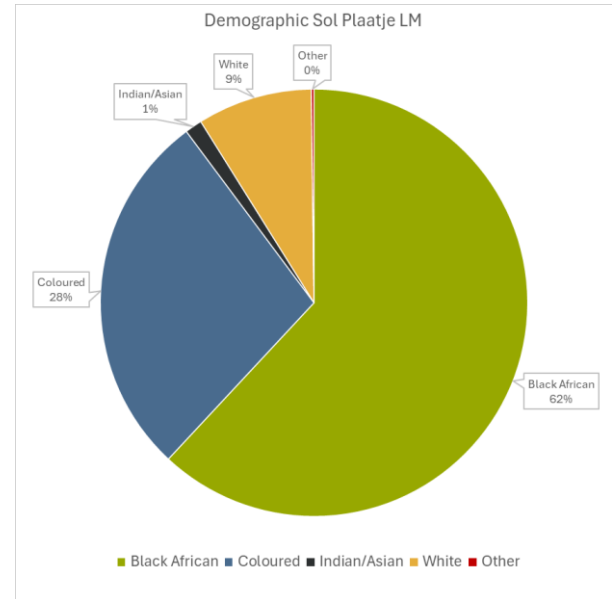


Figure 30: SPLM demographic (Stats SA Census, 2022).

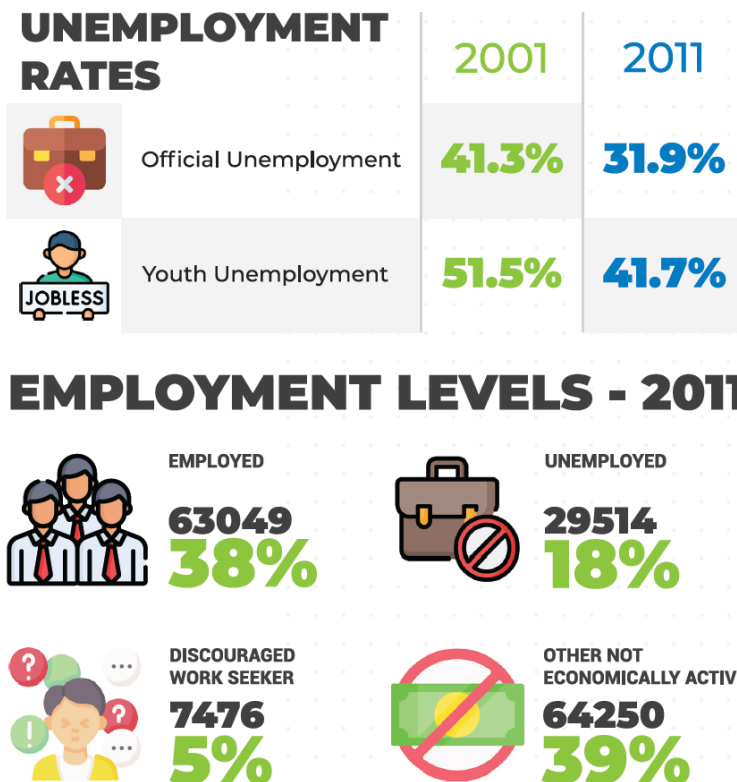


Figure 31: SPLM employment status (Sol Plaatje Local Municipality, 2022).



8 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and do an 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:

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

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

Table 13: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. 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 14.

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 14: 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:

$$S = C \times P$$

Table 15: Determination of Significance

Consequence	5- Very High ³	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 16.

Table 16: Significance Scores

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

³ 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 17: Criteria for Determining Prioritisation

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

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 17. The impact priority is therefore determined as follows:

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



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

Table 18: Determination of Prioritisation Factor

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

In order to determine the final impact significance (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 19: 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 EIA 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 Environmental Impact Assessment report submitted to the Competent Authority (CA) for adjudication.

Potential environmental impacts were identified during the scoping process. These impacts were identified by the EAP, the appointed specialists, as well as the public. Table 20 provides a summary of the potential impacts and mitigations identified.

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 have been suggested during this EIA phase.

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.



Table 20: Summary of activity impacts and mitigations.

Phase	Activity	Impacts	Mitigations
Planning	Site selection.	Environmental: <ul style="list-style-type: none">– Increased vehicle traffic to survey location– Temporary disturbance of wildlife	<ul style="list-style-type: none">– Prioritize communication and coordination between contractors and landowners;– conduct thorough site assessments to identify existing survey locations and sensitive areas;– minimise vehicle traffic and implement access restrictions;– training and awareness;– monitoring and reporting;– prioritise local employment;– utilise community networks;– promote equity;– invest in workforce development; and– support local food security.
	Engineering design (pivot layout, water supply infrastructure).	Socio-economic: <ul style="list-style-type: none">– community concerns– employment opportunities	
	Feasibility Studies (soil analysis, water availability, economic viability).		
	Human resource management (recruitment/employment).		
Construction	Site clearance and land preparation.	<ul style="list-style-type: none">– Soil erosion, compaction, loss of topsoil, soil contamination from spills;– increased runoff, sedimentation of water bodies, potential groundwater contamination, reduced water quality;	<ul style="list-style-type: none">– Compaction prevention;– soil and groundwater contamination prevention;– dust control;– maintain access roads;– speed limit of 30 km/h;– construction to take place preferably on non-windy days; and
	Construction of water supply infrastructure (buffer dam, pipelines).	<ul style="list-style-type: none">– dust generation, vehicle emissions, noise pollution;– alteration of drainage patterns;	



Phase	Activity	Impacts	Mitigations
	Installation of pivot irrigation systems.	<ul style="list-style-type: none"> – littering; – socio economic; – community concerns; – employment opportunities; 	<ul style="list-style-type: none"> – vehicle emissions control. – ensure that all vehicles used during construction are serviced and in a good working condition; – noise pollution control; – habitat protection; – wildlife protection; – biodiversity protection; – employ local work force;
	Construction of access roads and associated infrastructure.	<ul style="list-style-type: none"> – visual impact; – habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2; – loss of species of conservation concern; 	<ul style="list-style-type: none"> – utilise existing community structure; – opportunities to be given previously disadvantaged individuals; – training and awareness; – support local food security; – drainage management; – dedicated waste bins to be placed near construction sites;
	Storage and handling of construction materials.	<ul style="list-style-type: none"> – sedimentation, contamination and disruption of freshwater ecosystems; – anthropogenic disturbances, intentional and/or accidental killing of fauna; – fire damage; and 	<ul style="list-style-type: none"> – 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; – alien vegetation control measures; – implement a search and rescue procedure; – ensure vehicles are equipped with firefighting equipment;
	Soil compaction from heavy machinery.	<ul style="list-style-type: none"> – impact on heritage resources 	
	Waste disposal (vegetation).		



Phase	Activity	Impacts	Mitigations
			<ul style="list-style-type: none"> – firefighting equipment training; – no open fires; – no smoking; – dust control measures; – firebreaks around each pivot; and – implement a chance find protocol.
Operation	Irrigation of crops.	<ul style="list-style-type: none"> – soil salinization, nutrient depletion, soil compaction, pesticide and fertilizer accumulation; 	<ul style="list-style-type: none"> – Implement sustainable irrigation systems; – dust control measures; – implement integrated pest management; – training on safe pesticide handling and application; – establish buffer zones around sprayed areas; – utilise slow-release fertilizers; – implement irrigation scheduling; – prevent soil salinization; – prevent nutrient depletion in soils; – prevent soil compaction; – maintain access roads; – implement crop rotation and intercropping;
	Application of fertilizers and pesticides.	<ul style="list-style-type: none"> – erosion; – pesticide drift, dust generation during harvesting, emissions from farm machinery; – habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2; 	
	Crop harvesting and transportation.	<ul style="list-style-type: none"> – sedimentation, contamination and disruption of freshwater ecosystems – anthropogenic disturbances, intentional and/or accidental killing of fauna; 	
	Planting of grasses for pasture before and during fallow / grazing periods.	<ul style="list-style-type: none"> – socio-economic: Increased agricultural production, potential for job creation (long-term), changes in land use, potential health risks from pesticide exposure; 	



Phase	Activity	Impacts	Mitigations
	Maintenance of irrigation systems.	<ul style="list-style-type: none"> – increased energy consumption for pumping water; – visual impact; – fire damage; – noise nuisance; – oil/ fuel spillages causing soil and groundwater contamination; and – littering. 	<ul style="list-style-type: none"> – avoid clearing natural vegetation outside of the irrigated area; – maintain pumps; – alien vegetation management; – habitat protection; – wildlife protection; – biodiversity protection; – environmental training and awareness; – maintain vehicles, equipment and machinery to prevent leaks; – operation of vehicles and machinery on the pivots to be undertaken during the day, from 06:00 until 18:00; – ensure vehicles are equipped with firefighting equipment; – firefighting equipment training; – no open fires; – no smoking; – maintain firebreaks around each pivot area – speed limit of 30 km/h; – spill prevention kits to be available; – dedicated waste bins to be available with lids secured; – employ local work force; – utilise existing community structure;
	Water abstraction.		
	Energy Consumption.		



Phase	Activity	Impacts	Mitigations
			<ul style="list-style-type: none"> – opportunities to be given to previously disadvantaged individuals; – support local food security; – drainage management; and – stormwater management.
Decommissioning and closure	Decommissioning of irrigation infrastructure (pivot systems, pipelines).	<ul style="list-style-type: none"> – Potential for residual contamination, soil compaction; – potential for residual contamination of groundwater or surface water; – visual and noise impact; and – restoration of natural state. 	<ul style="list-style-type: none"> – Residue contamination assessment and monitoring; – dust control; – de-compaction of soil; – water monitoring; – remove all surface infrastructure and debris; – biodiversity monitoring; – alien vegetation management; and – pivot footprints to be revegetated with local indigenous species and monitored for proper rehabilitation and re-establishment.
	Removal of access roads and associated infrastructure.		
	Soil remediation (if necessary).		
	Revegetation and habitat restoration.		
	Monitoring of rehabilitated areas.		
	Removal of any contaminates.		



8.2.1 PLANNING PHASE IMPACTS

While the planning phase itself is not anticipated to generate significant environmental impacts, consideration must be given to logistical and communicative aspects to mitigate potential indirect disturbances. Effective communication and coordination between contractors, the landowner, and any other teams are paramount. This ensures that site visits for pre-emptive studies, which are essential for informed decision-making, are conducted with minimal disruption.

To further minimise potential disturbances during these initial site assessments, specific access routes for project vehicles should be designated, effectively steering them away from sensitive survey areas. Implementing speed limits and traffic control measures will further reduce disturbance levels, contributing to a more controlled and less disruptive environment.

(i) Mitigation measures

- Designate specific access routes for project vehicles to avoid sensitive areas and/or use existing access routes.
- Implement speed limits and traffic control measures to reduce disturbance.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2 CONSTRUCTION PHASE IMPACTS

8.2.2.1 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 machinery and vehicles.
 - Maintain all vehicles and machinery.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.2 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 sedimentation of nearby water bodies, degrading water quality and potentially impacting aquatic ecosystems. The increased volume and velocity of runoff also elevate the risk of localised flooding, especially during periods of heavy rainfall. While the removal of vegetation associated with agricultural activities can influence surface water dynamics, it is important to note that the agricultural activities (e.g. tilling) may also enhance surface water infiltration. Surface runoff is therefore anticipated to be more significant in compacted zones, particularly access routes. To address this, stormwater management infrastructure, in the form of diversion channels, will be implemented along access routes to minimize surface erosion.

It is important to maintain good hydrological functioning within the area as well as good vegetation cover to minimize sedimentation and erosion from runoff. The development of the pivots has the potential to impact surface water run-off in terms of, quantity and quality as well as directional flow. As not all the pivots will be active at once (refer to Figure 8 for the pivot cycles), the inactive pivots will contain a vegetation cover, and the areas between the pivots will be kept natural, the disruption of the hydrological functioning should not be significant.

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 swales to slow down runoff.
 - Maintain existing drainage patterns as much as possible.
- Sedimentation Control:



- Use sediment traps and silt fences where applicable to prevent sediment from entering freshwater ecosystems.
- Groundwater Protection:
 - Properly seal boreholes and wells, if applicable.
 - Prevent pooling of water.
 - Implement strict controls on the use and disposal of hazardous materials.
- Water Quality Protection:
 - Avoid construction activities near natural water bodies.
 - Implement buffer zones around water bodies.
 - Control runoff from construction sites.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.3 IMPACT ON AIR QUALITY AND CLIMATE

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

- Small contributions to air pollution may exacerbate existing air quality issues; and



- cumulative land clearance activities in the region could contribute to increased dust in the atmosphere.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.4 **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. Approximately 11 skilled employment opportunities will be created, and 45 unskilled employment opportunities will be created during the construction phase.

(i) Mitigation measures

- Employ local work force;
- Utilise existing community structure;
- Opportunities to be given previously disadvantaged individuals; and
- Support local food security.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.5 **VISUAL IMPACT**

The introduction of large-scale agricultural infrastructure, including pivot irrigation systems, water supply infrastructure, access roads, and storage facilities, 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; and

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.



8.2.2.6 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 between 06h00 and 18h00.
- 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.

8.2.2.7 BIODIVERSITY

8.2.2.7.1 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. Disturbance within natural systems makes them more prone to invasion of alien species. 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 / or smaller mammals and / or herpetofauna) which then reduces the food availability for predators (invertebrates and / or larger birds and / or larger mammals and / or herpetofauna). The changes in the vegetation structure also alter the availability of suitable cover for many faunal species. The significance of the loss of habitat and fragmentation may be lessened by creating suitable ecological corridors that ensure ecosystem connectivity.

Most of the planned development area falls within a CBA 2. In CBAs 1 & 2 rezoning of properties that will result in increased biodiversity loss is generally not advocated, as Critical Biodiversity Areas 1 & 2 are areas which include threatened species and/or threatened ecosystems that need to be kept in their natural or near natural state. There is however already a railway line and a tarred road (N12) near the eastern boundary of the property and a gravel road on the western boundary as well as a mine and a solar power development to the north and the south of the property respectively, these structures/disturbances already significantly fragment the habitat within this CBA area. As this fragmentation impact is already present further development will increase the significance of the cumulative impact but will not create a new impact in terms of fragmentation.

The wetland including the buffer zone has been demarcated as a NO-GO area. The large pan has already been subject to some disturbance being the recipient of effluent water, but has been fairly robust in managing these disturbances, thus the location of pivots adjacent to the pans should not impact the functioning of this system significantly provided there is no disturbance within the buffer zone area.

Clearance of primary vegetation allows secondary pioneer species or invasive plants to enter and recolonise disturbed areas, thus increasing the possibility of Alien species invading. Many alien species proliferate in disturbance areas such as the periphery of the irrigation lands. Invasive species affect our natural biodiversity in a number of ways. They may compete directly with natural species for food or space, may compete indirectly by changing the food web or physical environment, or hybridize with indigenous species. Rare species with limited



ranges and restricted habitat requirements are often particularly vulnerable to the influence of these alien invaders. Invasive plants have claimed about 8 percent or 10 million hectares of land suitable for agricultural use in South Africa. These invasive alien plants steal about seven percent of South Africa's water bulk every year.

8.2.2.7.2 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 protected 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 this resource from the area.

Birds of conservation concern occur in the area, the Dronfield IBA is located about 3km south of the site. No signs were found of African White-backed vultures nesting in any of the trees on this property during the field investigation, it is however probable that this area could form part of their foraging sites. Research on Dronfield Nature Reserve over the last 30 years has shown an active Northward movement in nesting activity adjacent to the N12, but no nesting has been observed North of the Dronfield West / East boundary, on Hakahana farm. Although this proposed development site has suitable trees for nest sites the disturbance from the roads and railway line is likely the reason no nesting activity has occurred in this area.

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.

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

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

8.2.2.7.4 SEDIMENTATION, CONTAMINATION AND DISRUPTION OF FRESHWATER ECOSYSTEMS

It is important to maintain good hydrological functioning within the area as well as good vegetation cover to minimize sedimentation and erosion from runoff. The development of the pivots has the potential to impact surface water run-off in terms of, quantity and quality as well as directional flow. As not all the pivots will be active at once, the inactive pivots will contain a vegetation cover, and the areas between the pivots will be kept natural, the disruption of the hydrological functioning should not be significant.

(i) Mitigation measures

- A search and rescue operation should be performed prior to clearing, it is however not a feasible or practical option regarding the protected trees, so it is important to ensure that trees between the pivots remain undisturbed. A permit is required if any protected trees need to be cut or removed within the development footprint.
- Activities should be confined to daytime hours to minimise the duration of vibration disturbances. Furthermore, stationary vehicles should be powered down, avoiding extended periods of idling, to reduce unnecessary vibration generation and emissions.
- As the intentional killing of herpetofauna is considered a result of ignorance, this can be ameliorated through education. The labour force involved should be educated regarding the conservation importance of herpetofauna (especially snakes).
- A management plan must be drawn up for the ecological corridor and other undeveloped portions of the property to best support the biodiversity and ecosystem connectivity in the area.
- The Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA.



- The avoidance of the no-go areas must be strictly enforced.
- Only the pivot footprint must be cleared and the lands planted as soon as possible after clearing.
- Erosion control measures must be in place to aid in the prevention of wash.
- Spot treatments of pesticide and herbicides reduce the risk of runoff and contamination of surrounding areas.

(ii) Cumulative Impacts

- Vegetation clearing and the subsequent loss of these protected trees for irrigation development in this area increases the significance of this impact as more of the vegetation type is transformed.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.8 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.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.2.9 HERITAGE RESOURCES

As described in previous sections, identified impacts include the proposed activities' impact on the potential grave site (DR001) along the northern boundary of the farm Witpan 52. Due to the grave potentially dating to 1907, which would correspond with dates after the South African War, this site could potentially be the grave of a lost or unidentified soldier or veteran. This would likely explain why the property Witpan 52 Portion 1 was registered as "Colonial Government" property. Because of this, disturbance of the site may have an impact on regional heritage integrity. Hence, pre-mitigation, any impact on or threat to this site has been scored as High. It has therefore been proposed that the site be avoided considering a buffer of 50 meters from the property Witpan 52 Portion 1. This would ensure that the integrity of the potential below-ground remains is not disturbed. Not considering the buffer, the proposed activities are approximately 40 meters away from Witpan 52 Portion 1. The proposed 50-meter buffer will ensure that activities do not disturb any potential burial, and therefore



renders the post-mitigation score as Low. The implementation of the proposed buffer would necessitate an alternative approach to the proposed activities, mainly the clearance of land, to ensure that the grave site is avoided.

The identified graves (DR009) represent areas of higher sensitivity and will be avoided. However, a 50-meter buffer is here proposed to be placed around the grave site as a precautionary measure despite not being affected by the proposed activities.

While the features identified represent markers of heritage significance (in particular, the stone age finds as well as grave sites), the occurrence of below-ground heritage finds is 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 it necessary.

Altogether, post-mitigation of the identified heritage impacts is rated a Low Negative, given that the impacts can be avoided, 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 diminish the adverse effects of development on heritage resources and features, 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.

8.2.3 OPERATIONAL PHASE IMPACTS

8.2.3.1 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 construction 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 (Gustavsen, 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. Aqua Farming undertakes annual Global G.A.P. audits as part of their business operations, ensuring that all fertilizer applications are done within the regulations.

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

(ii) Cumulative Impacts

- The accumulation of pesticide and herbicide residues in the soil, combined with similar practices on other agricultural land, could lead to significant long-term soil degradation and loss of soil biodiversity.



- Potential degradation of soil health and quality may result in a gradual decline in vegetation cover, as the soil's ability to support plant growth is diminished.
- With the implementation of crop rotation over a period of 6 years, and cattle grazing during the fallow seasons, the soil quality will be impacted by contributing to improved soil structure and fertility.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.2 **IMPACT ON WATER**

Pivot irrigation systems, particularly in large-scale operations, necessitate 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 on construction vehicles or tractors or accidental spillages can seep into and contaminate soil and possibly the groundwater.

In addition, 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



- Increased overall water demand on the river, potentially leading to water scarcity, reduced ecological flow, and stress on aquatic ecosystems, especially during dry periods; and
- foreseeable future increases in water demand from other potential developments in the catchment area could exacerbate water stress.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.3 IMPACT ON AIR QUALITY AND CLIMATE

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; and
- apply fertilizers based on soil testing and crop nutrient requirements to minimize over-application.

(ii) Cumulative Impacts



- Projected changes in rainfall patterns and increased evaporation could further reduce river flow, compounding the impact of water abstraction.
- Small contributions to air pollution may exacerbate existing air quality issues

(iii) Irreplaceable loss of Resources

- Abstraction of irrigation water from the Vaal River in the loss of a water resource and may impact the stream flow.

8.2.3.4 SOCIO-ECONOMIC IMPACT

The proposed project will create employment opportunities and contribute to food security. During operation, 8 skilled opportunities and 375 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 - high positive before and high after implementation of improvement measures. In addition, this project will contribute to increased agriculture production, thereby also contributing to the development and expansion of agricultural activities as per the Sol Plaatje District 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.
- Implement Integrated Pest Management (IPM) strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications
- Implement strict protocols for the handling, storage, and disposal of fertilizers and pesticides to prevent soil contamination.

(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.

8.2.3.5 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



- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.6 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.

8.2.3.7 BIODIVERSITY

The consistent application of pesticides and fertilizers, while intended to enhance crop productivity, can have detrimental effects on non-target organisms. Pesticide drift and runoff can contaminate surrounding habitats, impacting beneficial insects, pollinators, and aquatic species. The accumulation of these chemicals in the food chain can lead to bioaccumulation and biomagnification, posing risks to higher trophic levels, including birds of prey and mammals. Excessive nutrient runoff can also contribute to eutrophication of nearby water bodies, leading to algal blooms, oxygen depletion, and habitat degradation for aquatic organisms. The increased water abstraction associated with pivot irrigation can also impact aquatic biodiversity. Reduced streamflow can alter aquatic habitats, affecting fish populations, amphibians, and other aquatic organisms. Changes in water quality, due to increased runoff and sedimentation, can further degrade aquatic ecosystems.

As with all disturbance, there is an increased risk of alien infestation. Many alien species proliferate in disturbed areas such as the periphery of the irrigation lands. Invasive species affect our natural 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.

The operation of farm machinery, including tractors, harvesters, and irrigation pumps, can generate noise and light pollution, disrupting wildlife behaviour and migration patterns. The continuous disturbance created by intensive agricultural activities can lead to the displacement of sensitive species and the overall decline in biodiversity within the surrounding landscape.

(i) Mitigation measures

- Preserve or establish local indigenous vegetation along field boundaries to provide habitat connectivity, shelter, and food sources for wildlife.
- Alien vegetation that has grown because of land clearing must be removed through approved methods.
- Employ IPM strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications where feasible
- Apply pesticides and fertilizers based on precise crop needs and soil testing to minimize over-application and runoff.
- As far as possible, implement spot treatments of pesticide and herbicides, reducing the risk of runoff and contamination of surrounding areas.



- Employ slow-release fertilizers as far as possible to reduce nutrient leaching and runoff.

(ii) Cumulative Impacts

- Vegetation clearing and the subsequent loss of these protected trees for irrigation development in this area increases the significance of this impact as more of the vegetation type is transformed.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.3.8 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.

(ii) Cumulative Impacts

- No cumulative impacts are expected.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.4 DECOMMISSIONING, REHABILITATION AND CLOSURE PHASE IMPACTS

Decommissioning of a pivot is not a high impact process. It will entail removal of the centre pivot system and 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 AND 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

- Pesticide and herbicide residues in the soil, combined with residues from other agricultural land, could lead to significant long-term soil degradation and loss of soil biodiversity.
- Degradation of soil health and quality may result in a gradual decline in vegetation cover, as the soil's ability to support plant growth is diminished.
- With the implementation of crop rotation over the life cycle of the farming project, and cattle grazing during the fallow seasons, the soil quality will be impacted by contributing to improved soil structure and fertility.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.

8.2.4.2 BIODIVERSITY

As with all disturbance, there is an increased risk of alien infestation. Many alien species proliferate in disturbed areas such as the periphery of the irrigation lands. Invasive species affect our natural 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. This impact was rated as low negative before and after implementation of mitigation measures.

(i) Mitigation measures

- Alien vegetation that has grown because of the open lands must be removed through approved methods.
- The pivot footprints need to be revegetated with local indigenous grass species.

(ii) Cumulative Impacts

- Biodiversity will be reinstated to its natural state over time if no anthropogenic activities continue.

(iii) Irreplaceable loss of Resources

- No irreplaceable loss is expected.



8.3 SUMMARY OF IMPACTS

A summary of all the identified impact, their associated phase, as well as their impact calculations and significance are presented in Table 22 below. The No-Go alternative was also included in this table.

Table 21: Summary of impacts and mitigations.

Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
1	Increased vehicle traffic to survey location	Planning	-6	<ul style="list-style-type: none"> – Prioritize communication and coordination between contractors and landowners; and – minimise vehicle traffic and implement access restrictions; 	-5.00
2	Temporary disturbance of wildlife	Planning	-6	<ul style="list-style-type: none"> – Conduct thorough site assessments to identify existing survey locations and sensitive areas; – training and awareness; and – monitoring and reporting. 	-5.00
3	Community concerns	Planning	-3	<ul style="list-style-type: none"> – Utilise community networks; – promote equity; – invest in workforce development; and – support local food security. 	-3.00
4	Employment opportunities	Planning	6	<ul style="list-style-type: none"> – Prioritise local employment; – invest in workforce development; 	7.50
5	Soil erosion and compaction of soil on the access roads, loss of topsoil, soil contamination from spills.	Construction	-12	<ul style="list-style-type: none"> – compaction prevention; and – soil and groundwater contamination prevention. 	-9.28



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
6	Increased runoff, sedimentation of water bodies, potential groundwater contamination, reduced water quality.	Construction	-12	<ul style="list-style-type: none"> – Soil and groundwater contamination prevention. 	-8.44
7	Dust generation, vehicle emissions, noise pollution.	Construction	-11	<ul style="list-style-type: none"> – Dust control; – maintain access roads; – speed limit of 30 km/h; – construction to take place preferably on non-windy days; – vehicle emissions control; and – ensure that all vehicles used during construction are serviced and in a good working condition. 	-8.44
8	Alteration of drainage patterns.	Construction	-8.25	<ul style="list-style-type: none"> – Drainage management. 	-7.59
9	Littering.	Construction	-11	<ul style="list-style-type: none"> – Dedicated waste bins to be placed near construction sites. 	-4.00
10	Community concerns.	Construction	-4.5	<ul style="list-style-type: none"> – Employ local work force; – utilise existing community structure; – opportunities to be given previously disadvantaged individuals; – training and awareness; and – support local food security. 	-4.00



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
11	Employment opportunities.	Construction	8.25	<ul style="list-style-type: none"> – Employ local work force; – utilise existing community structure; – opportunities to be given previously disadvantaged individuals; – training and awareness; and – support local food security. 	9.38
12	Visual impact	Construction	-12	<ul style="list-style-type: none"> – 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. 	-6.75
13	Anthropogenic disturbances, intentional and/or accidental killing of fauna.	Construction	-15	<ul style="list-style-type: none"> – training and awareness. 	-9.38
14	Fire damage.	Construction	-12	<ul style="list-style-type: none"> – Ensure vehicles are equipped with firefighting equipment; – firefighting equipment training; – no open fires; – no smoking; and – firebreaks around each pivot. 	-4.5



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
15	Soil salinization, nutrient depletion, soil compaction, pesticide and fertilizer accumulation.	Operation	-14	<ul style="list-style-type: none"> – Implement sustainable irrigation systems; – implement integrated pest management; – training on safe pesticide handling and application; – establish buffer zones around sprayed areas; – utilise slow-release fertilizers; – implement irrigation scheduling; – prevent soil salinization; and – prevent nutrient depletion in soils. 	-6.19
16	Soil quality.	Operation	-12	<ul style="list-style-type: none"> – Routine soil tests to monitor salinity levels and identify areas of accumulation; – Periodic leaching practices by applying excess water to flush accumulated salts below the root zone; – Implement IPM strategies to minimize pesticide use; – 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. – Incorporate organic matter, such as compost or cover crops, into the soil to improve soil structure and reduce compaction, where possible. – Where possible, consider intercropping, i.e. planting multiple crops simultaneously to increase soil biodiversity and nutrient utilisation. 	15



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
				<ul style="list-style-type: none"> – 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 undertaken in accordance with the regulations. 	
17	Erosion on access roads.	Operation	-13	<ul style="list-style-type: none"> – Prevent soil compaction; and – maintain access roads. 	-7.50
18	Pesticide drift, dust generation during harvesting, emissions from farm machinery.	Operation	-13	<ul style="list-style-type: none"> – Implement sustainable irrigation systems; – training on safe pesticide handling and application; – establish buffer zones around sprayed areas; – implement irrigation scheduling; – prevent soil salinization; – prevent nutrient depletion in soils; – implement crop rotation and intercropping; – avoid clearing natural vegetation outside of the irrigated area; – maintain vehicles; and – speed limit of 30 km/h. 	-10.13
19	Anthropogenic disturbances, intentional and/or accidental killing of fauna.	Operation	-13	<ul style="list-style-type: none"> – Environmental training and awareness. 	-11.25



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
20	Contribution to food security.	Operation	13	<ul style="list-style-type: none"> It is proposed that the product also be sold locally if viable, to contribute to local food security. 	16.25
21	Increased agriculture production.	Operation	14	<ul style="list-style-type: none"> Sourcing local employment will contribute to the development of agricultural activities, as per the Sol Plaatje District Municipality SDF, and the local economy. 	19.25
22	Potential for long-term job creation.	Operation	13	<ul style="list-style-type: none"> Sourcing local employment will contribute to the development of the Sol Plaatje District Municipality SDF and the local economy 	17.50
23	Potential health risks from pesticide exposure.	Operation	-10	<ul style="list-style-type: none"> Implement Integrated Pest Management (IPM) strategies to minimize pesticide use, relying on biological control, cultural practices, and targeted applications Implement strict protocols for the handling, storage, and disposal of fertilizers and pesticides to prevent soil contamination. 	-4
24	Increased energy consumption for pumping water.	Operation	-9	<ul style="list-style-type: none"> Maintain pumps. 	-10.13



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
25	Visual impact.	Operation	-12	<ul style="list-style-type: none"> – Preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; and – limit vegetation clearance to access roads, pivots and infrastructure. 	-7.50
26	Fire damage.	Operation	-13	<ul style="list-style-type: none"> – Ensure vehicles are equipped with firefighting equipment; – firefighting equipment training; – no open fires; – no smoking; and – firebreaks around each pivot. 	-4.50
27	Noise nuisance.	Operation	-6.75	<ul style="list-style-type: none"> – Operation of vehicles and machinery on the pivots to be undertaken during the day, from 06:00 until 18:00. 	-4.50
28	Oil/ fuel spillages causing soil and groundwater contamination.	Operation	-12	<ul style="list-style-type: none"> – Spill prevention kits. 	-6.75
29	Littering.	Operation	-12	<ul style="list-style-type: none"> – Dedicated waste bins. 	-4.50
30	Potential for residual soil contamination, compaction.	Rehab and Closure	-10.5	<ul style="list-style-type: none"> – Residue contamination assessment and monitoring; and – de-compaction of soil. 	-8.75
31	Potential for residual of groundwater or surface water.	Rehab and Closure	-10.5	<ul style="list-style-type: none"> – Water monitoring. 	-8.75
32	Visual.	Rehab and Closure	7	<ul style="list-style-type: none"> – Remove all surface infrastructure and debris. 	11.00



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
Specialist Impacts					
33	Destruction or disturbance of potentially important grave site.	Construction	-17	<ul style="list-style-type: none"> – Site should be avoided considering a 50-meter buffer; and – the Heritage Protocol or Chance Find Procedure is advised to be followed should additional heritage finds or sites be encountered. 	-2.81
34	Destruction or disturbance of undiscovered below-ground heritage features.	Construction	-7.5	<ul style="list-style-type: none"> – A Heritage Procedure is advised to be followed should additional heritage finds or sites be encountered. 	-3.94
35	Loss of fossil Heritage.	Construction	-10.5	<ul style="list-style-type: none"> – The EAP and ECO must be notified that the whole study area has a High Palaeontological Sensitivity. A “Chance Find Protocol” must be implemented during the proposed activities and incorporated in the EMPr; and – if fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (e.g. documented and collection) can be undertaken by a professional palaeontologist. 	-3.75



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
36	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2 (original layout)	Construction and Operation	-16.25	<ul style="list-style-type: none"> - Habitat protection; - wildlife protection; - biodiversity protection; - preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; - implement a search and rescue procedure. - Vegetation clearing should be restricted to areas of the pivots only. - A management plan must be drawn up for the ecological corridor and other undeveloped portions of the property to best support the biodiversity and ecosystem connectivity in the area. - The Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA. - The avoidance of the no-go areas must be strictly enforced. 	-8.44
37	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2 (preferred alternative layout)	Construction and Operation	-8.25	<ul style="list-style-type: none"> - Habitat protection; - wildlife protection; - biodiversity protection; - preserve natural vegetation between pivots to minimise the impact on the visual aesthetic of the footprint area; - implement a search and rescue procedure. - Vegetation clearing should be restricted to areas of the pivots only. - A management plan must be drawn up for the ecological corridor and other undeveloped portions of the property to best support the biodiversity and ecosystem connectivity in the area. 	-6.75



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
				<ul style="list-style-type: none"> – The Alien vegetation that has grown as a result of land clearing must be removed by methods recommended by DWA. – The avoidance of the no-go areas must be strictly enforced. 	
38	Loss of species of conservation concern (original layout)	Construction and Operation	-16.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – limit vegetation clearance to access roads, pivots and infrastructure; – alien vegetation control 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. – Where possible trees should be avoided as much as possible, i.e. access roads between pivots can be re-routed to avoid clearing specific trees 	-13.50
39	Loss of species of conservation concern (preferred alternative layout)	Construction and Operation	-8.25	<ul style="list-style-type: none"> – Habitat protection; – wildlife protection; – biodiversity protection; – limit vegetation clearance to access roads, pivots and infrastructure; – alien vegetation control 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. – Where possible trees should be avoided as much as possible, i.e. access roads between pivots can be re-routed to avoid clearing specific trees 	-7.50



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Anthropogenic Disturbances, Intentional and/or accidental killing of fauna (original layout)	Construction and Operation	-5.25	<ul style="list-style-type: none"> – There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. – 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. 	-3.94
	Anthropogenic Disturbances, Intentional and/or accidental killing of fauna (preferred alternative layout)	Construction and Operation	-4	<ul style="list-style-type: none"> – There is unfortunately no mitigation for the vibrations caused by machinery/vehicles, except perhaps ensuring that activities are kept to a minimum. – 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. 	-3.5



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Sedimentation, contamination and disruption of freshwater ecosystems (original layout)	Construction and Operation	-5.5	<ul style="list-style-type: none"> – Only the pivot footprint must be cleared and the lands planted as soon as possible after clearing. – Erosion control measures must be in place to aid in the prevention of wash. – Spot treatments of pesticide and herbicides reduce the risk of runoff and contamination of surrounding areas – Implement sustainable irrigation systems – Implement integrated pest management – Training on safe pesticide handling and application – Establish buffer zones around sprayed areas – Utilise slow-release fertilizers – Implement irrigation scheduling – Prevent soil salinization – Prevent nutrient depletion in soils 	-4.5



Identifier	Impact	Phase	Pre-Mitigation Significance Score	Mitigation Measure	Final score
	Sedimentation, contamination and disruption of freshwater ecosystems (preferred alternative layout)	Construction and Operation	-5	<ul style="list-style-type: none"> – Only the pivot footprint must be cleared and the lands planted as soon as possible after clearing. – Erosion control measures must be in place to aid in the prevention of wash. – Spot treatments of pesticide and herbicides reduce the risk of runoff and contamination of surrounding areas – Implement sustainable irrigation systems – Implement integrated pest management – Training on safe pesticide handling and application – Establish buffer zones around sprayed areas – Utilise slow-release fertilizers – Implement irrigation scheduling – Prevent soil salinization – Prevent nutrient depletion in soils 	-4
40	Habitat fragmentation, loss of natural vegetation and alien invasion in a CBA1 and CBA2.	Rehab and Closure	-13	<ul style="list-style-type: none"> – Biodiversity monitoring; – alien vegetation management; and – pivot footprints to be revegetated with local indigenous species. 	-6

9 SENSITIVITY MAPPING

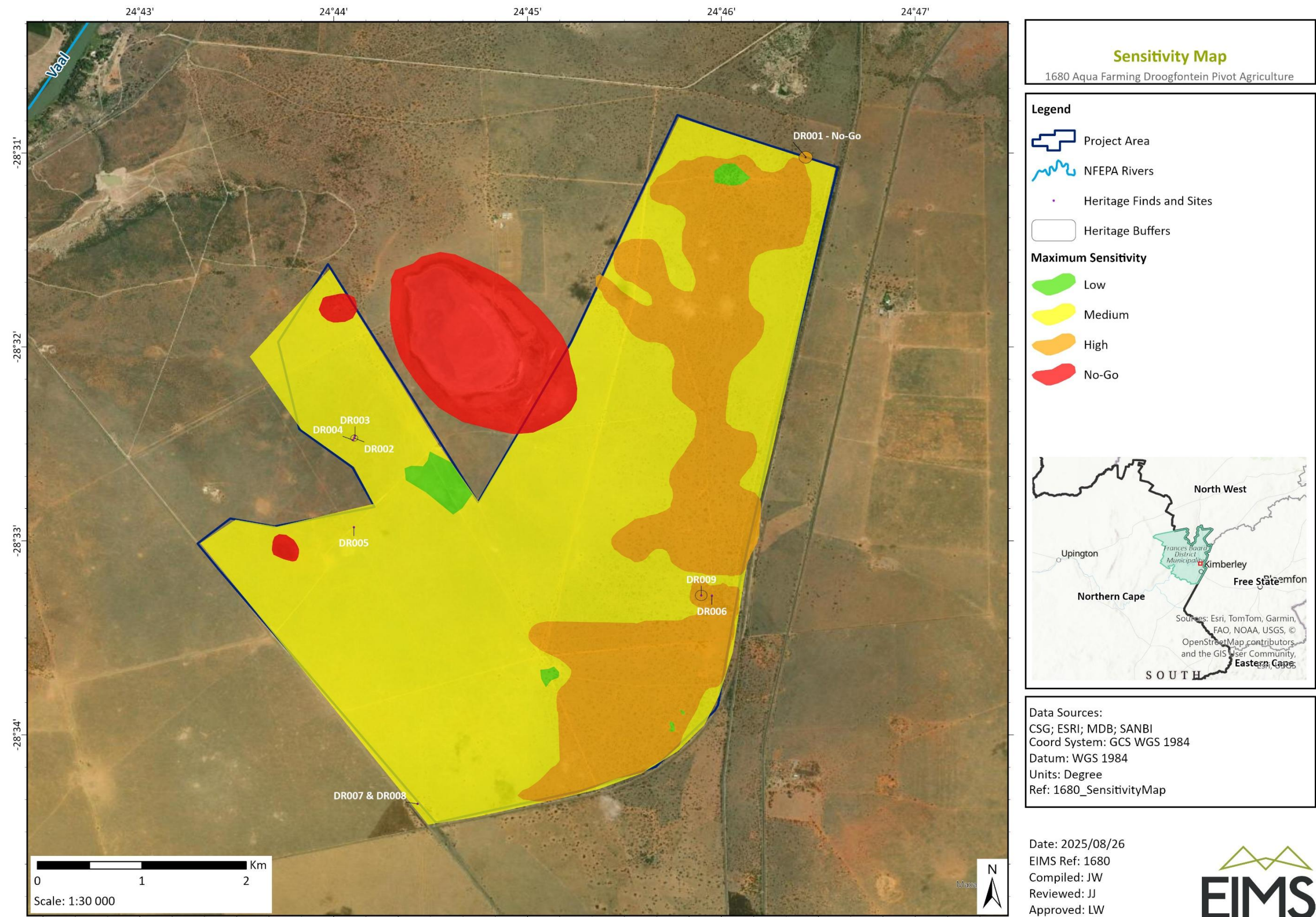


Figure 32: Maximum sensitivity map of project area.



10 CONCLUSION AND RECOMMENDATIONS

An EIA was undertaken to identify all the potential risks and impacts associated with each phase of the proposed pivot expansion activities as well as potentially feasible alternatives. Background information review on the surrounding areas, the biodiversity, heritage and palaeontological specialist assessment reports (Appendix 6) as well as the Department of Forestry, Fisheries and Environment (DFFE) National Web based Environmental Screening Tool Report (Appendix 4) assisted in identifying potential impacts. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria included the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

Only the Heritage, Palaeontological and Biodiversity specialist assessments were deemed necessary by the EAP and were conducted by the relevant specialists. These were the only specialist studies considered because of the proposed location and type of activities which form part of the pivot expansion project. A desktop study and an on-site investigation was conducted on the 13th of January 2025, which confirmed the redundancy of additional specialists' studies to be done. No aquatic areas exist within or closely surround the proposed footprint area. Most of the footprint will fall on old lands (previously cultivated land that was allowed to reform into a semi-natural state) and the proposed activity, pivot irrigation, will visually fit in with the surrounding area because of the presence of other pivots in the project's vicinity.

As part of an HIA assessment, a desktop as well as an on-site evaluation of heritage impacts was conducted. Through the methodology adopted as part of this assessment, heritage features were identified which can be avoided during the implementation of the proposed activities. Apart from unassessed chance finds, a Low impact on heritage features can be expected should the proposed mitigation measures be followed. Therefore, from an Archaeological perspective, the development will not have significant foreseeable impacts and can proceed as long as the recommended mitigation measures are implemented.

The PIA report indicated that the proposed development site is underlain by Quaternary to Recent aeolian dune sands, calcrete, surface limestones, Jurassic dolerite, and the Allanridge Formation (Ventersdorp Supergroup). Palaeontological sensitivity ratings from SAHRIS indicate:

- Quaternary sands – Medium
- Calcrete – High
- Jurassic dolerite – Zero
- Allanridge Formation – Low

The DFFE Screening Report classifies the location as High in palaeontology sensitivity. However, desktop research suggests an overall Low sensitivity for the area. No site investigation was undertaken, and it is concluded that the development will not significantly impact palaeontological resources.

It is recommended that no further palaeontological studies or specialist mitigation are required, unless fossils are uncovered during construction. In such cases, the Chance Find Protocol must be implemented, SAHRA must be notified, and a qualified palaeontologist must obtain a collection permit. All fossil material must be curated in an approved institution, with work meeting SAHRA's minimum standards for palaeontological studies.

The biodiversity assessment report indicated that the proposed development area is primarily composed of natural vegetation. The key areas of conservation concern include the pan systems and their immediate surrounds, as well as stands of large, protected trees (*Species 257*).

At the time of the property's purchase and initial application for irrigation development, the 2016 Northern Cape Critical Biodiversity Areas (CBA) map indicated that only the immediate area surrounding the pan was classified as CBA2, leaving the remainder of the property available for potential development. However, the recently updated CBA map (published after the pre-application engagement with DAERL) now classifies most of the property as CBA2, due to the presence of threatened bird habitat and to support vegetation type conservation targets.



No irreplaceable biodiversity features (e.g., endangered flora or fauna) will be permanently lost due to the development. While some protected trees will be removed, these species are well represented in the broader landscape and will not be lost from the region. The critically endangered bird species associated with the area do not rely solely on this site for breeding or foraging, particularly given existing disturbances from the adjacent railway line and N12 highway, which reduce the site's suitability for sensitive species such as the African White-backed Vulture.

Although mitigation options are limited due to the impracticality of preserving protected trees within pivot irrigation footprints, an alternative development layout—which reduces the number of pivots—will significantly reduce tree loss and establish a large ecological corridor through an area of high sensitivity. This corridor will help maintain habitat connectivity, support species movement and resilience, and reduce overall biodiversity impacts to a medium to low significance level.

Effective mitigation will depend on maintaining the ecological corridor as a functional ecosystem and actively managing alien vegetation within and around undeveloped areas. The long-term conservation of this corridor could be secured through formal protection mechanisms, such as:

- Biodiversity Agreement; and
- Conservation Servitude.

Engagement with stakeholders will be important to determine the most suitable mechanism for ensuring the long-term protection and management of this sensitive area.

Ultimately, while the development does fall within a CBA2 (where intensive agriculture is generally discouraged), the revised layout, combined with the absence of irreplaceable features, the establishment of a conservation corridor, and the local socio-economic benefits, provide a balanced approach that integrates development with biodiversity conservation objectives.

The associated EMPr identifies appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts.

10.1 PREFERRED ALTERNATIVES

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

With regards to incremental alternatives, an alternative layout proposes reducing and repositioning pivots to limit vegetation clearance and protect high-sensitivity areas. The revised design (Figure 8) removes ten pivots from high-density tree zones and outlines the operational schedule for each crop cycle phase.

10.2 ENVIRONMENTAL IMPACT STATEMENT

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

10.3 RECOMMENDATIONS FOR INCLUSION IN ENVIRONMENTAL AUTHORISATION

The following key recommendations are made:



- The EMPr should be adhered to during all phases of the project.
- An independent Environmental Control Officer (ECO) is not recommended for this project due to the nature thereof. It is however recommended that the farm manager (or suitable representative) is tasked with overseeing compliance with the EA and EMPr and this representative must take responsibility for non-compliance should they occur.
- A threatened or protected species permit and/or a permit in terms of the National Forest Act must be obtained prior to rescue and relocation or destruction of any protected species.
- The water allocation and use on the farm must be metered and the results recorded monthly for record purposes.
- Clearance must be limited to the proposed pivot footprints as presented in the EIA report.
- No impact on nearby surface water features may occur without approval from the Department of Water and Sanitation (DWS).
- Alien and invasive species must be adequately controlled and disposed of (where relevant).
- Internal environmental monitoring audits to be taken monthly during construction and operational phases.
- External environmental audits to be undertaken annually during construction, biennially (every 2 years) during operational phase and every 5 years during the rehabilitation phase.
- Soil assessments to be undertaken every 3 years to ensure no degradation of soil quality as a result of fertilisers, herbicides and/or pesticides.



11 ASSUMPTIONS AND LIMITATIONS

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

11.1 GENERAL

- This EIA assessment process and report is based on the technical information and process description provided by the applicant;
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.
- The description of the baseline environment has been obtained from ecological, heritage and palaeontological specialist studies with further desktop research where relevant.

11.2 ECOLOGICAL STUDY

The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure a comprehensive database of plant and animal species are captured. However, this is rarely possible due to time and cost constraints and therefore these surveys usually represent a “moment in time” survey. The survey represents the summer/wet season survey as it was conducted in January. A plant species list was compiled for the site from the site visit, this was augmented by a list of species which are known from other studies to occur in the broad vicinity of the site. The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach that takes account of the study limitations. Protected tree species which are of concern within this area are easily accounted for as they are highly visible and timing of the survey does not influence the accuracy of their records.

11.3 HERITAGE STUDY

11.3.1 GENERAL LIMITATIONS

Several limitations were expected and encountered while implementing the above-described methodology. Some of these limitations relate to the project itself, while some are more general, relating to the implementation of the methodology itself.

Firstly, such investigations are limited to desktop and field surveys from which findings are drawn. In this regard, the findings presented here are limited to surface observations. Below-ground archaeological contexts would only apply in cases where the methodology includes components involving excavations and test pits. To mitigate this limitation, this report advises the application of heritage procedures adopted by the developer in cases where construction activities lead to the identification of unexpected finds.

The field survey conducted for this report does not account for any finds further than immediate surrounding areas which are not potentially affected by the proposed development. To mitigate this, the initial desktop assessment considers surrounding pre-identified heritage resources and prior heritage studies done in the area. Although an extensive methodology was adopted to address the desktop assessment and field survey, one must remain cognisant of the fact that this assessment may not identify all heritage features possibly existing. For this reason, mitigation measures have been proposed to accommodate for chance finds as well as features that may not have been encountered and identified through the implementation of this study’s methodology.

11.3.2 PROJECT-SPECIFIC LIMITATIONS

As a key limitation, some areas and farms were inaccessible due to perimeter fences. These areas accounted for very few sections of the overall footprint. The field survey itself was limited to a 3-day site visit which may



present as a limitation to the extent of the investigation. However, strategic points were identified prior to the survey to ensure that an adequate representation of the site could be obtained through the site visit.

11.4 PALAEOLOGICAL STUDY

The geology of the area is the focal point of geological maps, and the sheet explanations of the Geological Maps were not intended to focus on palaeontological heritage. Many inaccessible areas of South Africa have never been examined by palaeontologists, and data is typically dependent solely on aerial pictures. Locality and geological information in museums and university databases is out of date, and data acquired in the past is not always adequately documented.

Comparable Assemblage Zones in other places are also used to provide information on the existence of fossils in areas that have not before been recorded. When similar Assemblage Zones and geological formations are used for Desktop studies, it is commonly assumed that exposed fossil exists within the footprint.



12 UNDERTAKINGS

12.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, Jessica Jordaan, 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 2025/09/01)

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 2025/09/01)

12.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, Jessica Jordaan, 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 2025/09/01)

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 2025/09/01)



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APPENDICES

Appendix 1: Curriculum Vitae of Environmental Assessment Practitioners.

Appendix 2: Site Maps and Layouts

Appendix 3: Public Participation Report

Appendix 4: DFFE Screening Tool Report.

Appendix 5: Site Sensitivity Screening Tool.

Appendix 6: Specialist Assessment Reports.

Appendix 7: Impact Assessment Matrix.

Appendix 8: Application Form.

Appendix 9: Environmental Management Programme.