

Technical Report: KRANSKLOOF Draft EIR/0916

**DRAFT EIA REPORT FOR THE PROPOSED CONSTRUCTION
OF AN AGRICULTURAL IRRIGATION DAM AND THE
PREPARATION OF LAND FOR CULTIVATION ON THE
REMAINING EXTENT AND PORTION 1 OF THE FARM
KRANSKLOOF 218 KR, MOKOPANE, LIMPOPO PROVINCE.**

14 February 2017

Prepared by:

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PROJECT DETAIL

LDEDET Reference No.	:	12/1/9/2-W72
NEAS Reference No.	:	LIM/EIA/0000246/2016
Project Title	:	The proposed construction of an agricultural irrigation dam and the preparation of land for cultivation on the Remaining Extent and Portion 1 of the farm Kranskloof 218 KR, Mokopane, Limpopo Province.
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Client	:	Slijpsteen Meel (Pty) Ltd.
Report Status	:	Draft Environmental Impact Report
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GLOSSARY OF TERMS AND ACRONYMS

AMSL	Above Mean Sea Level
BA	Basic Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
DM	District Municipality
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EPA	Environmental Protected Area
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
EWR	Ecological Water Reserve

Ga	giga-annum
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
LDEDET	Limpopo Department of Economic Development, Environment and Tourism
LSU	Large Stock Unit
kWh	kilo Watt hours
MLM	Mogalakwena Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
NEMA	National Environmental Management Act No. 107 of 1998
NWA	National Water Act No. 36 of 1998
PPP	Public Participation Process
EWR	Ecological Water Reserve
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SR	Scoping Report
WULA	Water Use Licence Application

CONTEXT FOR THE DEVELOPMENT

South Africa is situated in a semi-arid region. The average rainfall for the country is estimated 450 mm per year, which is well below the world average of approximately 860 mm per annum, and is characterised by a large in-season as well as annual variation. As a result, South Africa's water resources are scarce and extremely limited in extent. In global terms, South Africa is classified as "water short" and moving towards "water stressed". No truly large perennial river such as the Congo, Ganges or Nile which can serve a reliable source of water, occur in South Africa. The highly variable rainfall together with the steep topography and shallow soils, contribute to the flashy character of our rivers. Groundwater is also limited to the geology of the country, much of which is hard rock with little water bearing capacity.

Population growth, irrigation development and other economic activity in South Africa have long surpassed the stage where the requirements for water can be met from the natural availability thereof. The groundwater resources of the country, although very important for small towns and rural communities, are insufficient to sustain even a significant proportion of the water requirements of South Africa. Therefore, surface water is the main supply source. Due to the high variability in river flow within a year and between years, storage needs to be provided to bridge low flow periods with a degree of assurance as required by the different water use sectors (FAO, 2016).

Nationally, the total storage capacity of the major reservoirs in the country currently amounts to about 33 900 million m³, which is equal to approximately 70% of the mean annual runoff from the land surface of the country. This storage has been created by the construction of 252 large dams. In addition, some 3 500 dams with a height of greater than 5 m have been registered with the Department of Water and Sanitation's (DWS) Dam Safety Office.

Although water is essential to irrigation, the availability of water does not necessarily lead to irrigation development. Many cases in the country can be cited where dams had been built for irrigation, where little or no development realised, because of the lack of other primary success factors. Currently there are almost 300 irrigation schemes in the country in varying states of disrepair. The main reasons for the situation being institutional, social and political rather than insufficient water. Influencing factors include: inappropriate design and management systems, lack of capacity, land tenure, ownership, access to finance, training, entrepreneurship, lack of interest and others.

Currently close to 60% of all water used in the country, is utilised for irrigation. Most of this water is used by commercial farmers. Irrigated agriculture contributes of the order of 1,5% of the GDP of the country. The most beneficial irrigation uses of water are mainly for the production of export crops, which is a pure commercial revenue earning use.

In response to the above, Slijpsteen Meel (Pty) Ltd. is proposing the construction of an irrigation dam within the Mokamole river near Mokopane in the Limpopo Province (refer to Figure 1 for the locality map).

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Mogalakwena Municipality faces a number of challenges in addressing the needs and improving the lives of the community (IDP, 2014-15). The Mogalakwena Local Municipality's (MLM) Integrated Development Plan (IDP, 2014-15) identifies the mission of the municipality as: providing affordable and quality basic services; creating a conducive and sustainable environment for social and economic development; and being consultative, responsive and accountable. Mogalakwena Municipality is an area which mainly consists of rural land, agricultural land and some land dominated by urban and mining/industrial activities. Agricultural land within the municipal boundaries is categorized by the following farming activities: game; crops; livestock; poultry and horticulture. Products such as maize, game, cattle, vegetables, tobacco and citrus products are farmed. Agriculture is the second largest sector contributing towards the municipality's economy.

Slijpsteen Meel (Pty) Ltd. intends to develop an irrigation dam within the Makomole river covering a surface area of approximately 9 hectares and the preparation of land for cultivation on the Remaining Extent and Portion 1 of the farm Kranskloof No. 218, Registration Division K.R., Limpopo Province situated within the Mogalakwena Local Municipality area of jurisdiction. The town of Mokopane is located approximately 40km south east of the proposed development and the town of Lyden approximately 14km north east (refer to Figure 1 and 2 for the locality and regional map). The total footprint of the area to be transformed will be approximately 349 hectares.

The Environmental Impact Assessment (EIA) Regulations, 2014 (Regulation 982) determine that an environmental authorisation is required for certain listed activities, which might have detrimental effects on the environment. The following activities have been identified with special reference to the proposed development and are listed in the EIA Regulations:

- Activity 19(i) (GN.R. 983): *"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse."*
- Activity 13 (GN.R. 984): *"The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more."*
- Activity 15 (GN.R. 984): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*
- Activity 16 (GN.R. 984): *"The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more."*
- Activity 4 (a)(ii)(ee)(GN.R. 985): *"The development road wider than 4 metres within reserve less than 13.5 metres (a) in Limpopo (ii) outside urban areas, in (ee) critical*

biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority in bioregional plans.”

- Activity 12 (a)(ii) (GN.R. 985): *“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 (a) in Limpopo (ii) within critical biodiversity areas identified in bioregional plans.”*
- Activity 14 (iv)(xii)(a)(a)(ii)(ff) (GN.R. 984): *“The development (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size and (xii) infrastructure or structures with a physical footprint of 10 square metres or more Where such development occurs – (a) within a watercourse (a) in Limpopo (ii) outside urban areas, in (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”.*

Being listed under Listing Notice 1, 2 and 3 (Regulation 983, 984 & 985) implies that the development is considered as potentially having a significant impact on the environment. Subsequently a ‘thorough assessment process’ is required as described in Regulations 21-24. Ecolead Pty Ltd. in strategic partnership with Environamics CC has been appointed as the independent consultant to undertake the EIA on Slijpsteen Meel (Pty) Ltd.’s behalf.

Appendix 3 to GNR982 requires that the EIA process be undertaken in line with the approved plan of study for EIA and that the environmental impacts, mitigation as well as the residual risks of the proposed activity be set out in the environmental impact assessment report (EIR). The potential positive and negative impacts associated with the proposed development have been assessed and the potentially most significant environmental impacts associated with the development are briefly summarised below:

Impacts during the construction phase:

During the construction phase, minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on fauna and flora (habitat destruction and fragmentation), surface water, removal or destruction of graves and burial grounds. The positive impacts relate to temporary employment.

Impacts during the operational phase:

During the operational phase the study area will serve as an irrigation dam to irrigate 340 hectares of croplands. The negative impacts are generally associated with impacts on fauna and flora, impacts on the surface water (flow modifications, flow sediment equilibrium and water quality impairment) and heritage objects. The operational phase will have a direct positive impact by contributing to food security, providing permanent job opportunities and the creation of additional wetland habitat and providing a breeding area for aquatic species.

Impacts during the decommissioning phase:

Over the long term the physical environment will benefit from the decommissioning of the dam wall and cropland since the site will be restored to its natural state. The decommissioning phase will potentially result in impact on the riparian area and the loss of permanent employment.

Cumulative impacts:

The intensification of agriculture can lead to groundwater pollution related to the increased use of pesticides and fertilizers. Improved efficiency may significantly reduce return flows which are often utilized downstream by other irrigation schemes or wildlife habitats. Similarly, upstream developments are likely to impact on the irrigation scheme either in the form of reduced water availability (surface or groundwater) or reduced water quality. These impacts are identified as being potentially significant for the proposed development, if unmitigated.

Regulation 23 of the EIA Regulations determine that an EIA report be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. The EIA report will evaluate and rate each identified impact, and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation Appendix 3 of the EIA Regulations.

1 INTRODUCTION

This section aims to introduce the Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

Appendix 3. (3) An environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-(a) details of:

- (i) the EAP who prepared the report; and
- (ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

Regulations No. 982, 983, 984 and 985 (of 4 December 2014) promulgated in terms of Section 24(5) and 44 of the National Environmental Management Act, (107 of 1998) determine that an EIA process should be followed for certain listed activities, which might have a detrimental impact on the environment. According to Regulation No. 982 the purpose of the Regulations are: *“...to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto”*.

The EIA Regulations No. 983, 984 and 985 outline the activities for which EIA should apply. The following activities with special reference to the proposed activity are listed in the EIA Regulations:

Table 1.1: Listed activities ¹

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 983, 4 December 2014	Activity 19(i)	<ul style="list-style-type: none"> • <i>“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse.”</i> • Activity 19(i) is triggered since construction of the proposed dam and associated infrastructure within the Mokamole river will result in the excavation and

¹ Please refer to Table 5.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

		removal of soil and/or rock of more than 5 cubic meters from a watercourse.
GNR. 984, 4 December 2014	Activity 13	<ul style="list-style-type: none"> • <i>“The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.”</i> • Activity 13 is triggered since approximately 340Ha, consisting of 17 x 20Ha pivots, will be used for cultivation of various crops. The area earmarked for cultivation consists mainly of historic disturbed and cultivated land, but also includes natural vegetated areas.
GNR. 984, 4 December 2014	Activity 15	<ul style="list-style-type: none"> • <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i> • In terms of vegetation type the site falls within the Central Sandy Bushveld vegetation type, which is described by Mucina and Rutherford (2006) as ‘Vulnerable’. Activity 15 is triggered since the areas to be cleared of indigenous vegetation for construction of the proposed dam, as well as preparation of cultivation lands, will exceed 20Ha.
GNR. 984, 4 December 2014	Activity 16	<ul style="list-style-type: none"> • <i>“The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.”</i> • Activity 16 is triggered since the proposed dam wall will have a height of approximately 12m and a width of approximately 391m and the high-water mark of the dam will cover an area of approximately 9Ha.
GNR. 985, 4 December 2014	Activity 4 (a)(ii)(ee)	<ul style="list-style-type: none"> • <i>“The development road wider than 4 metres within reserve less than 13.5 metres (a) in Limpopo (ii) outside urban areas, in (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority in bioregional plans.”</i> • Activity 4(a)(ii)(ee) is triggered since a road with a width of 4-5m will be constructed and the site is located within a Critical Biodiversity Area (CBA).
GNR. 985, 4 December 2014	Activity 12 (a)(ii)	<ul style="list-style-type: none"> • <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 (a) in Limpopo (ii) within critical biodiversity areas identified in bioregional plans.”</i>

		<ul style="list-style-type: none"> Activity 12(a)(ii) is triggered since more than 300m² of indigenous vegetation will be removed within a critical biodiversity area.
GNR. 985, 4 December 2014	Activity 14 (iv)(xii)(a)(a)(ii)(ff)	<ul style="list-style-type: none"> <i>“The development (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size and (xii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs – (a) within a watercourse (a) in Limpopo (ii) outside urban areas, in (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”.</i> Activity 14(iv)(xii)(a)(a)(ii)(ff) is triggered since the dam will cover an area of more than 10m² within a critical biodiversity area.

Being listed under Listing Notices 1, 2 and 3 (Regulation 983, 984 & 985) implies that the proposed activity is considered as potentially having a significant impact on the environment. Subsequently a ‘thorough assessment process’ is required as described in Regulations 21-24. According to Appendix 3 of Regulation 982 the objective of the EIR is to, through a consultative process:

- 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;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site 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;
- Determine the—
 - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - degree to which these impacts-
 - can be reversed;
 - may cause irreplaceable loss of resources, and

- can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored..

This report is the Draft Environmental Impact Report (EIR) that was submitted to the Limpopo Department of Economic Development and Tourism (LDEDET). According to Regulation 982 all registered I&APs and relevant State Departments must be allowed the opportunity to review the reports. The Draft EIR will be made available to I&APs and all relevant State Departments. They will be requested to provide written comments on the report within 30 days of receiving it. All issues identified during the review period will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Ecolead in strategic partnership with Environamics was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. All correspondence may be directed to the lead EAP:

Contact person: Ruan Mostert
Postal Address: Postnet Suite 594, Private Bag X37, Lynnwood Ridge, 0040
Telephone: 072 7747 831 (w) 086 7641 433 (f) 072 774 7831 (Cell)
Electronic Mail: ruan@ecolead.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the EIA is also summarized in a curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix H to this report. The expertise of the specialists is also summarized in their respective reports.

Table 1.2: Details of specialists

Specialist Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Archaeological Impact Assessment	Exigo Sustainability	Mr. Nelius Kruger	PostNet Suite 74 Private Bag X07 Arcadia, 0007	Tel: (012) 751 2160 Fax: 086 607 2406	info@exigo3.com
Palaeontological Desktop Assessment	Skarab Palaeontological Consultants	Dr. J. F. Durand	PO Box 31517 Totiusdal, 0134	Cell: 083 235 7855	francois.karst@yahoo.com
Ecological Report	Exigo Sustainability	Dr. B. J. Henning	PostNet Suite 74 Private Bag X07 Arcadia, 0007	Tel: (012) 751 2160 Fax: 086 607 2406	info@exigo3.com
Wetland Delineation Report	Exigo Sustainability	Dr. B. J. Henning	PostNet Suite 74 Private Bag X07 Arcadia, 0007	Tel: (012) 751 2160 Fax: 086 607 2406	info@exigo3.com
Aquatic Assessment & Ecological Flow Assessment	The Biodiversity Company	Mr. Andrew Husted	-	Cell: 084 319 1225	andrew@thebiodiversitycompany.com
Hydrological Assessment	The Biodiversity Company	Mr. Andrew Husted	-	Cell: 084 319 1225	andrew@thebiodiversitycompany.com

1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 982. Table 1.3 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted on the 18th of August 2016 in order to discuss the proposed development and assess the site.
- The public participation process was initiated on 17 and 19 August and all I&APs were requested to submit their comments by 16 September 2016.
- Site notices were placed on site and at the Local Municipal Offices, in English and Afrikaans, on 18 August 2016 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise their preliminary comments by 16 September 2016.
- Identified I&APs, including key stakeholders representing various sectors, were directly informed of the proposed development via registered post and emails on 19 August 2016 and were requested to submit comments by 19 September 2016.
- A fully completed application form and Draft Scoping report was submitted to the Department on 29 September 2016.
- The Draft Scoping Report was made available to all registered I&APs and relevant State Departments on 29 September 2016 and they were requested to provide their comments on the report within 30 days of the notification (31 October 2016).
- Two newspaper advertisements were placed on 19 August 2016 and I&APs was invited to provide their comments and input.
- The Final Scoping Report (FSR) was submitted to the Department of environmental Affairs on 07 November 2016.
- The Department of Environmental Affairs accepted the final scoping report in a letter dated 24 November 2016.
- The Draft EIR Report was submitted to the Department of Environmental Affairs on 14 February 2017.

It is envisaged that the EIA process should be completed within approximately four months of submitting the Final EIR, i.e. by August 2017 – see Table 1.3.

Table 1.3: Project schedule

Activity	Prescribed timeframe	Timeframe
Site visit		19 August 2016
Public participation (BID)	30 Days	19 August 2016
Conduct specialist studies	-	August – November 2016
Submit application form and DSR	-	September 2016
Public participation (DSR)	30 Days	29 September – 31 October 2016

Submit FSR	-	8 November 2016
Department acknowledges receipt	10 Days	10 November 2016
Department approves/reject	43 Days	24 November 2016
Public participation (DEIR)	30 Days	14 February 2017
Submission of FEIR & EMPr	-	April 2017
Department acknowledges receipt	10 Days	April 2017
Decision	107 Days	July 2017
Department notifies of decision	5 Days	July 2017
Registered I&APs notified of decision	14 Days	July 2017
Appeal	20 Days	August 2017

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No.982. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations		Section in report	Pages
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-			
(a)	details of -		
	(i) the EAP who prepared the report; and	1	12 - 21
	ii) the expertise of the EAP, including a curriculum vitae.		
(b)	the location of the activity, including-		
	(i) the 21-digit Surveyor General code of each cadastral land parcel;		
	(ii) where available, the physical address and farm name;		
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-	2	22 - 28
	(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;		
(d)	a description of the scope of the proposed activity, including-		
	(i) all listed and specified activities triggered and being applied for; and		
	(ii) a description of the associated structures and infrastructure related to the development.		
(e)	a description of the policy and legislative context within which the	3	29 - 39

	development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.		
(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;	4	40 - 41
(g)	A motivation for the preferred development footprint within the approved site.	5	42 - 64
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –		
	(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	6	65 - 95
	(x) a concluding statement indicating the preferred alternative development location within the approved site.		
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (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;	6	65 - 95
	(viii) the possible mitigation measures that could be applied and level of residual risk;		
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	6	65 - 95
	(i) a description of all environmental issues and risks that were identified during the EIA process; and		

	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.		
(j)	an assessment of each identified potentially significant impact and risk, including- (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;		
(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;		
(l)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	7	96
(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;		
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Not applicable	
(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	Not applicable	
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;		
(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;	7	96 -98

(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;	Not applicable
(s)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs); (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	Appendix A to the report
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(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 (ii) a motivation for the deviation;	Not applicable
(v)	any specific information that may be required by the CA; and	Not applicable
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

Appendix 3. (3) An EIR (...) must include-

- (b) the location of the activity, including-
- (i) the 21-digit Surveyor General code of each cadastral land parcel;
 - (ii) where available, the physical address and farm name;
 - (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;
- (c) a plan which locates the proposed activity 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;
- (d) a description of the scope of the proposed activity, including-
- (i) all listed and specified activities triggered and being applied for;
 - (ii) a description of the associated structures and infrastructure related to the development.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the construction of an agricultural irrigation dam and the preparation of land for agricultural use on the Remaining Extent and Portion 1 of the farm Kranskloof No. 218, Registration Division K. R., Limpopo Province situated within the Mogalakwena Local Municipality area of jurisdiction. The town of Mokopane is located approximately 40km south east of the proposed development and the town of Lyden is located approximately 14km to the north east of the site (refer to Figure 1 for the locality map).

Please note that the client is in process of amending the current property details with a surveying process. As soon as this process has been completed the farm will be sub-divided into the following portions:

- The remainder of portion 2 of the farm Kranskloof 218 KR
- Portion 3 of the farm Kranskloof 218 KR
- Portion 4 of the farm Kranskloof 218 KR
- Portion 5 of the farm Kranskloof 218 KR.

Although the subdivision has been finalised, the new title deeds is not yet available. Therefore, a process will be initiated later on for the amendment of either the application form or the environmental authorisation.

The project entails the construction of an irrigation dam with a development footprint of 9 hectares and a dam wall height of approximately 12 meters. The dam is being constructed in order to supply the proposed agricultural uses with a sustainable supply of water. The total area of land to be prepared for cultivation is approximately 340 hectares – refer to table 2.1 for general site information.

Table 2.1: General site information

Description of affected farm portion	The Remaining Extent and Portion 1 of the farm Kranskloof No. 218, Registration Division K. R., Limpopo
21 Digit Surveyor General codes	TOKR0000000002180001 TOKR0000000002180000
Title Deed	T83492/2001
Photographs of the site	Refer to the Plates
Height of the dam wall	Height of approximately 12 meters
Area of dam wall	17 508m ²
Water area on 1108 amsl	Approximately 9ha
Water volume on 1108 amsl	330 000 m ³
Volume of Dam wall before stripping	97 239m ³
Dimensions of the dam	Dam wall will be 391m in length and 66m on widest toe with a cut slope 1:2 and fill slope 1:3
Area to be transformed for the dam	Approximately 9 hectares when full capacity s reached
Area to be transformed for cultivation	Approximately 340 hectares

The current land-use of the proposed development site is characterised by crop cultivation. The farm owner also has some game on the farm. Neighbouring farms are being used for crop cultivation, livestock grazing and game farming. The croplands to be prepared for cultivation are largely located on previously cultivated fields. The storage dam will provide water for cropland irrigation – refer to plates 1-8 for photographs of the area. The property on which the development is to be established is owned by Slijpsteen Meel (Pty) Ltd.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities ²

Relevant	Activity	Description of each listed activity as per project
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² Please refer to Table 5.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

notice:	No (s)	description:
GNR. 983, 4 December 2014	Activity 19(i)	<ul style="list-style-type: none"> • <i>“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse.”</i> • Activity 19(i) is triggered since construction of the proposed dam and associated infrastructure within the Mokamole river will result in the excavation and removal of soil and/or rock of more than 5 cubic meters from a watercourse.
GNR. 984, 4 December 2014	Activity 13	<ul style="list-style-type: none"> • <i>“The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.”</i> • Activity 13 is triggered since approximately 340Ha, consisting of 17 x 20Ha pivots, will be used for cultivation of various crops. The area earmarked for cultivation consists mainly of historic disturbed and cultivated land, but also includes natural vegetated areas.
GNR. 984, 4 December 2014	Activity 15	<ul style="list-style-type: none"> • <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i> • In terms of vegetation type the site falls within the Central Sandy Bushveld vegetation type, which is described by Mucina and Rutherford (2006) as ‘Vulnerable’. Activity 15 is triggered since the areas to be cleared of indigenous vegetation for construction of the proposed dam, as well as preparation of cultivation lands, will exceed 20Ha.
GNR. 984, 4 December 2014	Activity 16	<ul style="list-style-type: none"> • <i>“The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.”</i> • Activity 16 is triggered since the proposed dam wall will have a height of approximately 12m and a width of approximately 391m and the high-water mark of the dam will cover an area of approximately 9Ha.
GNR. 985, 4 December 2014	Activity 4 (a)(ii)(ee)	<ul style="list-style-type: none"> • <i>“The development road wider than 4 metres within reserve less than 13.5 metres (a) in Limpopo (ii) outside urban areas, in (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted</i>

		<p><i>by the competent authority in bioregional plans.”</i></p> <ul style="list-style-type: none"> • Activity 4(a)(ii)(ee) is triggered since a road with a width of 4-5m will be constructed and the site is located within a Critical Biodiversity Area (CBA).
GNR. 985, 4 December 2014	Activity 12 (a)(ii)	<ul style="list-style-type: none"> • <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 (a) in Limpopo (ii) within critical biodiversity areas identified in bioregional plans.”</i> • Activity 12(a)(ii) is triggered since more than 300m² of indigenous vegetation will be removed within a critical biodiversity area.
GNR. 985, 4 December 2014	Activity 14 (iv)(xii)(a)(a)(ii)(ff)	<ul style="list-style-type: none"> • <i>“The development (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size and (xii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs – (a) within a watercourse (a) in Limpopo (ii) outside urban areas, in (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”.</i> • Activity 14(iv)(xii)(a)(a)(ii)(ff) is triggered since the dam will cover an area of more than 10m² within a critical biodiversity area.

The potentially most significant impacts will occur during the construction phase of the dam and preparation of land for cultivation, which will include the following activities:

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation.
- Civil works to be conducted:
 - Excavation, layering, levelling and compaction of area.
 - Construction of the dam wall.
 - Construction of road network and pump station.

2.3 IRRIGATION DAM AND CULTIVATION

In Southern Africa, dry season agriculture and the pre-rainy season establishment of food and cash crops cannot be undertaken without large quantities of water. To rely upon streamflow at a

time when temperatures and evaporation are often at a peak can be unrealistic and risky. It may become essential for a dam to be constructed on a river or stream to allow for off-season storage of vital water supplies. Although primarily for irrigation, such structures can be used, either separately or combined, for stock and domestic water purposes, drainage sumps, groundwater recharge, flood amelioration and conservation storage. The key components of the proposed project are described below:

- Irrigation Dam - The proposed dam will be constructed in order to capture run-off water during the rainy season, which will be used to complement existing irrigation activities on the farm and to increase capacity for future planned cultivation. The dam wall will have a length of approximately 380m and a width of approximately 41m, with a surface water cover of approximately 9 hectares.
- Dam wall – The dam wall will be constructed from material sourced from the area (cement, rock and gravel) and will have a height of approximately 12m and a width of approximately 391m. Please note that it is not foreseen that a borrow pit will be needed for extraction of the construction material.
- Pumping station – Distribution of water to the farming units will make use of a 5m x 5m pumping station. A maximum of 450m³ water will be utilised per hour for a maximum of two harvests per annum, depending on the harvest requirements. Less water will be utilised during the rainy season or rainy days and water requirements for the individual harvest cycles differ during the soil preparation phase, planting phase, grow and harvest phase.
- Pipeline – The pipeline will transport the water from the irrigation dam to the centre pivots for irrigation. The pipeline will have a combined length of approximately 10.75km and will have a diameter of approximately 250mm.
- Cultivation area – Approximately 340Ha consisting of various pivots will be used for cultivation of various crops and vegetables. The area earmarked for cultivation consists mainly of historic disturbed and cultivated land, but also includes natural vegetated areas.
- Centre pivots – Centre pivots will be utilised for the irrigation of the croplands as they are easy to relocate and/or move between crop circles when required. Centre pivots also require less maintenance, offer supplier guarantees during the construction of the pivots, the current employees are well trained in using the centre pivots and spare parts are readily available as centre pivots are already utilised on other parts of the farm as well.
- Roads – An internal site road network will also be required to provide access to the proposed dam and cultivated land.

2.4 LAYOUT DESCRIPTION

The layout plan follows the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site have been considered – refer to figure 3 for the development footprint. The total surface area proposed for irrigation dam is 9 hectares and approximately 340 hectares for the proposed croplands. The croplands are largely located on previously cultivated fields. A draft layout plan is attached as an Appendix to this report.

2.5 SERVICES PROVISION

During the construction phase of the dam wall, water may be abstracted from ground water resources. The site falls within the A62A quaternary drainage region, this drainage region falls under Zone B, which refers to the amount of water that may be taken from the ground water resource per hectare, per annum. According to the Revision of General Authorisations in terms of Section 39 of the National Water Act of 1998 (Act No. 36 of 1998), Zone B indicates that 45m³ water may be abstracted from the ground water resource without applying for a Water Use License. A full assessment of the application for a water use authorization will be undertaken for the in-stream dam and irrigation.

With regards to waste, portable chemical toilets will be utilized, that will be serviced privately. Waste will be disposed at a licensed waste site (such as Mokopane, Modimolle, Polokwane, Vaalwater, Lephalale and Bela-Bela). The construction and hazardous waste will be removed to licensed landfill sites accepting such kinds of wastes.

During the operational phase the pump station and center pivots will utilize approximately 40 842 kilo Watt hours (kWh) of electricity per month, amounting to approximately 490 104 kWh per annum. The operations will rely on the municipal power supply.

3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

Appendix 3. (3) An EIR (...) must include-

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

3.1 INTRODUCTION

Environmental decision making with regards to the construction of dams and cultivation is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- National Environmental Management Biodiversity Act (NEMBA: Act 10 Of 2004)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- The National Forest Act (Act No. 84 of 1998)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- Limpopo Environmental Management Act (2004)
- Limpopo Conservation Plan V2 (2013)
- Limpopo Growth and Development Strategy (2015)
- Waterberg District Municipality Integrated Development Plan for 2012 – 2016
- Mogalakwena Local Municipality Integrated Development Plan for 2015/2016.

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.1 and 3.2 to provide a reference framework for the implications for the proposed activity.

3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa (Act No. 108 of 1996)	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that “everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people’s environmental right and places government under a legal duty to act as a responsible custodian of the country’s environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.
The National Environmental Management Act (Act No. 107 of 1998)	National and Provincial Department of Environmental Affairs	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 982, 983, 984, and 985 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. This EIA was triggered by activity 19(i) listed

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			in Regulation R983, activities 13, 15, 16 listed in Regulation R984 and activities 4(a)(ii)(ee), 12(a)(ii) and 14 (iv)(xii)(a)(a)(ii)(ff) which requires a 'scoping and environmental impact assessment process.'
National Environmental Management Biodiversity Act (NEMBA: Act 10 of 2004)	National Department of Environmental Affairs – Biodiversity Section	2004	<p>The following aspects of the NEMBA (2004) are important to consider in the compilation of an ecological report. It:</p> <ul style="list-style-type: none"> • Lists ecosystems that are threatened or in need of national protection; • Links to Integrated Environmental Management processes; • Must be taken into account in EMP and IDPs; • The Minister may make regulations to reduce the threats to listed ecosystems.
The National Forest Act (Act 84 of 1998)		1998	<p>The National Forest Act:</p> <ul style="list-style-type: none"> • Promotes the sustainable management and development of forests for the benefit of all; • Creates the conditions necessary to restructure forestry in State Forests; • Provide special measures for the protection of certain forests and protected trees; • Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. • Promotes community forestry.
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (DWA)	1998	<p>Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation. It provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources.</p> <p>As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The Act requires that, in general a</p>

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<p>water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. The National Water Act identifies eleven different water uses for which a water use licence is required.</p> <p>A Water Use License is in the process of being applied for, for impeding and diverting the flow of a water course (Section 21 (c)) and altering the bed, banks, course and characteristics of a watercourse (Section 21(i) for the building of an instream dam (Section 21 (b) and taking water from a water resource (Section 21(a)).</p>
National Environmental Management: Waste Act (Act No. 59 of 2008)	Department of Environmental Affairs (DEA)	2008	<p>NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.</p> <p>Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determine that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development.</p>
The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999	<p>The Act aims to introduce an integrated and interactive system for the management of the heritage resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected</p>

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<p>therewith.</p> <p>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected.</p> <p>A case file will be opened on SAHRIS and all relevant documents will be submitted for their comments and approval.</p>
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.
The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of the National Environmental Management: Biodiversity Act	National and Provincial Government	2004	<p>The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of the National Environmental Management: Biodiversity Act (10/2004). The regulation listed a total of 559 alien species as invasive and further 560 species are listed as prohibited and may not be introduced into South Africa. Below is a brief explanation of the four categories of Invasive Alien Plants as per the regulation.</p> <ul style="list-style-type: none"> • Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued. • Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
(10/2004)			<p>issued.</p> <ul style="list-style-type: none"> Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the proposed development

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
Limpopo Environmental Management Act (2004)	Limpopo Provincial Government	2004	The Limpopo Environmental Management Act (2004) deals with the conservation of wild animals, fresh water fish and the conservation and protection of flora in the Limpopo Province. Animals and plants are both listed in the schedules with different degrees of protection afforded to each.
Limpopo Conservation Plan V2	Limpopo Provincial Government	2013	<p>The purpose of the Limpopo Conservation Plan version 2 (LCPv2) is to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas (CBA) and associated land-use guidelines). The Limpopo Conservation Plan categories for the proposed dam and croplands are presented in Figure 5. The following can be concluded regarding developments:</p> <ul style="list-style-type: none"> The dam is located in an ESA1 area which can be considered a compatible land-use. The management objective for this area is to maintain ecosystem functionality and

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<p>connectivity allowing for limited loss of biodiversity pattern;</p> <ul style="list-style-type: none"> • The croplands are located in the following areas: <ul style="list-style-type: none"> ○ The majority of the area is classified as “Not Natural Areas (NNA)” or “Other Natural Areas (ONA)”. No management objectives, land management recommendations or land-use guidelines are prescribed. These areas are nevertheless subject to all applicable town and regional planning guidelines and policy. Where possible existing Not Natural areas should be favoured for development before "Other natural areas" as "Other natural areas" may later be required either due to the identification of previously unknown important biodiversity features on these sites, or alternatively where the loss of CBA has resulted in the need to identify alternative sites. ○ Small pockets of CBA1 areas exist. After the area was thoroughly surveyed it was found that this specific area is largely encroached sandveld and should rather be classified as some ESA areas. • ESA1 and ESA2 areas exist on isolated areas of the proposed cropland areas. The ESA areas should be managed for sustainable development and therefore the croplands are suitable from the LCPv2 guidelines.
Limpopo Growth and Development Strategy	Limpopo Provincial Government	2015	<p>The Limpopo Growth and Development Strategy (further referred to as the LGDS) of 2015 in is a culmination of various discussions with stakeholders from all sectors towards realising the dream of sustainable and integrated development that seeks to promote economic growth and development, improve the quality of life of its citizen, raise the institutional efficiency of government, attain regional integration and enhance innovation.</p> <p>One of the pillars towards the realisation of this vision and mission statement of the provincial government is economic development. The LGDS is therefore a key towards the realisation of the stated vision and mission. To achieve its objective, the provincial government has made a range of commitments to accelerate the delivery of priority services including infrastructure, the development of</p>

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<p>human resources, the establishment of strong inter-governmental relations and co-operative governance and to reduce the impact of HIV/AIDS. Following the outcome of various international, national and provincial programmes and initiatives such as the World Summit on Sustainable Development, NEPAD, the National Spatial Development Program, the National Growth Summit, the Integrated Sustainable Rural Development Strategy, Land Reform and Land Restitution Programme, the National Skills Development Strategy, the National Housing Policy and the policy on free basic services and the National Crime Prevention Strategy, the province adopted five development objectives for itself whose performance indicators correspond to those of the Millennium Development Goals. These objectives (discussed in detail below) are:</p> <ul style="list-style-type: none"> • The need to improve the quality of life of the population of Limpopo, • Growing the economy in the province, • Attain regional integration, • Enhance innovation and competitiveness, and • Improve the institutional efficiency and effectiveness of government. <p>These objectives are aimed towards facilitating economic growth and capital investment that will address the low absorption rate of the labour force into the economy as a matter of priority. This aim is founded within the president's State of the Nation Address of 2004 in which he stressed the need to bridge the divide between the First and Second Economies.</p>
Waterberg District Municipality Integrated Development Plan (IDP)	Waterberg District Municipality	2016 - 2017	<p>The Waterberg District Municipality's Integrated Development Plan for 2016-2017 indicates that the Waterberg District contributes almost 30% of the Limpopo Province agricultural activity, agriculture contributes over 4% of the District GGP and it employs around 21% of the labour force of the District.</p> <p>Although named the Waterberg the district is actually classified as a semi-arid area with poor water resources. For crop farmers, there have been dramatic changes in many commodity prices leading to changes in cropping patterns. Crops such as cotton, tobacco, maize and sorghum have been badly affected by low international prices and over production and plantings have been reduced significantly,</p>

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<p>often with negative financial and employment implications. Alternative crops like sunflower, wheat, soya beans, groundnuts and paprika are all internationally traded commodities and thus sensitive to the rand/dollar exchange rate. The cattle and game industry is undergoing significant transformation. Lead by water constraints, areas previously under dry land and irrigation are being consolidated and converted for extensive livestock production.</p> <p>Similarly, other former cultivated land and livestock grazing is being converted to game ranching and eco-tourism. Even within the game ranching industry owners are diversifying into lodges and eco-tourism. This general trend has been encouraged by the establishment and development of the Waterberg Biosphere. This trend is expected to continue. Furthermore, the plan describes the local economic development strategy of the district.</p>
Mogalakwena Municipality Integrated Development Plan (IDP)	Mogalakwena Local Municipality	2014-2015	<p>The vision of the Mogalakwena Local Municipality according to the Integrated Development Plan for 2014/2015 (further referred to as the Plan) is to be the leading, sustainable and diversified economic hub focused on community needs. The Plan also identifies the mission of the municipality as: Mogalakwena municipality is committed to develop communities and promote economic growth by: providing affordable and quality basic services; creating a conducive and sustainable environment for social and economic development; and being consultative, responsive and accountable.</p> <p>Key constraints facing the economy of Mogalakwena are:</p> <ul style="list-style-type: none"> • N1 bypasses the Mokopane • Water scarcity • Large area affected by land claims with poor facilitation and management of land restitution initiatives • High level of unemployment/poverty • Lack of skilled labour mainly amongst the youth, women, and people with disabilities • Limited local beneficiation • Limited sector/business linkages

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			<ul style="list-style-type: none">• Lack of business support, investment opportunities and investment incentives• Untapped tourism potential and undeveloped tourist attractions• Signage/ facade of town• Lack of institutional capacity (linked to service delivery)• Market entry barriers for emerging entrepreneurs• No investment and retention strategy• LED projects often collapse• No co-ordination and alignment of activities amongst institutions• Lack of planning to accommodate mining developments

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the subdivision of properties or the building of dams.

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations

3.6 CONCLUSION

The Environmental Impact Assessment was undertaken in accordance with the Environmental Impact Assessment Regulations (2014) published in GNR 982, in terms of Section 24(5) and 44 of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended as well as all relevant National legislation, policy documents, national guidelines.

4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

Appendix 3. (3) An EIR (...) must include-

(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;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

South Africa is situated in a semi-arid region. The average rainfall for the country is approximately 450 mm per year, which is well below the world average of approximately 860 mm per annum, and is characterised by a large in-season as well as annual variation. As a result, South Africa's water resources are scarce and extremely limited in extent. In global terms, South Africa is classified as "water short" and moving towards "water stressed".

Due to the high variability in river flow within a year and between years, storage needs to be provided to bridge low flow periods with a degree of assurance as required by agricultural sector for the purpose of irrigation or stock. Agriculture is key to food security in many parts of the world. Making agriculture work must be central component of policy approaches to food insecurity reduction and increasing economic growth. Increased investment in agriculture will help redress the current inequalities.

Not only will the establishment of an irrigation dam and croplands will significantly contribute to achieving food security in the country and economic growth in the region and creating long term employment, but will also assist the farmer to produce sustainable yields from his crops.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility's contribution towards food security and the associated benefits to society in general is discussed below:

- Food security - In the 2010/2011 financial year food security was reprioritised as one of the top priorities for South African government. This is in line with South Africa's millennium development goals which aim to reduce the proportion of people who go hungry and to reduce poverty and unemployment. Making agriculture work must be central component of policy approaches to food insecurity reduction and increasing economic growth. Increased investment in agriculture will help redress the current inequalities.
- Local economic growth - The proposed project will contribute to local economic growth by supporting agricultural development in line with provincial and regional goals. Building material for the dam wall will also be procured from local producers.
- Provision of job opportunities - Approximately 40 000 small-scale farmers, 15 000 medium to large scale commercial farmers, 120 000 permanent workers and an unknown number of seasonal workers are involved in irrigation farming in South

Africa. The proposed development will provide a number of temporary job opportunities during construction, while a number of permanent job opportunities will be provided during the operational phase. Poverty is one of the key social problems facing the Mogalakwena Municipality. According to Census 2011, of the 78 647 economically active (employed or unemployed but looking for work) people in the district, 40,2% are unemployed. The unemployment rate of Mogalakwena is almost double that of the other municipalities in the district. This could be attributed to a reduction in mining activities in recent years. The unemployment estimates in the Municipality vary between 45% and 70% of the economically active population (people between the ages of 15 and 64 years). Therefore, the development will alleviate unemployment in this community.

- Improving farm income – Agriculture contributes to poverty alleviation by reducing food prices, creating employment, improving farm income and increasing wages (FAO, 2016).
- Topographic conditions and ground formations: The contours and ground formations of the area proposed for the dam, are ideal when taking storage and catchment yield and solubility of the soil into consideration.
- Land capability: The agricultural potential in terms of crop production of the site is moderate, but under irrigation the expected yield of the area will dramatically increase.
- Proximity to a river: The Mokamole River runs through Portions of the farm Kranskloof and is adjacent to the proposed croplands, which makes this the ideal position for the proposed irrigation dam.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

Appendix 3. (3) An EIR (...) must include-

(g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;

(h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –

(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and

(xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on ‘assessment of alternatives and impacts’ proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is however, important to note that the regulation and guidelines specifically state that only ‘feasible’ and ‘reasonable’ alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site assessment on the Remaining Extent and Portion 1 of the farm Kranskloof No. 218 revealed two possible alternatives for an irrigation dam within Makomole. The site selection took into consideration the topography, contours, catchment yield, storage capacity and ground formations, and ecological sensitivity. The following sections explore different types of alternatives in relation to the proposed activity in more detail.

5.1.1 No-go alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo. The description provided in section 5.3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. Should the proposed

activity not proceed, the site will remain unchanged and will continue to be used for cattle grazing (refer to the photographs of the site). However, the potential opportunity costs in terms alternative land use income through irrigation of croplands, food security and economic growth in the region would be lost.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Slijpsteen Meel (Pty) Ltd. in the Mokopane area to potentially establish irrigation croplands. From a local perspective, the Remaining Extent and Portion 1 of the farm Kranskloof No. 218 is preferred due to its proximity to a river and the agricultural potential of the farm. The area proposed for the croplands are also mainly located on historic croplands therefore, the majority of the area has been disturbed previously. The applicant is also currently busy with irrigation activities adjacent to the proposed site.

The National Department of Agriculture (2006) classified land capability into two broad categories for the intensity of use for rain-fed agriculture, namely land suited to cultivation (Classes I – IV) and land with limited use, generally not suited to cultivation (Classes V – VIII). The site falls within Class 3 and therefore the agricultural potential in terms of crop production of the site is moderate, but can be enhanced with irrigation (refer to figure 7 elow).

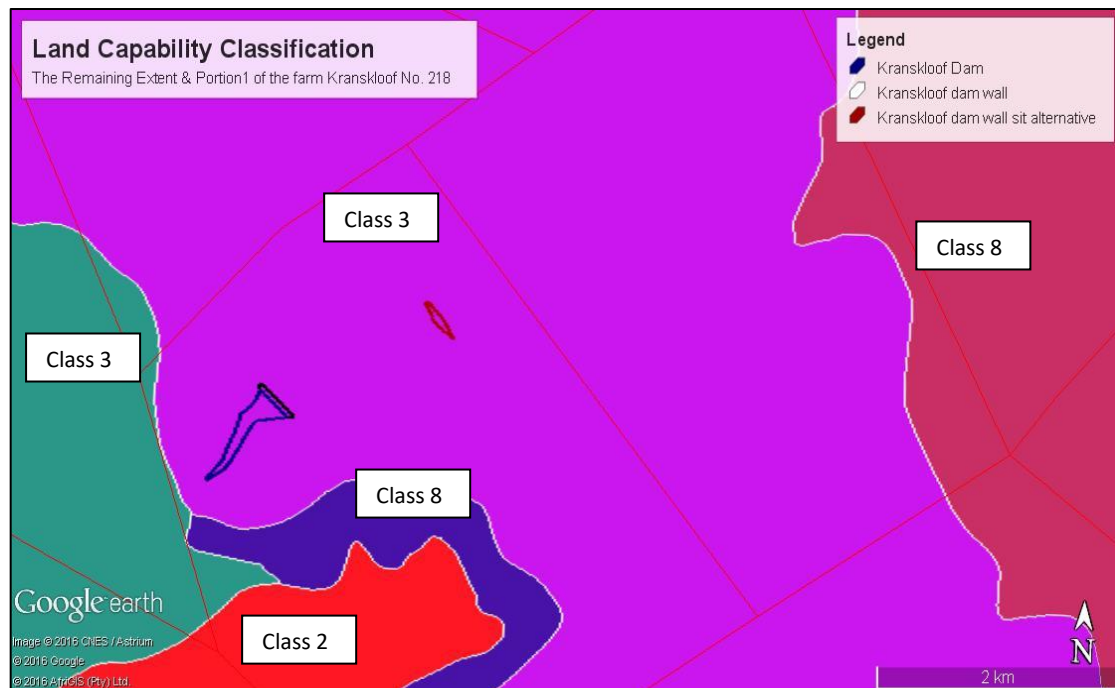


Figure 7: Land capability classification of the Remaining Extent and Portion 1 of the farm Kranskloof No. 218.

Two possible areas were identified on the farm Kranskloof No. 218 for a proposed irrigation dam. The areas identified are as follows – also refer to figure 8:

Preferred site: This is the preferred option since the area is better suited for the construction of a dam. The contours and ground formations are deemed favourable and this

option also has a larger catchment yield than the alternative site. A detailed survey was conducted of the preferred and the alternative sites, and the results indicated that the preferred site is the most suitable site for construction of a dam in terms of topography, current river drainage patterns, storage capacity etc.

Alternative site: This site is deemed less ecologically sensitive than the preferred site, but is not deemed feasible in terms of ground formation, which is essential for water retention. A detailed survey conducted indicated that the alternative site is not suitable for construction of a dam in terms of the topography, storage capacity, drainage patterns etc. Therefore, no site alternatives are considered.

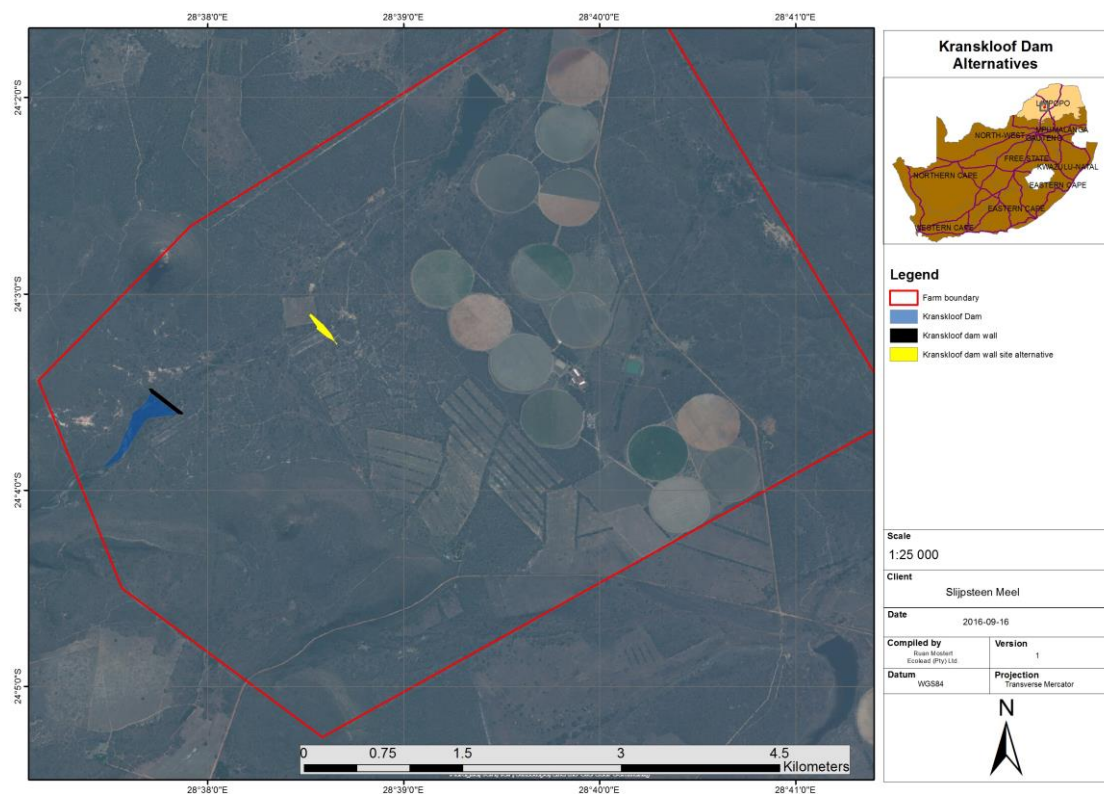


Figure 8: Proposed Layout of preferred and alternative activity.

5.1.3 Activity alternatives

The scoping process also considered whether irrigated croplands would be the most appropriate land use for the particular site.

Irrigated croplands – Slijpsteen Meel (Pty) Ltd. intends to build an irrigation dam in the Makomole river to irrigate approximately 340 hectares of croplands. Crops under irrigation deliver a higher yield than dry croplands and ensures a harvest year after year. Irrigated croplands are also one of the most profitable forms of agriculture. Crops to be cultivated will mainly consist of onions and potatoes, however may vary depending on seasonal and climatic condition.

5.1.4 Activity alternatives

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Irrigated croplands – Slijpsteen Meel (Pty) Ltd. intends to build an irrigation dam in the Makomole river to irrigate approximately 340 hectares of croplands. Crops under irrigation deliver a higher yield than dry croplands and ensures a harvest year after year. Irrigated croplands are also one of the most profitable forms of agriculture. Crops to be cultivated will mainly consist of onions and potatoes, however may vary depending on seasonal and climatic conditions.

Rain-fed croplands - Due to the local climatic conditions rain-fed croplands is not considered suitable. Furthermore, rain-fed croplands produce a lower yield than irrigated croplands and with current rain shortages across the country, failed harvests are imminent.

Cattle grazing – The grazing capacity of the of the 340 hectares, if calculated at an above average 15 hectares per Large Stock Unit (LSU), will only be able to accommodate approximately 22 cattle which is not financially feasible to sustain the farm.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design of the dam wall were held between the owner and the engineer. The layout plan is submitted as part of the EIA Report (refer to figure 3), and it indicates the preferred location of the dam wall and croplands. Two alternative sites on the same farm were identified for the dam wall but after the initial site assessment the alternative site was ruled out and the EIR will therefore only focus on the single preferred site.

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

➤ Newspaper advertisement

Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English and Afrikaans in the local newspaper (Northern News/Noord Nuus) on the 19th of August 2016 (see Appendix B) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register, and submit their comments to EcoLead Environmental Consultants. I&APs were given the opportunity to raise comments and send them through to the EAP.

➤ Site notices

Site notices were placed on site and at the Local Municipal Offices, in English and Afrikaans, on 18 August 2016 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 16 September 2016. Photographic evidence of the site notices is included in Appendix C.

➤ Direct notification of identified I&APs

Identified I&APs, including key stakeholders representing various sectors, were directly informed of the proposed development via registered post and emails on 19 August 2016 and were requested to submit comments by 19 September 2016. For a complete list of stakeholder details see Appendix D and for proof of registered post see Appendix E. The consultees included:

- Limpopo Department of Economic Development, Environment and Tourism (LDEDET)
- Limpopo Department of Water and Sanitation
- The Department of Water and Sanitation (DWS)
- Limpopo Department of Agricultural and Rural Development
- Limpopo Department of Rural Development and Land Reform
- Department of Agriculture, Forestry and Fisheries, Water and Irrigation Development
- Department of Public Works, Roads and Infrastructure
- The South African Heritage Resources Agency (SAHRA)
- The Municipal Manager at the Waterberg District Municipality
- The Municipal Manager at the Mogalakwena Local Municipality
- The Local Councilor at the Mogalakwena Local Municipality (Ward 7)
- Waterberg Biosphere Reserve – Dr. Rupert Barber

It was expected from I&APs to provide their inputs and comments by 19 September 2016. To date only comments have been received from adjacent land owners.

➤ Direct notification of surrounding land owners and occupiers

Written notices were provided to all surrounding land owners and occupiers on 19 August 2016. The Mogalakwena Local Municipality and other local property owners were contacted to obtain the contact details of the surrounding land owners; nine farmer's contact details could be obtained (refer to figure 9):

- Farm Wydehoek No. 216 – Hoogestraat Ondernemings
- Farm Appingendam No. 805 – South African Police Services
- Farm Groenvley No. 224 – Labuschagne Familie Trust
- Farm Groothoek No. 220 Mabote Safari Reserve
- Farm Zaaiplaats No. 223 – South African National Government
- Farm Zwartkop No. 219 – Mrs. Sandra Spangler
- A portion of the farm Zwartkop No. 219 – Mr. L. P. Du Plessis
- Farm Bacchus No. 215 – Vista Vitas Private Company
- Farm Voorwaarts No. 209 – Voorwaarts Safaris

The surrounding land owners were given the opportunity to raise comments by 16 September 2016. See Appendix F for written comments. For a list of surrounding land owners see Appendix D.

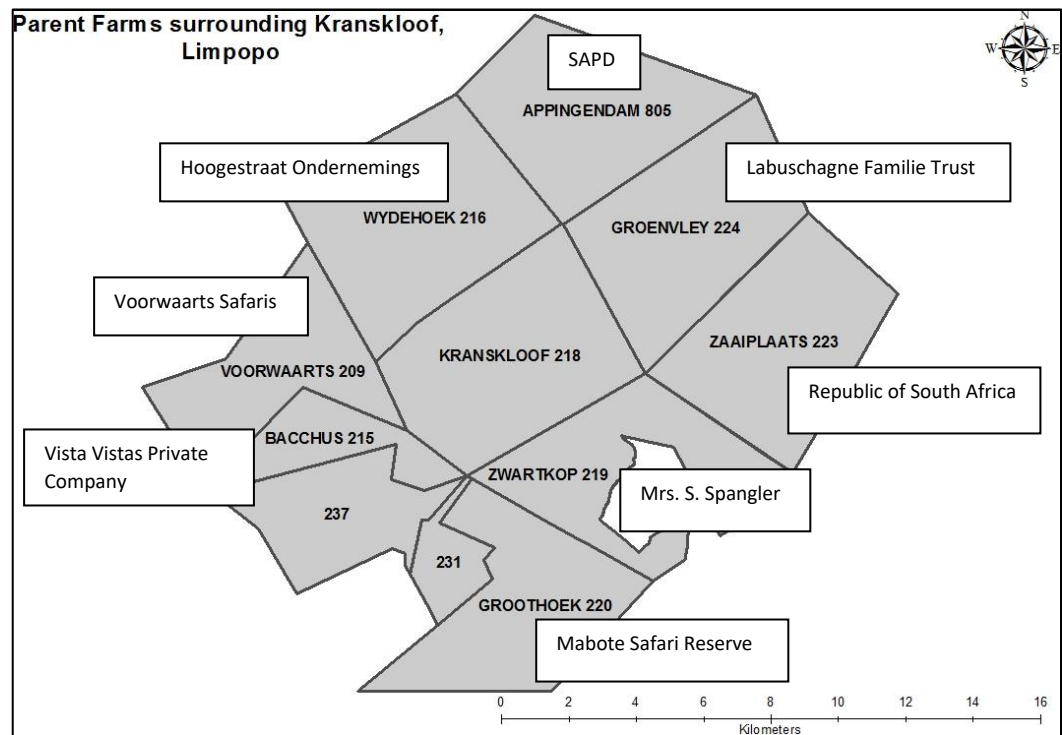


Figure 9: Surrounding Land Owners

➤ Circulation of the Draft Scoping Report

All registered interested and affected parties were provided the opportunity to comment on the draft scoping report. The comment period ran from the 30th of September to the 31st of October 2016. Refer to the Comments and Response Report, as well as written comments for a full description of comments received during the consultation process. The following registered I&APs and State Departments were informed of the availability of the Draft Scoping Report:

- Adjacent landowners
- Limpopo Department of Economic Development, Environment and Tourism (LDEDET)
- Limpopo Department of Water and Sanitation
- The Department of Water and Sanitation (DWS)
- Limpopo Department of Agricultural and Rural Development
- Limpopo Department of Rural Development and Land Reform
- Department of Agriculture, Forestry and Fisheries, Water and Irrigation Development
- Department of Public Works, Roads and Infrastructure
- The South African Heritage Resources Agency (SAHRA)
- The Municipal Manager at the Waterberg District Municipality
- The Municipal Manager at the Mogalakwena Local Municipality
- The Local Councilor at the Mogalakwena Local Municipality (Ward 7)
- Waterberg Biosphere Reserve – Dr. Rupert Barber

It was expected from I&APs to provide their inputs and comments within 30 days after receipt of the notification or copy of the Draft Scoping report.

➤ Circulation of the Draft Environmental Impact Report

All registered interested and affected parties were provided the opportunity to comment on the draft EIR. The comment period will be from the 14th of February to the 16th of March 2017. The following registered I&APs and State Departments were informed of the availability of the Draft EIR:

- Adjacent landowners
- Limpopo Department of Economic Development, Environment and Tourism (LDEDET)
- Limpopo Department of Water and Sanitation
- The Department of Water and Sanitation (DWS)
- Limpopo Department of Agricultural and Rural Development

- Limpopo Department of Rural Development and Land Reform
- Department of Agriculture, Forestry and Fisheries, Water and Irrigation Development
- Department of Public Works, Roads and Infrastructure
- The South African Heritage Resources Agency (SAHRA)
- The Municipal Manager at the Waterberg District Municipality
- The Municipal Manager at the Mogalakwena Local Municipality
- The Local Councillor at the Mogalakwena Local Municipality (Ward 7)
- Waterberg Biosphere Reserve – Dr. Rupert Barber

It is expected from I&APs to provide their inputs and comments within 30 days after receipt of the notification or copy of the Draft Environmental Impact Report (EIR) (refer to Appendix F for written comments received to date).

5.2.2 Consultation process

Regulation 41 requires that the municipality, relevant ward councillor and any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices D and E.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) *“A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.”* Issues raised by I&APs and consultation bodies. ????

Table 5.1 summarises the comments received from consultation bodies to date. The full wording and original correspondence is included in Appendix F.

Table 5.1: Issues raised by key consultation bodies

Organisation	Person	Written comment (see Appendix F)
Limpopo Department of Rural Development & Land Reform	Molatelo Makhuvha	On 22 September 2016, The Department informed the EAP via fax that the proposed property is privately owned and that the department does not have any jurisdiction over the property. However they noted that it should be verified whether there are land claims registered over the property.

Organisation	Person	Written comment (see Appendix F)
Waterberg District Municipality	Ben Greeff	On the 5 th of October 2016 Mr Greeff from the agricultural department of the Waterberg District Municipality requested a site visit. It was indicated that a site visit can be scheduled for early 2017 when more detailed information is available. A site visit was subsequently conducted with Mr Greeff on the 31 st of January 2017. Although Mr Greeff mentioned that the department will support the proposed activity in principle, the EAP still await the department's written comments.
Department of Agriculture, Forestry and Fisheries Water and Irrigation Development	Nomvuzo Mjadu	<p>On 25 October 2016 DAFF provided several comments with regards to the proposed project via email. These varied from:</p> <ul style="list-style-type: none"> - Land ownership – steps to address the needs of historical disadvantageous individuals. - Pump station – design - Freeboard – provision to be made for free board in final designs - Water Quality Concerns - Soil types and choice of irrigation system - Dam design - Impact of the dam on existing water levels - Additional authorisations - Key issues to be addressed in the EIA - Reserve determination - Water Quality - Positive impacts - Pipeline routes - Specialist studies - General – site notices <p>Please refer to Appendix F for a full description of the comments and responses.</p>
Adjacent land owner of the farm Wydehoek	Mr JJ Swanepoel	On 23 August 2016, Mr Swanepoel requested via fax to be registered as an interested and affected party and indicated that he opposes the proposed activity as he is of the opinion that it will have a

Organisation	Person	Written comment (see Appendix F)
		<p>significant impact on his water availability. Subsequently a consultation meeting was held with Mr Swanepoel on the 13th of October 2016 in order to try and address his concerns.</p> <p>Please refer to Appendix F for a full description of the comments and responses.</p>
Adjacent land owner of the farm Groenvley	Mr Ernst Labuschagne	On 12 September 2016, Mr Labuschagne informed the EAP that he has no objection against the proposed activity.
Adjacent land owner of the farm Voorwaarts	Mr Jan Fourie	On 15 September 2016, Mr Fourie indicated that he supports the proposed activity.
Adjacent land owner of the farm Groothoek	Mr Arno van Niekerk	On 22 September 2016, Mr van Niekerk indicated that he supports the proposed activity.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative.

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, hydrology and drainage, and climate and biodiversity. The area proposed for development mainly consists of mixed broadleaf Savanna woodland that varies in density and species composition, although the cropland development sites occur mostly on old cultivated fields that differ in terms of species compositions depending on the age of the old fields and stage of succession. However, it was noted from an ecological and conservation point of view that no red data faunal species occurred on site, but species of importance were found (refer to section 5.3.1.2) and the protected tree species *Combretum imberbe*, *Securidaca longipedunculata* and *Sclerocarya birrea* were found in the study area (refer to table 5.3. for the tree species identified).

5.3.2 Geology, soils and agricultural potential

According to Mucina and Rutherford (2006) the large southern and eastern parts of the area are underlain by granite of the Lebowa Suite and some granophyre of the Rашoop Granophyre Suite (both Bushveld Complex, Vaalian). In the north, the sedimentary rocks of the Waterberg Group (Makolien Erathem) are most important. Specifically, sandstone,

conglomerate and siltstone of the Alma formations and sandstone, siltstone and shale of the Vaalwater Formation. Well-drained, deep Hutton or Clovelly soils often with a catenary sequence from Hutton at the top Clovelly on the lower slopes and shallow, skeletal Glenrosa soils also occur.

5.3.3 Vegetation and landscape features

According to Mucina & Rutherford (2006) the farm portions are classified as part of the Central Sandy Bushveld (Plains) and Waterberg Mountain Bushveld vegetation types:

The Central Sandy Bushveld had a vulnerable conservation status in 2006 which has since been changed to least threatened, with less than 3% statutorily conserved and about 24% that has been transformed. The landscape and vegetation features of this vegetation type include low undulating areas, sometimes between mountains, and sandy plains and catenas supporting tall, deciduous *Terminalia sericea* and *Burkea africana* woodland on deep sandy soils and low, broadleaved *Combretum* woodland on shallow rocky or gravelly soils. Species of *Acacia*, *Ziziphus* and *Euclea* are found on flats and lower slopes on eutrophic sands and some less sandy soils, while the grass-dominated herbaceous layer have a relatively low basal cover on dystrophic sands.

The conservation status of the Waterberg Mountain Bushveld is least threatened with about 9% conserved and 3% transformed. The vegetation structure varies from rugged mountains with vegetation grading from *Faurea saligna* – *Protea caffra* bushveld on higher slopes through broad-leaved deciduous bushveld on rocky mid and foot slopes to a deeper sandveld in the valleys.

According to the Ecological Report (attached as Appendix H2) the study area can be largely classified in the north as undulating plains with drainage channels, while the area to the south of the plains are mountainous terrain. With the exception of occasional small anthills and erosion along the drainage channel of the non-perennial streams bisecting the site, the plains section of the study area does not exhibit significant topographical features. The only particular sensitive topographical features occur in the rocky mountainous regions on the steep, rocky slopes in the Waterberg Mountains.

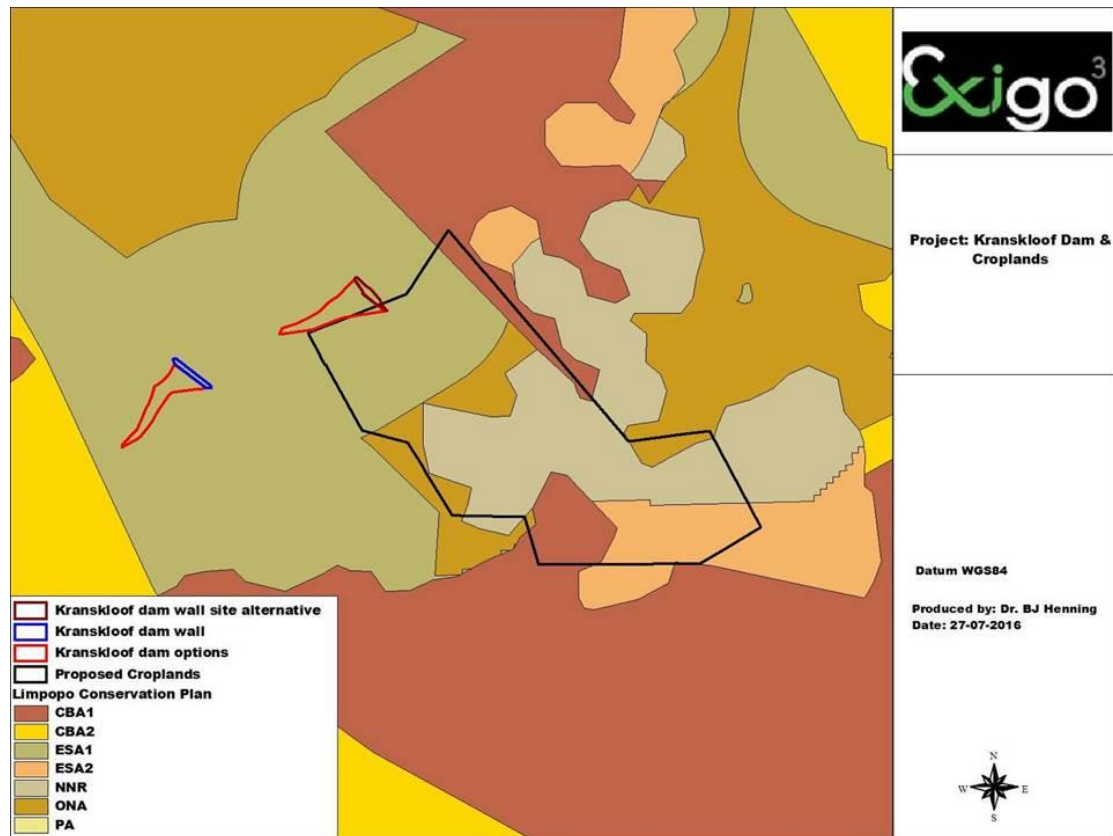


Figure 10: Ecological Support Area and Critical Biodiversity Area Map

After each vegetation unit found on site had been evaluated the following species of importance for the study area and listed as A2 endemics occur within the following habitat types of the Central Sandy Bushveld:

- *Adromischus umbraticola* subsp. *umbraticola* – a succulent perennial herb that grows in rock crevices in open areas in Central Sandy Bushveld;
- *Argyrobium megarrhizum* – a dwarf shrub that grows in both bushveld and grassland habitats; and
- *Frithia humilis* – a small, insignificant succulent growing in level sandy areas among rocky outcrops.

Red Data, Protected and Endemic Plant Species

No red data plant species were found on the site due to the state of the vegetation and physical environment of the larger area mostly not being suitable for any of the red data plant species that may be found in the area.

The region is known to have protected tree species. On the initial site investigation the Leadwood, Marula and Violet tree was found on site – refer to Table 5.3 and figure 9 below. The National Forest Act (no.84 of 1998: National Forest Act, 1998) provides a list of tree species that are considered important in a South African perspective as a result of scarcity, high utilization, common value, etc. In terms of the National Forest Act of 1998, these tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except

under license granted by DWAF (or a delegated authority). Obtaining relevant permits are therefore required prior to any impact on these individuals.

Table 5.3. List of protected tree species found in the area

Tree species	Habitat
<i>Combretum imberbe</i>	Floodplains along drainage channels / clayey soils
<i>Securidaca longipedunculata</i>	Deep sandy soils
<i>Sclerocarya birrea</i>	Sandy soils on plateaus and undulating plains



Figure 11: Marula, Violet and Leadwood trees

Alien Invasive Species

Invasive alien plants pose a direct threat not only to South Africa's biological diversity, but also to water security, the ecological functioning of natural systems and the productive use of land. They intensify the impact of fires and floods and increase soil erosion. Of the estimated 9000 plants introduced to this country, 198 are currently classified as being invasive. It is estimated that these plants cover about 10% of the country and the problem is growing at an exponential rate.

The following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014) (refer to Table 5.4 below):

Table 5.4: List of exotic plant species of the study area

Species	Category
<i>Cereus peruvianum</i>	1b
<i>Datura stramonium</i>	1b
<i>Eucalyptus camaldulensis</i>	1b
<i>Jacaranda mimosifolia</i>	1b
<i>Opuntia ficus-indica</i>	1b
<i>Opuntia stricta</i>	1b
<i>Verbena bonariensis</i>	1b

Species	Category
<i>Xanthium strumarium</i>	1b

An important aspect relating to the proposed development should be to protect and manage the biodiversity (structure and species composition) of the vegetation types which are represented on the proposed development site. Vegetation removal should be kept to the footprint areas of the proposed development. The unnecessary impact on the surrounding woodland areas outside the development area should be avoided as far as possible.

5.3.4 Hydrology and drainage

The study area is located within Limpopo Water Management Area (WMA), and is located in the Quaternary Catchment Areas (QCA) A62A and A62J. The area exhibits a weakly dendritic drainage pattern, mostly due to the very gentle slope. Storm water generally collects in areas where the natural topography has been disturbed, such as foot paths or dirt tracks, with surface water eventually draining into roads further downstream within Lebowakgomo and other townships. The main drainage channel includes the Mokamole River and its tributaries draining the proposed development area. These drainage channels form tributaries of the regionally important perennial Mogalakwena River that lies to the north of the site. It must be noted that stream flow along the drainage channels occurs only during and directly after heavy precipitation events, and may continue for a short period directly after a particularly good rainy season. Small dams are located along the stream channels. Another feature of the southern section of the project area, as well as the certain sections of the area earmarked for construction of the dam, is the presence of wetlands or pans, they are however located more than a kilometre from the proposed site for croplands.

According to the Riparian and Wetland Report (attached as Appendix H3) the smaller, more defined drainage channels on site are considered as narrow water courses with very little riparian woodland of significance identified surrounding the small water courses, while the broad water courses have more developed riparian woodland. The water courses identified on site are characterised as shallow sandy channels not more than a few feet wide representing tributaries of the Mokamole River.

No buffer zone would be needed around the smaller channels considering that the smaller channels merely function as carriers of water flow. In the case of the proposed development, the non-perennial drainage channels will be crossed and unavoidable impact will occur. Strict mitigation should be applied in this area.

Water courses

The non-perennial channels that occur throughout the project area can be described as water courses or channels. The channels are mostly defined with riparian woodland along its edges dominated by species such as *Acacia karroo*, *Ziziphus mucronata* and *Combretum hereroense*. The more defined water courses are classified as channels.

Instream habitat / Channel Zone:

Section 1.1 (xi) of the National Water Act (1998) described "instream habitat" as the area which includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse. The water courses on the site are non-perennial systems and the actual channels form a sandy riverbed. This is the result of deposition of sand in the riverbed as a result of sediment transport imbalances that occur upstream. Sediment transport imbalances have been caused by changes in the river catchments such as increased sediment yields and flood peak attenuation due to road crossings and small dam construction in the water courses upstream of the site. Historically floods used to flush river systems to maintain the long-term sediment balance in the river system, but with reduced flood peaks, sediment transport capacities in the rivers are reduced and flushing efficiency decreased. In the case of the water course on the site, the lack of flushing of the system has caused severe sedimentation in the system over the years. The instream channel is characterized by a few hygrophilous grass species and sedge species in some areas where water collect.

Riparian zone

Riparian Habitat are described by the National Water Act (1998) Section 1.1 (xxi) as follows: "*Riparian habitat' includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas*". The riparian zone of the tributaries represents open woodland similar to the surrounding vegetation and is therefore not unique. No specific buffer zone would be needed around these small water courses. The layout will impede on the water courses, although specific mitigation measures should be implemented to ensure the flow regime and functionality of the water courses are kept intact.

Floodplain River and exoreic depressions

The Mokamole River in which the dam will be built is classified as a floodplain river. A floodplain, is a flat or nearly flat land adjacent a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge. The vegetation associated with the floodplain is mostly sedges and bulrushes depending on the depth of the water and the substrate. Species such as *Phragmites australis*, *Miscanthus junceus*, *Imperata cylindrica*, *Schoenoplectus corymbosus*, *Juncus effuses* and *Leersia hexandra* mostly grow along the shallow edges of the dam on a sandy substrate.

In the case of the study area the floodplain adjacent to the Mokamole River has some areas with patchy riparian woodland dominated by the woody species *Syzigium guineense* with the occasional specimen of *Catha edulis* also documented with *Terminalia sericea* and *Faurea saligna*. Small depressions have formed on the floodplains where water "takes a short-cut" over the floodplain during flood events.

A few small dams were created by construction of weirs in the Mokamole River that creates deeper pools in the Mokamole River. This impacted the river downstream through erosion, while the areas upstream became clogged with sediment. The dams are classified as exorheic depressions. A depression is classified as a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within

which water typically accumulates. Dominant water sources are precipitation, ground water discharge, interflow and (diffuse or concentrated) overland flow. For 'depressions with channelled inflow', concentrated overland flow is typically a major source of water for the wetland, whereas this is not the case for 'depressions without channelled inflow'. Dominant hydrodynamics are (primarily seasonal) vertical fluctuations. The edges of the man-made dams are mostly dominated by *Phragmites australis* and *Miscanthus junceus*.

Valley bottom wetlands

One type valley bottom wetlands are associated with the study area as classified by Sanbi (2009) namely unchannelled valley bottom wetlands. Unchannelled valley-bottom wetland can be described as: a mostly flat valley-bottom wetland area without a major channel running through. This wetland type is characterised by an absence of distinct channel banks and the prevalence of diffuse flows, even during and after high rainfall events. Water inputs are typically from an upstream channel, as the flow becomes dispersed, and from adjacent slopes (if present) or groundwater. Water generally moves through the wetland in the form of diffuse surface flow and/or interflow (with some temporary containment of water in depressional areas), but the outflow can be in the form of diffuse or concentrated surface flow. Infiltration and evaporation from unchannelled valley-bottom wetlands can be significant, particularly if there are a number of small depressions within the wetland area. Horizontal, unidirectional diffuse surface-flow tends to dominate in terms of the hydrodynamics.

The vegetation structure of the valley bottom wetlands is mostly closed grassland. The most abundant and most conspicuous plant species is hygrophilous grasses such as *Sporobolus africanus*, *Miscanthus junceus*, *Hyperthelia dissoluta*, *Andropogon eucomis*, *Eragrostis gummiflua* and *Imperata cylindrica*. Other plants associated with valley bottom channels are *Juncus effusus* and *Verbena bonariensis*.

Hillslope seep wetlands

This vegetation unit represent the grassland areas classified as 'Hill slope Seep Wetlands' mostly adjacent to the floodplain river and along slopes where the bedrock is closer to the surface. The seep areas either feed the floodplain river directly through channelled outflow or occur isolated along a slope. A Hill slope seep is classified as a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Water inputs are primarily from precipitation that that enters the wetland from an up-slope direction in the form of subsurface flow. Water movement through the wetland is mainly in the form of interflow, with diffuse overland flow ('sheetwash') often being significant during and after rainfall events. In this hill slope seep the water leaves the 'Hill slope seep with channelled outflow', therefore directly connected to a water course (SANBI, 2009). The vegetation associated with the seep wetland varies according to various factors such as land-use and soils. The most common grass species associated with hillslope seep wetland is *Eragrostis gummiflua*, *Imperata cylindrica*, *Verbena bonariensis*, *Terminalia sericea* and *Faurea saligna* (Photograph 5). Where degradation such as overgrazing has occurred the dwarf shrub *Stoebe vulgaris* completely dominate the lower herbaceous stratum as observed on the seeps associated with old fields on seeplines. The overgrazing further caused sheet erosion along hillslope seeps of this area.

According to the Hydrological study (attached as Appendix H4) flows within the Mokamole reach are currently modified due to numerous weirs, low water crossings, and instream dams. The presence of these structures reduces natural flooding of the system. The 25 km reach of the Mokamole River, has an average slope of 1.9%, and the slope associated with the project area is 6.5%. The high gradient of the upper reaches of the Mokamole system, coupled with bedrock and cobbled instream habitats, results in a system which natural flushes during periods of high rainfall, and a low base flow. The lack of flushes in the system is apparent, and can be attributed to instream impoundments and constructions.

5.3.5 Climate

Climate in the broad sense is a major determinant of the geographical distribution of species and vegetation types. However, on a smaller scale, the microclimate, which is greatly influenced by local topography, is also important. Within areas, the local conditions of temperature, light, humidity and moisture vary greatly and it is these factors which play an important role in the production and survival of plants (Tainton, 1981). In terrestrial environments, limitations related to water availability are always important to plants and plant communities. The spatial and temporal distribution of rainfall is very complex and has great effects on the productivity, distribution and life forms of the major terrestrial biomes (Barbour et al. 1987). Furthermore, aspects like topography, slope and altitude may further result in differences in precipitation and water availability to plants within the study area.

The site falls within the summer rainfall region with very dry winters and frost that occurs fairly infrequent during winter (4 mean frost days per annum). The study area has a mean annual precipitation of 518mm. The rainy season extends over the summer months from October through to April, with the highest rainfall occurring during December and January. Precipitation is usually associated with thunderstorms. Mean monthly temperatures for the area is 37.3°C and -0.9°C for January and June respectively. The temperatures are very mild and stable with a minimum variance between maximum and minimum making the area an ideal living place with regard to temperature.

5.3.6 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

5.3.6.1 Ecology

According to the Ecological Study conducted for the site (Appendix H2), large and medium sized mammals that occurred historically in the larger study area, are absent from the area, owing to anthropogenic impacts in recent centuries. Most of these larger antelope and predator species are today confined to game reserves and national parks in South Africa and therefore will not occur naturally in the study area. This loss of large species means that the mammal diversity at the site is far from its original natural state not only in terms of species richness but also with regards to functional roles in the ecosystem.

According to the Aquatic and Ecological Flow Assessment (attached as Appendix H5) the upstream site was characterised by diverse instream habitat and flow regimes. Good stones

in and out of current, gravel, and sand were present. Marginal vegetation was limited and aquatic vegetation was absent during the survey. Flow regimes included pools, runs, and riffles. Slow deep, slow shallow, and fast shallow velocity depth classes were present. Water clarity was high. The downstream site was characterised by slow flowing waters over stones and sand substrate. Good stones and marginal vegetation were present, predominantly out of current. Stones in current was limited to two sections totalling 12 m of the river section. A fine silt was present and inundated instream, habitat. Water clarity was low.

The species richness within the Sub-Quaternary Reach (SQR) is considered high, and furthermore the species within the reach are generally considered to require largely unmodified physico-chemical conditions to survive and breed. Furthermore, species in the reach require flow during all phases of their life-cycle, often preferring fast flowing clear waters for breeding and survival.

The conservation status of the indigenous fish species was assessed in terms of the IUCN Red List of Threatened Species. Based on this assessment a single species of special concern occur within the reach, *Oreochromis mossambicus* (Refer to Figure 12). *Oreochromis mossambicus* (Mozambique tilapia) is currently listed as Near Threatened (NT). The most serious threat facing *O. mossambicus* is hybridization with the rapidly spreading introduced species *Oreochromis niloticus* (Nile tilapia). Hybridization has already been documented throughout the northern part of the species' range, with most of the evidence coming from the Limpopo River catchment. Given the rapid spread of *O. niloticus* it is anticipated that *O. mossambicus* will qualify as threatened under Criterion A due to rapid population decline through hybridization. *Oreochromis mossambicus* occurs in all but fast flowing waters and is tolerant of high salinities. It feeds on algae and invertebrates. The clearest morphological indicator of hybridization between *O. mossambicus* and *O. niloticus* is barring on the caudal fin. No traces of hybridization were recorded amongst the *O. mossambicus* recorded in the project area.



Figure 12: *Oreochromis mossambicus* (Mozambique tilapia)

The Integrated Habitat Assessment System (IHAS) index was developed by McMillan (1998) for use in conjunction with the SASS5 protocol. According to the IHAS results, habitat availability for aquatic macroinvertebrates was Good at the Upstream site, and Adequate at the Downstream site. The upstream site presented diverse flows over stones, gravel and sand substrate. Limited in current marginal vegetation diversity was observed during the study, however out of current marginal vegetation was abundant and diverse. No aquatic vegetation was present at the site.

5.3.7 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.7.1 Socio-economic conditions

The Mogalakwena Local Municipality is located in the John Waterberg District Municipality of the Northern Cape Province. According to Census 2011, Mogalakwena Municipality contains over 45% of the Waterberg district 's population with a total population of 307 682 and 79 396 households. The Africans are in majority (295 796) and constitute approximately 96% of the total Mogalakwena municipality population. The white population is 9274, coloured population is 403 and the Indian/Asian population is 1646. Just over 53% of the population is female. The population growth rate was estimated at 0.31% in 2011.

Of the population aged 20 years and older, 18,2% completed/have some primary education, 35,6% have secondary education, 21,7% have completed matric, 8,5% have some form of higher education, and 16% have no form of schooling. According to Census 2011, there are 17 525 households of which 42,3% have access to piped water in the yard, while only 20,2% of households have access to piped water in their dwelling which is the lowest figure in the Waterberg District Municipality. Of the 78 647 economically active (employed or unemployed but looking for work) people in the district, 40,2% are unemployed. The unemployment rate of Mogalakwena is almost double that of the other municipalities in the district. This could be attributed to a reduction in mining activities in recent years. Of the 39 515 economically active youth (15–35 years) in the area, 51,7% are unemployed, which is also the highest in the district.

Agricultural activities include farming of cattle, poultry, game and citrus. Mining activities include platinum, clay (for bricks), granite, limestone, fluorspar, and coal.

5.3.7.2 Cultural and heritage aspects

Special attention was given to the identification of possible cultural or heritage resources on site. The initial site investigation concluded that four (4) heritage resources located on the site earmarked for development. According to the Archaeological Impact Assessment (attached as Appendix H1) the history and archaeology of the larger Waterberg region is well known and the landscape is primarily well known for the occurrence of Iron Age farmer and rock art occurrences. Large portions of the Kranskloof property has been transformed by historic and more recent agriculture and human settlement but heritage resources ranging from medium-low to high significance were noted within development areas of the proposed Kranskloof dam and agricultural lands development project. These resources were uniquely coded **EXIGO-KKD-IAxx** (Exigo Kranskloof Development Iron Agexx), **EXIGO-KKD-HPxx** (Exigo Kranskloof Development Historical Periodxx) and **EXIGO-KKD-BPxx** (Exigo Kranskloof Development Burial Placexx) (refer to table 5.5.).

Table 5.5: Heritage sites locations

Site Code	Short Description	Coordinate S E	Mitigation Action
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EXIGO-KKD-IA01	Iron Age Farmer Activity Site	S24.07085° E28.66177° S24.07159° E28.65843°	<p>Avoidance:</p> <ul style="list-style-type: none"> - 100m conservation buffer. - General site monitoring by informed ECO. <p>Site Impact:</p> <ul style="list-style-type: none"> - Limited Phase 2 investigation (permitting required). - Destruction permitting.
EXIGO-KKD-IA02	Single lower grindstone (Iron Age farmer Period).	S24.05960° E28.64588°	General site monitoring by informed ECO
EXIGO-TRU-IA03	Single lower grindstone (Iron Age farmer Period).	S24.05753° E28.65217°	
EXIGO-TRU-IA04	Single lower grindstone (Iron Age farmer Period).	S24.06369° E28.65584°	
EXIGO-TRU-HP01	Colonial (Historical Period) occupation site.	S24.05880° E28.64907°	
EXIGO-TRU-BP01	Burial Site	S24.05880° E28.64907°	<p>Avoidance:</p> <ul style="list-style-type: none"> - Avoidance & redesign development to avoid the heritage resource, 100m conservation buffer, fence burial place and apply access control, site monitoring, site management plan implementation. <p>Site Impact:</p> <ul style="list-style-type: none"> - Relocation of burials and documentation of site, full social consultation with affected parties, possible conservation management and protection measures. Subject to authorisations and relevant permitting from heritage authorities and affected parties.

The Iron Age Farmer Period

A small Iron Age Farmer Period site was documented near the southern border of the farm Kranspoort. At the site, which measures approximately 50m x 20m, a number of upper and lower grindstones and a single undecorated potsherd fragment were noted. No subsurface deposits were noted and features signifying a residential function such as middens and hut floor remains are generally absent from the site. Lower grindstones were documented in isolated locations in a central portion of the farm Kranspoort. Each of the single grindstones occurs in areas that have previously been used as agricultural lands and it seems that no site context for the features exists. As such, no subsurface deposits or associated material culture were noted at these localities.

Colonial Period and recent times

An occupation site dating to the Colonial (Historical) Period was documented in a central portion of the farm Kranspoort. At the site, a deep ash midden containing Colonial Period material culture, a number of irregular stone structures and a grave (**Site EXIGO-KKD-BP01**) were noted. A number of upper grindstones occur at the site which indicates a possible continuation of Iron Age farming technologies into Colonial Period agricultural activities.

Graves

A single burial site was located in the study area. In the rural areas of the Limpopo Province graves and cemeteries sometimes occur within settlements or around homesteads but they are also randomly scattered around archaeological and historical settlements. The probability of additional and informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface.

The single grave occurs in a central portion of the farm Kranspoort in association with **Site EXIGO-KKD-HP01**. The burial, which probably dates to the Colonial Period, is demarcated with an elongated stone cairn with upright rocks placed at the head and foot ends. No further grave dressing or goods were noted. The burial site, which is of high heritage significance, is located within areas demarcated for centre-pivot irrigation fields and impact on the site is anticipated.

The following figure illustrates the locations of the above-mentioned sites:

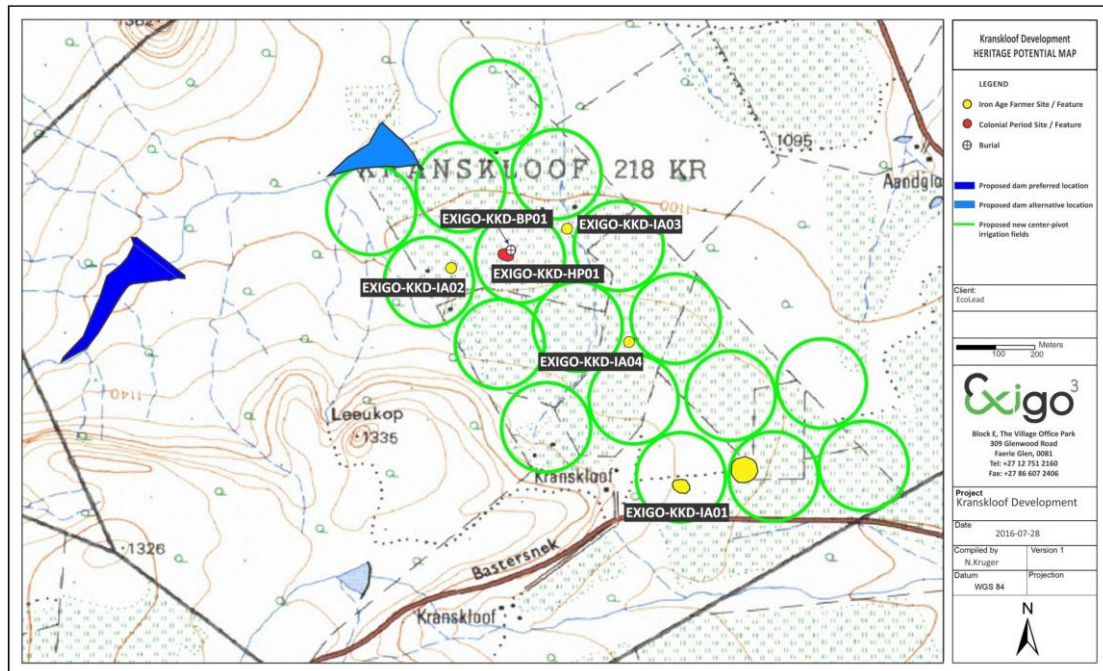


Figure 13: Topographical map indicating locations of all heritage sites found

Palaeontology

Even though the Kranskloof project subject to this assessment occur in transformed areas, a Palaeontological Impact Assessment and / or Desktop Study should be conducted for areas where bedrock will be impacted on, pending a final decision from SAHRA in this regard. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the dam and croplands are largely dependent on technical and environmental factors such as proximity to a river, topography of the site, drainage patterns, storage capacity, ground formations and land capability. the Remaining Extent and Portion 1 of the Farm Kranskloof No. 218 where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- Proximity to a river: The Mokamole River runs through the Remaining Extent and Portion 1 of the farm Kranskloof and is adjacent to the proposed croplands, which makes this the ideal position for the proposed irrigation dam.
- Topographic conditions and ground formations: A detailed survey was conducted which indicated that the contours, flow pattern, storage capacity and ground formations of the area proposed for the dam, are ideal when taking storage and catchment yield and solubility of the soil into consideration.

- Land capability: The agricultural potential in terms of crop production of the site is moderate, but under irrigation the expected yield of the area will dramatically increase.

It is evident from the discussion above that the Remaining Extent and Portion 1 of the Kranskloof No. 218 may be considered favourable and suitable in terms of these site characteristics. A detailed survey conducted indicated that the alternative site is not suitable for construction of dam in terms of the topography, storage capacity, drainage patterns etc. Therefore, no alternatives will be considered.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

In conclusion, the preferred alternative entails the following:

- The development of the irrigation dam and croplands on the Remaining Extent and Portion 1 of the farm Kranskloof No. 218, Limpopo Province - refer to Section 2 of this report.

The preferred layout of the dam and croplands on the Remaining extent and Portion 1 of the farm Kranskloof No. 218 is included as an appendix to this report. It may be concluded that no other alternatives are considered during the EIA process.

6 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

Appendix 3. (3)(h) An EIR (...) must include-

(h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –

(v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (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; and

(viii) the possible mitigation measures that could be applied and level of residual risk

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(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;

(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;

6.1 SCOPING METHODOLOGY

The contents and methodology of the scoping report aimed to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on the 18th of August 2016. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	X			A dam wall will be built in the Makomole River located on Portion 1 of the farm Kranskloof No. 218.
II. A conservation or open space area	X			The site is located in a Critical Biodiversity Area (CBA) and Ecological Protected Area (EPA).
III. An area that is of cultural importance	X			According to the Archaeological Impact Assessment (refer to Appendix H1) six (6) heritage objects were found on the proposed crop fields site, which consisted of Iron Age Farmer and Lower Grindstone activities and Colonial occupation and burial site.

QUESTION	YES	NO	Un-sure	Description
IV. Site of geological significance		✗		None.
V. Areas of outstanding natural beauty		✗		None.
VI. Highly productive agricultural land		✗		None.
VII. Floodplain	✗			The dam wall will be built in the floodplain.
VIII. Indigenous forest		✗		None.
IX. Grass land		✗		None.
X. Bird nesting sites		✗		None.
XI. Red data species		✗		None.
2. Will the project potentially result in potential?				
I. Removal of people		✗		None.
II. Visual Impacts		✗		None.
III. Noise pollution		✗		Construction activities will result in the generation of noise over a period of months. The noise impact is unlikely to be significant.
IV. Construction of an access road		✗		Ready access to the farm exists.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		✗		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.		✗		None.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	✗			A maximum of 450m ³ water will be utilised per day. Less water will be used during the rainy season or rainy days and different amount of water is used for the different phases of the crop cycle.
VIII. Job creation		✗		Employment opportunities will be created during the construction and operational phases.
IX. Traffic generation		✗		None.
X. Soil erosion		✗		None.
XI. Installation of additional bulk telecommunication transmission lines or facilities		✗		None.
3. Is the proposed project located near the following?				

QUESTION	YES	NO	Un-sure	Description
I. A river, stream, dam or wetland	X			The dam wall will be located in the Makomole River and the croplands within close proximity to the river. No Wetlands are located on/in close proximity to the proposed site.
II. A conservation or open space area		X		None.
III. An area that is of cultural importance		X		None.
IV. A site of geological significance		X		None.
V. An area of outstanding natural beauty		X		None.
VI. Highly productive agricultural land		X		None.
VII. A tourist resort		X		Tourist activities taking place on the farm Wydehoek adjacent to the proposed site.
VIII. A formal or informal settlement		X		None.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in depth assessment during the EIA process. An indication is provided of the specialist studies which was conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor:** Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor:** Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts:** Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation:** Impacts need to be mitigated to minimise the effect on the environment.

Table 6.2: Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
CONSTRUCTION PHASE															
<p><u>Activity 19(i) (Regulation 983):</u> <i>"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse."</i></p> <p><u>Activity 13 (Regulation 984):</u> <i>"The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more."</i></p> <p><u>Activity 15 (Regulation 984):</u> <i>"The clearance of an area of 20 hectare or more of indigenous vegetation..."</i></p> <p><u>Activity 16 (Regulation 984):</u> <i>"The development of a dam where the highest part of the</i></p>	<p><u>Site clearing and preparation</u> Certain areas of the site will need to be cleared of vegetation.</p> <p><u>Civil works</u> The main civil works are:</p> <ul style="list-style-type: none"> Excavation, layering, levelling and compaction of area. Construction of the dam wall. Construction of road network and pump station. 	<p style="text-align: center;">BIOPHYSICAL ENVIRONMENT</p>	<p>Fauna, Flora & Aquatic Habitats</p>	<ul style="list-style-type: none"> Loss or fragmentation of habitat for faunal and floral species. Destruction of habitat for faunal and floral species. Loss of instream habitat. Loss of faunal and floral species of conservation significance. Spread of Alien Invasive species. Negative effect of human activities on flora. Loss of fisheries and rare species. 			S	P	D	IR	SL	Yes	<p>- The removal of the indigenous trees and shrubs should only occur on the footprint area of the dam wall and croplands. No vegetation should be cleared on adjacent areas.</p> <p>- Conduct flora species search and rescue efforts before ground clearing of land for dam wall construction and croplands in order to reduce negative impacts on species of concern.</p> <p>- All cleared areas on dam walls and direct surroundings should be rehabilitated.</p> <p>- Release of water from the dam downstream to allow normal ecosystem functioning on a regular basis.</p> <p>- Limit pesticide use to non-persistent, immobile pesticides and apply in</p>	M	<p>Ecological Report; Riparian and Wetland Report; and Aquatic and ecological flow assessment</p>

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
<p><i>dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high water mark of the dam covers an area of 10 hectares or more."</i></p> <p>Activity 4 (a)(ii)(ee) (Regulation 985):</p> <p><i>"The development road wider than 4 metres within reserve less than 13.5 metres (a) in Limpopo (ii) outside urban areas, in (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority in bioregional plans."</i></p> <p>Activity 12 (a)(ii) (Regulation 985):</p> <p><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</i></p>												<p>accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.</p> <p>- Work in rivers, streams and riparian zones should preferably be done during the low flow season.</p> <p>- Operate dams to suit downstream requirements.</p> <p>- Maintain present water quality by controlling water levels above the maintenance dry levels and keeping fine bottom sediments settled;</p> <p>- Control of any aquatic water plants that might be brought into the ecosystem by avifauna that utilize the dam for breeding and foraging.</p>		
	Air	<ul style="list-style-type: none"> Air pollution due to the increase of dust generated by construction activities. 			S	S	D	CR	NL	Yes	<p>- Implement standard dust control measures on access roads to the construction sites of the dams and croplands, including periodic spraying and chemical dust suppressants of construction areas and access roads, and ensure that these are</p>			-

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
<p>accordance with a maintenance management plan (a) in Limpopo (ii) within critical biodiversity areas identified in bioregional plans.”</p> <p>Activity 14 (iv)(xii)(a)(a)(ii)(ff) (Regulation 985):</p> <p>“The development (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size and (xii) infrastructure or structures with a physical footprint of 10 square metres or more Where such development occurs – (a) within a watercourse (a) in Limpopo (ii) outside urban areas, in (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”.</p>														
	Soil	<ul style="list-style-type: none"> • Soil degradation, including erosion & Sedimentation. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills). 										Yes	- Concurrent rehabilitation of disturbed areas should be an ongoing process of all exposed areas on the dam footprint and dam wall construction sites. - Cover disturbed soils as completely as possible, using vegetation or other materials. - Protect sloping areas and drainage channel banks downstream and upstream of the dam footprint areas that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. - Repair all erosion damage	L

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													as soon as possible to allow for sufficient rehabilitation growth. - Gravel roads must be well drained in order to limit soil erosion. - Keep cut and fill slopes as flat as possible and well covered (stabilized) with vegetation to minimize slumping as well as minimize surface erosion. Well-cemented but highly erosive soils may best resist surface erosion with near-vertical slopes that minimize the surface area exposed to erosion.		
		Ground water	<ul style="list-style-type: none"> Drying up of drinking and irrigation wells. Reduced base flow/wetlands. Impact on ground water quality. 			L	P	Pr	IR	CL	Yes	<ul style="list-style-type: none"> Define and enforce abstraction regulations. Monitor ground water levels. Monitor ground water quality from surrounding boreholes. Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or 		L	-

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													chemicals should be removed from the site and discarded in an environmental friendly way. The Environmental Control Officer (ECO) should enforce this rule rigorously.		
		Surface water	<ul style="list-style-type: none"> • Spillages of harmful substances or other upstream sources. • Impacts on river flow and drainage. • Destruction of wetlands and loss of their associated functions. • Impact on surface water quality. • Flow modifications. • Depletion of water run-off for downstream users. • Increased sedimentation. 			L	L	D	IR	CL	Yes	<ul style="list-style-type: none"> - All construction vehicles should be inspected for oil and fuel leaks regularly and frequently. - Vehicle maintenance will not be done on site except in emergency situations in which case mobile drip trays will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. - The vegetation associated with the water courses and wetlands up and downstream of the dams has a high sensitivity with a high conservation priority. No major alteration of these important corridor areas is recommended. - Any future work in rivers, streams and wetlands (drainage crossings etc.) should preferably be done 		L	Riparian, Wetland Report, & Aquatic and Ecological Flow Assessment

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													during the low flow season. - Perform upstream and downstream surface water quality monitoring. - Maintain present water quality by controlling water levels above the maintenance dry levels and keeping fine bottom sediments settled.		
		Local unemployment rate	<ul style="list-style-type: none"> The creation of local employment and business opportunities, skills development and training. 	+		P	S	D	I	N/A	Yes	- Where reasonable and practical, service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.	L	-	
		Visual landscape	<ul style="list-style-type: none"> Potential visual impact on residents of farmsteads and motorists in close proximity to proposed development due to dust during construction. 	-		L	S	D	CR	NL	Yes	- Dust suppression will play an important role to minimise the visibility of dust. - Contractors must avoid using roads not earmarked for the development. - Good housekeeping should be implemented. - Proper rehabilitation of disturbed areas.	L	-	
		Traffic volumes	<ul style="list-style-type: none"> Increase in construction vehicles. 	-		P	S	Pr	CR	NL	Yes	- The development may commence without	L	-	
		SOCIAL/ECONOMIC ENVIRONMENT													

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													influencing the levels-of-service for the local road network. - The contractor should be held responsible for repairing damage caused to the roads during the construction phase of the project.		
		Health & Safety	<ul style="list-style-type: none"> Air/dust pollution due to construction. Road safety due to construction vehicles. Impacts associated with the presence of construction workers on site and in the area. Influx of job seekers to the area. Increased risk of veld fires. 	-		L	S	Pr	PR	ML	Yes	- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced.	L	-	
		Noise levels	<ul style="list-style-type: none"> The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site. 	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. - Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have	L	-	

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													effective exhaust mufflers.		
		Tourism industry	<ul style="list-style-type: none"> The proposed activities might have an impact on tourism in the area, as a result of water depletion for downstream game farmers. 	-		L	S	D	CR	NL	Yes	<ul style="list-style-type: none"> During construction care should be taken to ensure that the volume of water allocated for downstream users are not impacted on or depleted. Conditions contained in the water use licence to be adhered to. 	L	-	
		Heritage resources	<ul style="list-style-type: none"> Removal or destruction of archaeological and/or paleontological sites. Removal or destruction of buildings, structures, places and equipment of cultural significance. 	-		L	P	D	IR	CL	Yes	<ul style="list-style-type: none"> Redesign infrastructure to avoid the proposed conservation buffer. Implement a heritage conservation buffer of at least 100m around the heritage receptor, where possible redesign infrastructure to avoid the heritage resource and the proposed conservation buffer. Site monitoring: Regular examination of trenches and excavations in this area in order to avoid the destruction of previously undetected heritage remains. Destruction permitting for the site if, and when 	L	Heritage	

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
			<ul style="list-style-type: none"> Removal or destruction of graves and burial grounds. 										required.		Impact Assessment & Palaeontological Heritage Assessment
													- Implement a strict heritage conservation buffer of at least 100m around the grave, redesign infrastructure to avoid the heritage resource and the proposed conservation buffer. Fence the burial place and apply access control. Implement a site management plan detailing strict site management conservation measures. - Site monitoring: Regular examination of trenches and excavations in this area in order to avoid the destruction of previously undetected burials or heritage remains. If burials were to be retained with no infrastructure redesign a strict site management and monitoring protocol will be required (planning, construction phases). - Permits shall be obtained from the SAHRA should the proposed site affect any heritage sites or if any	L	

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS		SPECIALIST STUDIES / INFORMATION		
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures		Level of residual risk	
												heritage sites are to be destroyed or altered.			
OPERATIONAL PHASE															
	<p>The key components of the proposed project are described below:</p> <ul style="list-style-type: none"> <u>Irrigation Dam</u> - The proposed dam will be constructed in order to capture run-off water during the rainy season, which will be used to complement existing irrigation activities on the farm and to increase capacity for future planned cultivation. The dam wall will have a length of approximately 380m and a width of approximately 41m, with a surface water cover of approximately 9 hectares. <u>Dam wall</u> – The dam wall will be constructed from material sourced from the area (clay, rock and gravel) and will have a height of 	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> Loss or fragmentation of habitat for faunal and floral species. Destruction of habitat for faunal and floral species. Loss of faunal and floral species of conservation significance. Establishment of alien invasive plant species on site. Loss of fisheries and rare species. Loss of instream habitat due to changes in channel structure and conditions. 								Yes	<ul style="list-style-type: none"> Release of water from the dam downstream to allow normal ecosystem functioning on a regular basis. Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Large trees and other debris should be left within the proposed impoundment area to provide habitat for aquatic biota within the system. Contamination of the river system with unset cement or cement powder should be negated as it is detrimental to aquatic biota. An aquatic monitoring survey needs to be conducted after the construction activities so that impacts can be assessed and 	M	Ecological Report; Aquatic and Ecological Flow Assessment

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
	approximately 12m and a width of approximately 391m.												adaptive management practices implemented if necessary.		
	<ul style="list-style-type: none"> <u>Pumping station</u> – Distribution of water to the farming units will make use of a 5m x 5m pumping station. 	Aquatic ecology	<ul style="list-style-type: none"> Creation of additional wetland habitats. Dam provides a breeding area for aquatic species. 		+	L	L	D	I	N/A	Yes	- Monitor the water levels on a regular basis to ensure that water levels are sufficient for breeding of aquatic species.	+	Aquatic and ecological flow assessment	
	<ul style="list-style-type: none"> <u>Cultivation area</u> – Approximately 340Ha consisting of several pivots will be used for cultivation of various crops and vegetables. The area earmarked for cultivation consists mainly of historic disturbed and cultivated land, but also includes natural vegetated areas. 	Air quality	<ul style="list-style-type: none"> The proposed development will not result in any air pollution during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<ul style="list-style-type: none"> <u>Roads</u> –An internal site road network will also be required to provide access to the proposed dam. The road will have a width of ~5m 	Soil	<ul style="list-style-type: none"> Degradation of irrigated land due to salinization, alkalization, waterlogging and soil acidification. 			L	L	D	PR	ML	Yes	<ul style="list-style-type: none"> - Set-up or adjust irrigation management infrastructure to ensure sufficient income to maintain both the irrigation and drainage systems as well as the integrity of the agricultural land. - Analyse soils and monitor changes so that potential problems can be managed. 	L	-	
		Ground water	<ul style="list-style-type: none"> Drying up of drinking & irrigation wells. Reduced base flow/wetlands. Impact on ground water quality. 			S	S	Pr	CR	ML	Yes	<ul style="list-style-type: none"> - Define and enforce abstraction regulations. - Monitor ground water levels. - Perform ground water quality monitoring from 	L	-	

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION			
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk				
													surrounding boreholes.				
		Surface water	<ul style="list-style-type: none"> Reduction in irrigation water quality. Impacts on river flow and drainage. Water quality problems for downstream users caused by irrigation return flow quality. Reduction in water quantity available for downstream users. Impact on surface water quality. Flow modifications. Sediment build up. Water quality impairment. 										<ul style="list-style-type: none"> Define and enforce return water quality levels (including monitoring). Designate land for saline water disposal. Build separate disposal channels. Educate for pesticide or sewage contamination dangers. Monitor irrigation water quality. Proposed water use to be authorized through a water use license application process in order to ensure that sufficient water volumes is released to ensure water allocations downstream can be maintained. Ensure surface water runoff is not contaminated. Perform upstream and downstream surface water quality monitoring. 	Yes	<ul style="list-style-type: none"> Where reasonable and practical, the farmer should 	L	Riparian and Wetland report; Aquatic and Ecological Flow Assessment, Water Use Licence
		Local unemployment	<ul style="list-style-type: none"> Job creation through the employment of farm 	+		L	L	D	I	N/A	Yes		N/A	-			

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
		rate	workers.									implement a 'locals first' policy, when employing farm workers.		
		Food security	<ul style="list-style-type: none"> Contributes to food security of the country. 	+		L	L	D	I	N/A	Yes	No mitigation measures required.	N/A	-
		Health & Safety	<ul style="list-style-type: none"> As the proposed dam is classified as a dam with a safety risk, a dam wall could have a negative impact on people, fauna and flora as well as infrastructure located downstream. 	-		L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> Ensure that the dam wall is constructed as per the engineering design drawings. Inspect the dam wall on a regular basis for leaks and cracks. Ensure that inspections comply with the requirements of the NWA for dams with a safety risk. 	L	-
		Noise levels	<ul style="list-style-type: none"> The proposed development will not result in any noise pollution during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Tourism industry	<ul style="list-style-type: none"> The proposed activities might have an impact on tourism in the area, as a result of water depletion for downstream game farmers. 	-		L	S	D	CR	NL	Yes	<ul style="list-style-type: none"> During the operational phase care should be taken to ensure that the volume of water allocated for downstream users are not impacted on or depleted. Conditions contained in the water use licence to be 	L	-

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
													adhered to.		
		Heritage resources	<ul style="list-style-type: none"> Removal or destruction of archaeological and/or paleontological sites. Removal or destruction of buildings, structures, places and equipment of cultural significance. 	-		L	P	D	IR	CL	Yes	- Redesign infrastructure to avoid the proposed conservation buffer. Implement a heritage conservation buffer of at least 100m around the heritage receptor, where possible redesign infrastructure to avoid the heritage resource and the proposed conservation buffer. Alternatively a phase II Heritage Impact Assessment should be conducted and approved prior to disturbance of any heritage resources. - Site monitoring: Regular examination of trenches and excavations in this area in order to avoid the destruction of previously undetected heritage remains. Destruction permitting for the site if, and when required.	L	Heritage Impact Assessment & Palaeontological Heritage Assessment	
			<ul style="list-style-type: none"> Removal or destruction of graves and burial grounds. 			L	P	D	IR	CL	Yes	- Implement a strict heritage conservation buffer of at least 100m around the grave, redesign infrastructure to	L		

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												avoid the heritage resource and the proposed conservation buffer. Fence the burial place and apply access control. Implement a site management plan detailing strict site management conservation measures. - Site monitoring: Regular examination of trenches and excavations in this area in order to avoid the destruction of previously undetected burials or heritage remains. If burials were to be retained with no infrastructure redesign a strict site management and monitoring protocol will be required (planning, construction phases). - Permits shall be obtained from the SAHRA should the proposed site affect any heritage sites or if any heritage sites are to be destroyed or altered.		
DECOMMISSIONING PHASE														
Due to the permanent nature of the proposed development, it is unlikely that closure will be implemented. No impacts are therefore anticipated for the post closure phase of the proposed development at this stage. If the project is to be														

Low significance		Medium significance		High significance		Positive impact	
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
decommissioned the same impacts and mitigations contained in the construction phase will apply.														

Nature of the impact:	(N/A) No impact	(+) Positive Impact	Negative Impact (-)		
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National	
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite	
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent	
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-	
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues were addressed in more detail in the EIA report.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 19(i) (GN.R. 983): *“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse.”*
- Activity 13 (GN.R. 984): *“The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.”*
- Activity 15 (GN.R. 984): *“The clearance of an area of 20 hectare or more of indigenous vegetation...”*
- Activity 16 (GN.R. 984): *“The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high water mark of the dam covers an area of 10 hectares or more.”*
- Activity 4 (a)(ii)(ee)(GN.R. 985): *“The development road wider than 4 metres within reserve less than 13.5 metres (a) in Limpopo (ii) outside urban areas, in (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority in bioregional plans.”*
- Activity 12 (a)(ii) (GN.R. 985): *“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 (a) in Limpopo (ii) within critical biodiversity areas identified in bioregional plans.”*
- Activity 14 (iv)(xii)(a)(a)(ii)(ff) (GN.R. 985): *“The development (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size and (xii) infrastructure or structures with a physical footprint of 10 square metres or more Where such development occurs – (a) within a watercourse (a) in Limpopo (ii) outside urban areas, in (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”.*

During the construction phase, minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on fauna and flora (habitat destruction and fragmentation), surface water, removal or destruction of graves and burial grounds. The positive impacts relate to temporary employment.

6.2.2 Impacts during the operational phase

During the operational phase the study area will serve as an irrigation dam to irrigate 340 hectares of croplands. The negative impacts are generally associated with impacts on fauna and flora, impacts on the surface water (flow modifications, flow sediment equilibrium and water quality impairment) and heritage objects. The operational phase will have a direct positive impact by contributing to food security, providing permanent job opportunities and the creation of additional wetland habitat and providing a breeding area for aquatic species.

6.2.3 Impacts during the decommissioning phase

Due to the permanent nature of the proposed development, it is unlikely that closure will be implemented. No impacts are therefore anticipated for the post closure phase of the proposed development at this stage. If the project is to be decommissioned the same impacts anticipated during the construction phase will apply.

6.3 ASPECTS TO BE ASSESSED

Table 6.3 below provides a summary of the aspects that need to be assessed as part of the EIR (refer to Appendix G for a detailed assessment of the key impacts). The aspects are also linked to specialist information that has been obtained. Refer to Table 6.2 for a description of the potential impacts.

Table 6.3: Aspects to be assessed

Aspects	Potential impacts	Specialist studies / technical information
Construction of the irrigation dam and croplands	<ul style="list-style-type: none"> Impacts on the fauna and flora 	Ecological Report
	<ul style="list-style-type: none"> Impacts on surface water (water flow, water quality and drainage) 	Riparian and wetland report Aquatic Assessment Hydrological Assessment
	<ul style="list-style-type: none"> Impacts on aquatic ecosystem 	Aquatic and Ecological Flow Assessment
	<ul style="list-style-type: none"> Impacts on heritage resources 	Archaeological & Paleontological Assessments
Operation of the irrigation dam and croplands	<ul style="list-style-type: none"> Impacts on the fauna and flora 	Ecological Report
	<ul style="list-style-type: none"> Impacts on aquatic ecosystem (breeding area for aquatic species). 	Aquatic and Ecological Flow Assessment
	<ul style="list-style-type: none"> Impacts on surface water (water flow, drainage, water quality and downstream water users). 	Riparian and wetland report, Water Use License Application Hydrological Assessment
	<ul style="list-style-type: none"> Impacts on heritage resources 	Archaeological & Paleontological Assessments
Decommissioning of the Dam	If the project is to be decommissioned the same impacts anticipated during the construction phase will apply.	

6.4 SUMMARY OF RECOMMENDATIONS FROM SPECIALIS STUDIES

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Archaeological Impact Assessment: To determine whether the proposed activity will impact on any heritage or archaeological artifacts.
- Ecological Report: To determine what the impact of the proposed activity will be on the ecology (fauna and flora) in the area.
- Riparian & Wetland Report: To determine what impacts of the proposed activity will have on the on the wetlands and riparian areas of the site.
- Aquatic and Ecological Flow Assessment: To determine what the impacts of the dam will be on the river flow and associated ecology.
- Paleontological Desktop Assessment: To determine the impacts on paleontological resources.
- Hydrological Impact Assessment: To determine the impact on surface water.

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

6.4.1 Issue 1: Archaeological Impact Assessment

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA). The aim of this survey was to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites/features. The main question which needs to be addressed is:

“Will the proposed development impact on any heritage or archaeological artefacts?”

The Archaeological Impact Assessment (Refer to Appendix H1) confirmed that the heritage objects on the proposed crop fields site rated a low to medium impact significance, except for the burial which rated as high significance. The Archaeological Impact Assessment provides a number of management and mitigation measures (refer to section 5.3.2.2 for the nature of the heritage objects).

6.4.2. Issue 2: Ecological Report

The potential impact of the proposed development on threatened flora and fauna known to occur in the Limpopo Province had to be determined. The main question which needs to be addressed is:

“How will the proposed development impact on the ecology?”

The fauna and flora ecological study (refer to Appendix H2) confirmed that: It is evident from the distribution of biodiversity, presence of threatened species and sites of scientific interest, that the most sensitive areas that occur in the direct vicinity of the developments are the riparian zones that will be flooded during the dam construction, as well as the impact of the clearing of natural vegetation for the development of croplands. Most of these areas will be modified, and will have a definite impact on the natural ecosystem processes (flow regime and the fragmentation of fauna habitats), although additional habitat will be created. The most significant impacts are habitat destruction (flooding, clearing of the area) and dust, although impacts such as alien species invasion and spillages are limited during the construction phase or can be successfully mitigated.

Most of the vegetation on the footprint areas of the dams will be flooded and cleared for the croplands, therefore a licence for the protected trees such as marulas on site needs to be obtained from DAFF. Detailed ecological (fauna habitat & flora) surveys were conducted during July 2016 to verify the ecological sensitivity and ecological components of the site at ground level. The impact on the Mokamole River will also need a Water Use Licence from DWS before any construction activities can occur in the channel or floodplains.

A number of impacts the dam and cropland development might have on the fauna and flora of the site were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to sensitive ecosystems leading to reduction in the overall extent of a particular habitat;
- Increased soil erosion;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts;
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species;
- Soil and water pollution through spillages;
- Establishment and spread of declared weeds and alien invader plants;
- Air pollution through dusts and fumes from construction vehicles (construction phase)

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance.

6.4.3. Issue 3: Riparian & Wetland Report

In order to determine the potential impacts that the proposed development will have on the wetland on site, a wetland study has been conducted. The main question which needs to be addressed is:

“How will the proposed development impact on the surface water on site?”

According to the Riparian and Wetland Study (Appendix H3) an impact assessment was conducted for the water courses and riparian zones on site in addition to the buffer zones recommended to ensure the protection of the wetlands. The most significant impacts are habitat destruction rated as high, fragmentation rated as high and sedimentation rated as high. These significance impacts can be effectively mitigated towards a low significance rating.

6.4.4. Issue 4: Aquatic and Ecological Flow Assessment

In order to determine the potential impacts that the proposed development will have on the fauna and flora of the wetland on site, an Aquatic and Ecological Flow Assessment study had been conducted. The main question which needs to be addressed is:

“How will the proposed development impact on the aquatic ecology?”

Based on this assessment (attached as Appendix H5), the EcoStatus of the reach is moderately to largely modified. This varies from the Desktop Present Ecological State designated to the sub-quaternary catchment of largely modified.

The instream ecological state of the Mokamole reach associated with the Kranskloof Dam is regarded as largely modified at a desktop level. The vegetation survey has indicated that the riparian ecosystem is categorised as natural upstream of the proposed dam, and largely natural downstream of the proposed dam. Therefore, to ensure that ecosystem functioning be maintained, the riparian system downstream of the dam should be managed at a largely natural or ‘B’ category by ensuring the implementation of the Ecological Water Reserve (EWR) for the proposed Kranskloof Dam and removal of dysfunctional impoundments.

The instream assessment indicated a clear variation in ecological state between the upstream and downstream sites. Impacts identified at a desktop level were observed within the downstream reach. Modifications to abiotic drivers, including habitat and physicochemical water quality were evident, resulting in modified abiotic responders, including macroinvertebrate and fish community structures.

Findings from the risk assessment indicate medium to high potential impacts on a local and regional scale due to construction activities. High risks are associated with direct loss of aquatic habitat and sedimentation of downstream habitats. Should mitigation measures be implemented, risks are rated from high to low. High risks are associated with direct impacts to habitat as these impacts cannot be mitigated for. The risk of sedimentation of downstream systems is reduced to medium should mitigation measures be implemented. Further risks associated with the construction of the dam wall pertain to management of the construction

site (e.g. denuding of vegetation). Should best practices be implemented these impacts are considered low.

During the operational phase, risks associated with the project are considered long term, and will affect water quality, flows, and habitat integrity. This will have a direct impact to aquatic biota in the system and fish and macroinvertebrate community structures will be modified. Mitigation measures for these impacts are limited, and modifications to the reach are definite. However, best practice can limit effects of impacts to the reach by adequately controlling flows, placing silt traps above the dam to reduce sediment build up. The direct loss of instream habitat is unavoidable, therefore, trees and other structures within the impoundment should remain to provide habitat diversity to aquatic biota within the system.

6.4.5. Issue 5: Paleontological Desktop Assessment

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

The Palaeontological Impact Assessment (Appendix H6) indicates that the rocks of the Bushveld Igneous Complex are non-fossiliferous and are of no palaeontological concern. The sedimentary units in the study area being older than 1 giga-annum (Ga) are devoid of macroscopic multicellular fossils. No fossils have been reported from this region. Due to the unlikelihood of fossils occurring in the study area it is recommended that the project should be exempted from further palaeontological studies.

6.4.5. Issue 6: Hydrological Report

In order to determine the potential impacts that the proposed development will have on the hydrological flow, a hydrological assessment has been conducted. The main question which needs to be addressed is:

"How will the proposed development impact on the surface water flow on site?"

According to the Hydrological report (attached as Appendix H4), flows within the Mokamole system are largely modified. Natural peak flows are minimised due instream impoundments. Should the proposed Kranskloof Dam be constructed, it is recommended that unnecessary downstream weirs, dams, and road crossing be removed, and that flows for dam stream reaches be actively managed to increase natural flow cycles and improve the state of the system.

6.5 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of their significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 6.4.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

6.5.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

Table 6.4: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.

3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		

Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.

2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
<p>This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.</p>		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
<p>Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.</p> <p>The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.</p>		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve

		an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

7 ENVIRONMENTAL IMPACT STATEMENT

This section aims to address the following requirements of the regulations:

Appendix 3. (3) An EIR (...) must include-

(l) an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(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;

7.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues³ were identified, which were addressed in this EIA report:

➤ Impacts during construction phase:

- Direct habitat destruction (- Medium)
- Fragmentation of habitats (- Medium)
- Surface water (- Medium)
- Temporary employment and other economic benefits (+ Medium)

➤ Impacts during the operational phase:

³ The significance rating refers to the significance of the impact post mitigation.

- Loss of aquatic habitat (- Medium)
- Flow modifications (- Medium)
- Flow sediment equilibrium change (- Medium)
- Water quality impairment medium (- Medium)
- Creation of additional wetland habitats (+ Medium)
- Providing a breeding area for aquatic species (+ Medium)

7.2 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the EIA report. In terms of the legal requirements it is concluded that:

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 of the 2014 EIA Regulations – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the 2014 EIA Regulations - already approved by the environmental authority.
- The EIA process has been conducted as required by the 2014 EIA Regulations, Regulations 23 and Appendix 3.
- The EMPr has been compiled in accordance with Appendix 4 of the 2014 EIA Regulations.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and thus, no terms of reference are provided for such studies.

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the construction

of an agricultural irrigation dam and the preparation of land for cultivation on the Remaining Extent and portion 1 of the farm Kranskloof 218 KR near Mokopane, Limpopo Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr.
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed irrigation dam must comply with all relevant national environmental laws and regulations, and must have an approved water use license.
- All actions and task allocated in the EMPr should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

We trust that the department find the report in order and eagerly await your final decision in this regard.

Mr. Ruan Mostert

EcoLead

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