mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

and

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED)

NAME OF APPLICANT:	**Renaissance Resources (Pty) Ltd**
TEL NO:	**082 960 9428 (Abraham)**
CEL NO:	**082 371 8731 (Juan)**
FAX NO:	**086 510 7120**
POSTAL ADDRESS:	**PO Box 28210; Kimberley; 8300**
PHYSICAL ADDRESS:	**61c Long Street; Kimberley; 8301**

FILE REFERENCE NUMBER SAMRAD: **(NC) 30/5/1/2/2/10199 MR**

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1)(c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is therefore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) 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;

(d) determine the—

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be avoided, managed or mitigated.

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	**ROELINA OOSTHUIZEN**
Tel No.:	**053 8320029**
Cell No.:	**084 208 9088**
Fax No.:	**086 510 7120**
E-mail address:	**roosthuizen950@gmail.com**

ii) Expertise of the EAP

(1) **The qualifications of the EAP**

Masters in Environmental Management (UFS)
B-Comm in Human and Industrial- Psychology (NWU)
(With evidence attached as **Appendix 1**)

(2) **Summary of the EAP's past experience**

(In carrying out the Environmental Impact Assessment Procedure)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Scoping Reports, etc.
Please refer to attached CV.
(with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	PORTION 2 (AT LAST) OF THE FARM NO. 232, Barkly-Wes IN EXTENT: 2 723.7718 HA AND PORTION 2, 3, 4, 5 AND 6 OF THE FARM DE BAD 155, Kimberley IN EXTENT: 3 497.4237 HA **TOTAL EXTENT: 6 221.1955 HA**
Application area (Ha)	6221.1955 ha (Six thousand two hundred and twenty one comma one nine five five hectares.)
Magisterial district:	Barkly-Wes and Kimberley
Distance and direction from nearest town	The At Last area is situated ± 14km west from the town Delportshoop, ± 30 km north from Barkly West and ± 62.3 km north west from Kimberley The De Bad area is situated ± 17.5 km south of the town Schmidtsdrift, ± 36.72 km north east from Douglas and ± 68.69 km west from Kimberley as the major town.
21 digit Surveyor General Code for each farm portion	Ptn 2 / At Last 232 - C00700000000023200002 Ptn 2 / De Bad 155 - C03700000000015500002 Ptn 3 / De Bad 155 - C03700000000015500003 Ptn 4 / De Bad 155 - C03700000000015500004 Ptn 5 / De Bad 155 - C03700000000015500005 Ptn 6 / De Bad 155 - C03700000000015500006

c) Locality map

(show nearest town, scale not smaller than 1:250000)

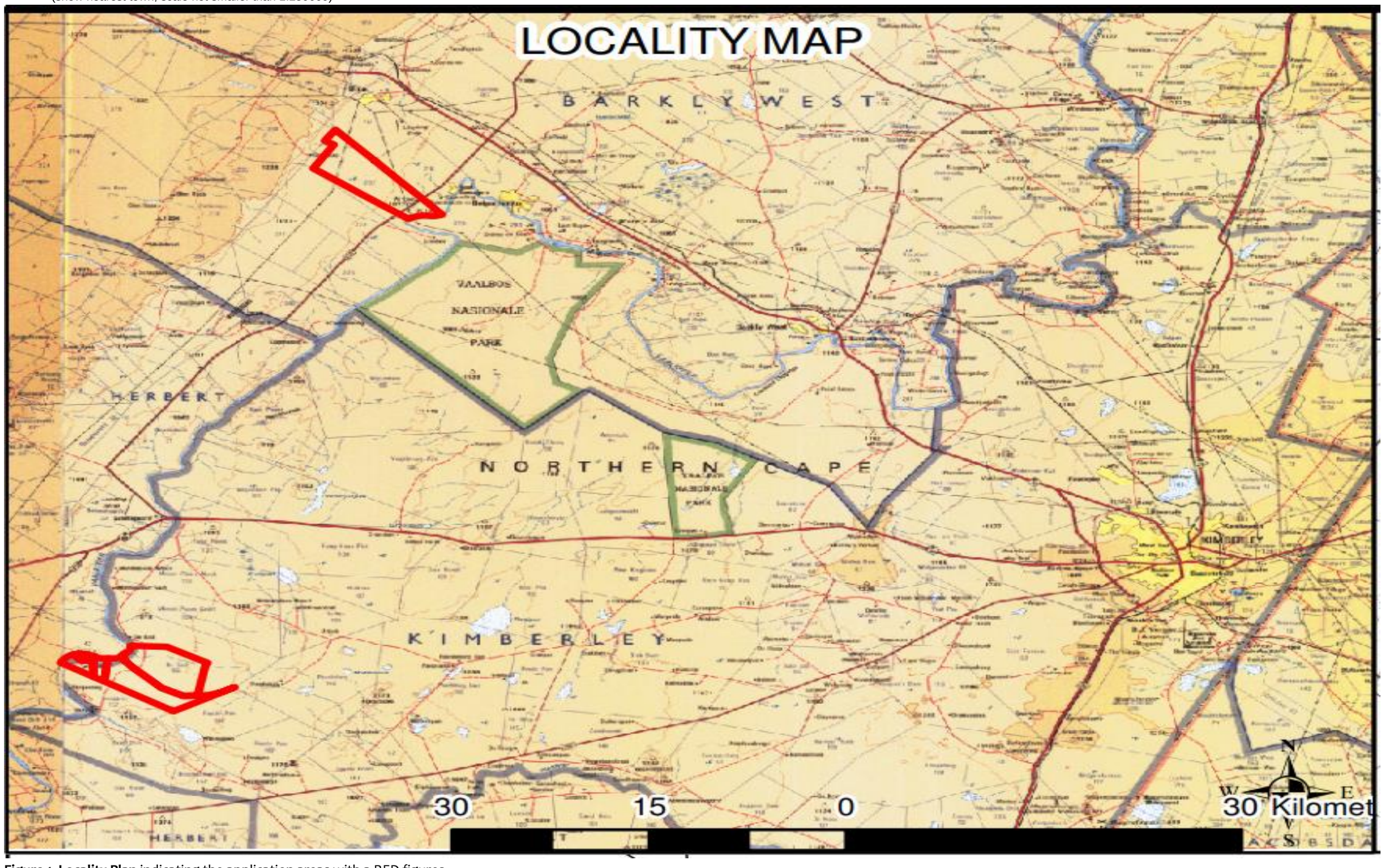


Figure 1. Locality Plan indicating the application areas with a RED figures.

d) Description of the scope of the proposed overall activity

(provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)

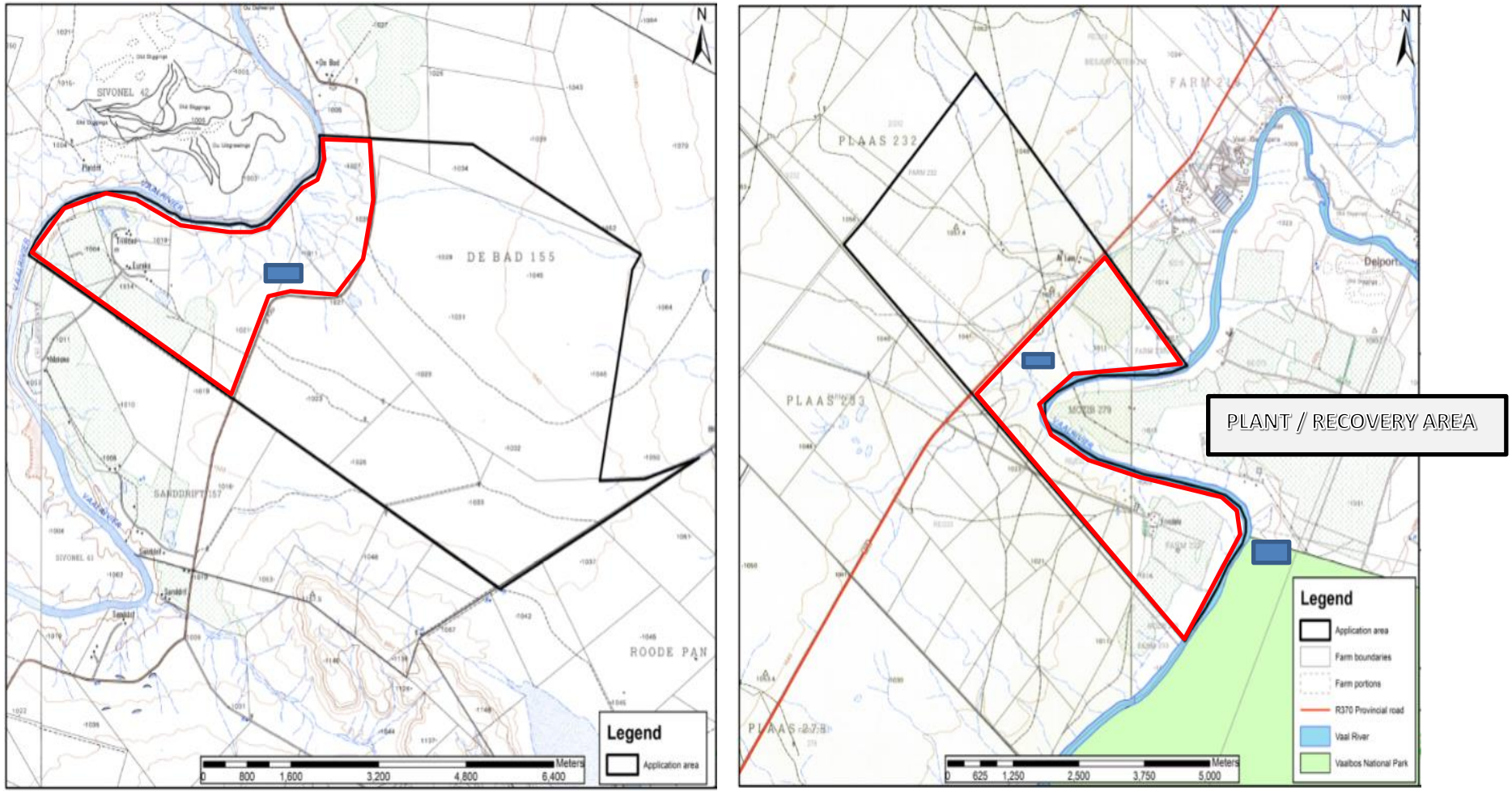


Figure 2. A map of the area indicating the overall location and extent of PROPOSED listed activities and main infrastructure on the mining site

i) Listed and specified activities

Table 1: Listed and Specified Activities

Name of activity (e.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)	Aerial extent of the activity (Ha or m²)	Listed Activity (mark with an X where applicable or affected)	Applicable Listing Notice (GNR544, GNR545 or GNR546 / Not listed GNR983, GNR984, GNR985/ Not listed)
Activity 9: "The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (vii) with an internal diameter of 0.36 metres or more; or (viii) with a peak throughput of 120 litres per second or more;	Water distribution Pipelines	X	NEMA: LN1 (GNR327)
Activity 12: "The development of— The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse"** Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities)	Clean and dirty water system It is anticipated that the operation will establish storm water control berms and trenches to separate clean and dirty water on the mining site.	X	NEMA: LN1 (GNR327)
Activity 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014	Possible storage dam and tanks	X	NEMA: LN1 (GNR327)
Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, **excavation, removal or moving** of	Possible excavation within the 1:100-year flood line if approval is received from DWA	X	NEMA: LN1 (GNR327)

soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;			
Activity 24: The development of a road- (ii) a road with a reserve wider than 13,5 meters or where no reserve exists where the road is wider than 8 metres.	Access and haul roads 10 000m²	X	NEMA: LN1 (GNR327)
Activity 17: Any activity including the operation of that activity which requires a **mining right** as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including – (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, crushing, screening or washing; But excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing notice 2 applies. The Renaissance operation directly relates to mining of a mineral resource (diamonds) and requires a mining right.	6 221.1955 ha	X	NEMA: LN2 (GNR325)
Activity 14: The development and related operation of facilities or infrastructure for the storage and handling of dangerous goods (fuel), where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic meters.	2 X 23 000l diesel tanks = 46 000l with capacity for storing of old oils and new oils to be calculated	X	NEMA: LN1 (GNR327)
Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	±250 ha	X	NEMA: LN2 (GNR325)
Activity 12(g): The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous	At Last falls into Critical Biodiversity Area 1 and 2 as well as Ecological	X	NEMA: LN3 (GNR 324)

vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Support Areas and Freshwater Ecosystem priority area quinary catchments A small part of De Bad falls into Critical Biodiversity Area 2 and Ecological Support Areas.		
Activity 11: The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require **a mining right**, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	0.3ha The disposal of inert waste of 10 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by other legislation. The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a mining right.		NEMWA: Category B (GNR 633)
Office complexes Temporary workshop facilities Storage facilities Concrete bund walls and diesel depots Ablution facilities Topsoil stockpiles Overburden stockpiles Water tanks	± 200 m2 ± 300 m2 ± 2 000 m2 ± 250 m2 ± 30 m2 ± 500 m2 5 000 m2 3m x 3m = 9m² each		Not Listed
Waste disposal site (domestic and industrial waste): It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:	15m x 30m = 450m²		Not Listed

• Small amounts of low-level hazardous waste in suitable receptacles. • Domestic waste. • Industrial waste.			

ii) Description of the activities to be undertaken

(Describe methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

Basic overview of the mining method

The following is a description of a typical South African alluvial diamond mining operation, which is also being utilized by Renaissance Resources (Pty) Ltd at the At Last and De Bad operations. The mining method being employed is a strip mining process with oversize material from the gravel scalping and the tailings from the plant, being used as backfill material prior to final rehabilitation.

Gravels are excavated, loaded onto a vibrating grizzly or scalping screen and the +32 mm oversize material is discarded back into the open pit (about 55% reduction). The screen will be moved adjacent to each pit. Once the pit is complete it will be moved to the next pit.

The remaining –32 mm fraction is , loaded and transported to the nearby treatment facility using articulated dump trucks.
Where pans are used the screened material is loaded into a series of 4 sixteen foot rotary pans, each typically with a treatment capacity of 80 tph. Tracer tests are done regularly to ensure that the pans are operating at the correct density. Concentrate is tapped continuously from each of the pans every three hours into three ton holding bins and transported with enclosed trucks to a final recovery unit or any other facility which is chosen by Renaissance Resources (Pty) Ltd.

Topsoil will be removed from the first block, where after it will be stored separately on the high ground of the proposed mining area. Stored topsoil will be kept separate from overburden and will not be used for the building or maintenance of access roads. Stored topsoil will be adequately protected from being eroded or blown away.

Exposed diamondiferous gravel of Block 1 will then be removed by means of an excavator and loaded onto a tipper truck or front end loader, which will transport it to the nearby first stage mineral processing plant at the edge of excavation due for backfilling. At this plant the diamondiferous gravel will be sorted by means of a grizzly screen grid or scalping screen and all material larger than 100 mm will be separated from the rest. This material will be used in the backfilling stage.

Screened material smaller than 100 mm will be transported to a stockpiling area at the treatment plant, via front-end loader or tipper. From here it will be transported to a conveyor belt, which will feed it onto a Findlay type screen or if wet, then to scrubber or wet rotary screen and then directly onto 2 - 4 X 16 feet washing pans per site.

The following procedure will be followed in terms of backfilling and rehabilitation:

- The coarse gravel sifted at the grizzly screen, tailing from the pans and fine concentrate will be transported back to and dumped into open Block 1. During this process of backfilling, variation in the dumping sequence of different sized

materials will be followed to ensure better compaction and stability of the reclaimed gravel. This will ensure that the voids surrounding the coarse gravel will be filled up with finer sediments. Compaction will be achieved through the movement of heavy vehicles over the area during the backfilling stage.

- The mining sequence will be followed until the last block is reached. Topsoil stored at the beginning of the mining operation will now be utilized for the final rehabilitation of the last block on the land portion.

Workshop equipment and tools to be used consist of secured container stores containing grease pumps, rigger chains, hydraulic jacks, air compressors, electric testers, welders, grinders, socket sets, gas sets, magnetic drills, hydraulic test instruments, tools, spanners and tool boxes Approximately 18 000 litres of process water will be required by the proposed mining operation per hour per pan however modern technology in de-sanding may reduce water consumption in some areas. The use of closed circuit water recovery systems on the pans can result in further savings of more than 50% on water requirement.

Process water is sourced from the Vaal River for the At Last and De Bad operations. Other sources of water include pumping water from mining excavations or the tailings or slimes disposal facilities and recycling ponds. The production rate of the proposed operation will be approximately 80 tph per pan.

Waste Management

Proper sanitation facilities will be provided for employees. No person will pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine. Acceptable hygienic and aesthetic practices will be adhered to. Non-biodegradable refuse such as glass bottles, plastic bags, etc. will be sorted and stored in separate lockable containers at a central point. It will be disposed of at a recognised disposal facility twice a month. Biodegradable refuse will either be handled as indicated, or be buried in a pit excavated for that purpose and covered with layers of soil when almost full. A final 0,5m thick layer of topsoil will be incorporated where practicable. Provision will be made for the future subsidence of the covering. Refuse will not be dumped in the vicinity of the mining area. Waste material with regard to vehicle repairs will be kept in 200 litres steel containers in the maintenance/farmstead area. This material will be disposed of at a recognised disposal facility once a month.

Access Roads

The At Last property is accessed via the R370 tar road and a gravel road, as well as tracks on the property. While the De Bad property is accessed via a Secondary gravel road that turns off from the N8 national tar road the Activities associated with the Mine that is expected to make use of these roads include:-

- The transportation of mining personnel to and from the site;
- Delivery of supplies and materials;

- The transportation of the product for the market.
  These transport operations will make use of passenger vehicles, light delivery vehicles and very limited heavy vehicles.

Haul Roads

There will be one Haul road to the plant area and one haul road to the mining site. No other haul roads will be constructed. Main haul roads will have a minimum width of 15m. No roads will be wider than 15m. Existing roads will be used as far as practically possible.

e) Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use License has/has not been applied for).
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	- Section 5: Implementation of control measures for alien and invasive plant species; - Section 6: Control measures. - Regulation GN R1048, published on 25 May 1984, in terms of CARA	- Control measures are to be implemented upon the approval of the EMPR.
Constitution of South Africa (Act 108 of 1996)	- Section 24: Environmental right - Section 25: Rights in Property - Section 27: Water and sanitation right	- To be implemented upon the approval of the EMPR.
Environment Conservation Act (Act 73 of 1989) and Regulations (ECA)	- Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities that still relate to the existing section of ECA. - Section 28A: Exemptions.	- To be implemented upon the approval of the EMPR.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.	- Control measures are to be implemented upon the approval of the EMPR.

Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.
Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Mining Right has been applied for (NC) 30/5/1/2/2/10199 MR. - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal)	- Control measures are to be implemented upon the approval of the EMPR.

	- Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption) - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM: AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM: AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines)	- Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered. - The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas,

	29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations. Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007 GNR 150/GG 29657/23-02-2007 Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 * Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 * - Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species. - Regulation GN R151, published on 23 February 2007 (List of Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA - Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA - Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species)	called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. Most of De Bad comprises natural or transformed areas, but the local catchment of the Vaal River, south of the site comprise of Critical Biodiversity Areas Two. The remaining section of Vaal River on site, along with the ephemeral pans are classified as Ecological Support Areas (Figure 32). At Last mainly comprise of Ecological Support Areas, but an ephemeral tributary to the Vaal, including its buffer zone, lines the site's northern boundary and is classified as Critical Biodiversity Areas One. According to the Mining and Biodiversity Guidelines (DENC et al. 2013) no areas on De Bad is considered important, but the ephemeral drainage line on At Last and a small section of the Vaal River buffer in the south have Highest Biodiversity Importance. These

		areas constitute the highest risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining in order to support mainstreaming of biodiversity issues in decision making in the mining sector.
The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa's natural biodiversity and its landscapes and seascapes.	- Chapter 2 lists all protected areas.	- Applicable. The mining operation does fall within protected areas which is known. - At Last falls into Critical Biodiversity Area 1 and 2 as well as Ecological Support Areas and Freshwater Ecosystem priority area quinary catchments in terms of the screening report. - A small part of De Bad falls into Critical Biodiversity Area 2 and Ecological Support Areas in terms of the screening report.
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R921 published on 29 November 2013 in terms of NEM: WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil	- To be implemented upon the approval of the EMPR.

	Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921)	
National Forest Act (Act 84 of 1998) and Regulations	- Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.	- A permit application regarding protected tree species needs to be lodged with DAFF if necessary. - Control measures are to be implemented upon the approval of the EMPR.
National Heritage Resources Act (Act 25 of 1999) and Regulations	- Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site. - Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter,	- Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure are attached to the PIA.

	exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process. - Regulation GN R548 published on 2 June 2000 in terms of NHRA	
National Water Act (Act 36 of 1998) and regulations as amended, *inter alia* Government Notice No. 704 of 1999	- Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents. - Section 21: Water uses In terms of Section 21 a licence is required for: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (f) Waste discharge related water use; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (i) altering the bed, banks, course or characteristics of a watercourse; (j) removing, discharging or disposing of water found underground if it is necessary	- A water use application must be submitted. - Control measures are to be implemented upon the approval of the EMPR.

	for the efficient continuation of an activity or for the safety of people; and; - Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j))	
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.

Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees.	- Control measures are to be implemented upon the approval of the EMPR.
Road Traffic Act (Act 93 of 1997) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa (giving effect to section 27 of the Constitution).	- Control measures are to be implemented upon the approval of the EMPR.
National Land Transport Act, (Act 5 of 1998)		- To take note.
Spatial Planning and Land Use Management (Act 16 of 2013 (SPLUMA) and regulations	- To provide a framework for spatial planning and land use management in the Republic; - To specify the relationship between the spatial planning and the land use management, amongst others - Regulations GN R239 published on 23 March 2015 in terms of SPLUMA	- To be implemented upon the approval of the EMPR.
Subdivision of Agricultural Land Act, 70 of 1970 and regulations	- Regulations GN R373 published on 9 March 1979 in terms of Subdivision of Agricultural Land	- To take note.
Basic Conditions of Employment Act (Act 3 of 1997)) as amended	- To regulate employment aspects	- To be implemented upon the approval of the EMPR
Community Development (Act 3 of 1966)	- To promote community development	- To be implemented upon the approval of the EMPR
Development Facilitation (Act 67 of 1995) and regulations	- To provide for planning and development	- To take note.
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59	- To take note.

Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)	- To take note.
Land Survey Act (Act 8 of 1997)) and regulations, more specifically GN R1130	- To control land surveying, beacons etc. and the like; - Agriculture, land survey S10	- To take note.
National Veld and Forest Fire Act (Act 101 of 1998)) and regulations, more specifically GN R1775	- To regulate law on veld and forest fires - (Draft regulations s21)	- To be implemented upon approval of the EMPR

f) Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)

The Renaissance Resources Project is in line with the 'Beneficiation Strategy for the Minerals Industry of South Africa' (DMR, 2011) in terms of aiming to beneficiate diamonds for sale/export. The benefits of this will fall directly to the Northern Cape Province and, specifically, the Dikgatlong and Sol Plaatje Districts.

In addition, the South African National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. The Renaissance Project will contribute to achieving this plan in terms of direct and indirect employment of people from the local and district municipalities as well as investment in the region and on a national scale.

Renaissance was granted a prospecting right by the DMR to prospect for alluvial diamonds on Portion of Portion 2 of the Farm 232 (At Last 232), and Portions 2,3,4,5 and 6 of the Farm De Bad 155 in the Districts of Barkly West and Kimberley. The At Last area is situated ± 14km west from the town Delportshoop, ± 30 km north from Barkly West and ± 62.3 km north west from Kimberley. The De Bad alluvial diamond project is located on the eastern bank of the Vaal River, 45km downstream of the At Last project and about 30km north-east of Douglas in the Northern Cape Region.

In order to advance the project and to prove the presence of a minable resource of diamonds Renaissance undertook a in depth investigation mainly obtained through in-depth discussions with previous small-scale diggers and farmers and from consulting geologists who did work on the projects on the farms and a reserve was proven.

Diamond mining, will contribute to South Africa's status in world diamond production and Renaissance's vision is to be an active participant in the industry. Importantly it is a product that is exported and earns foreign exchange.

Should this proven reserve be mined, it would provide a significant contribution to the local community and the economy of the country.

Need

Analysis of the Diamond Industry – ALROSA(website)

The Information on the analysis of the diamond industry was obtained from the ALROSA website who is one of the biggest diamond producers in the world.

The world diamond market is represented by diamond mining and trade in rough diamonds. The bulk of the world diamond mining is concentrated in nine countries, with their share in the global production in physical terms as high as 99%.

The world's largest producers of natural diamonds are Russia, the Democratic Republic of Congo (DRC) and Botswana, all together accounting over 60% of the global diamond production.

Top Countries in the Global Diamond Production 2016: 134.1 mln. Carats

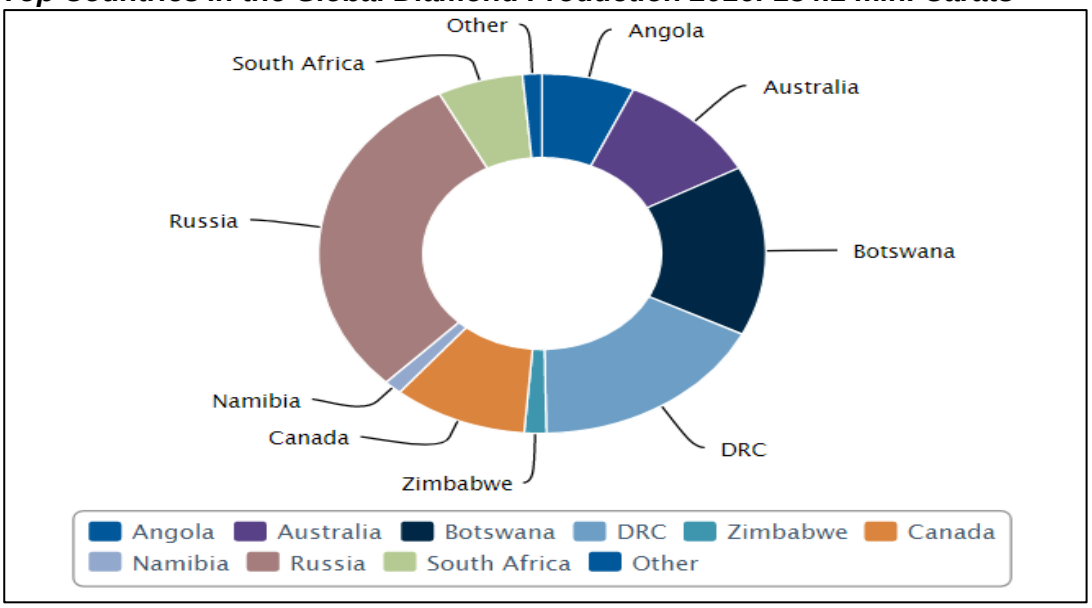


Figure 3. Kimberley Process companies' data Global Diamond Production 2011-16 (thousands of carats)

World diamond production based on the costs of produced rough diamonds are dominated by Russia, Botswana and Canada with a combined production of more than 60% of the total worldwide production

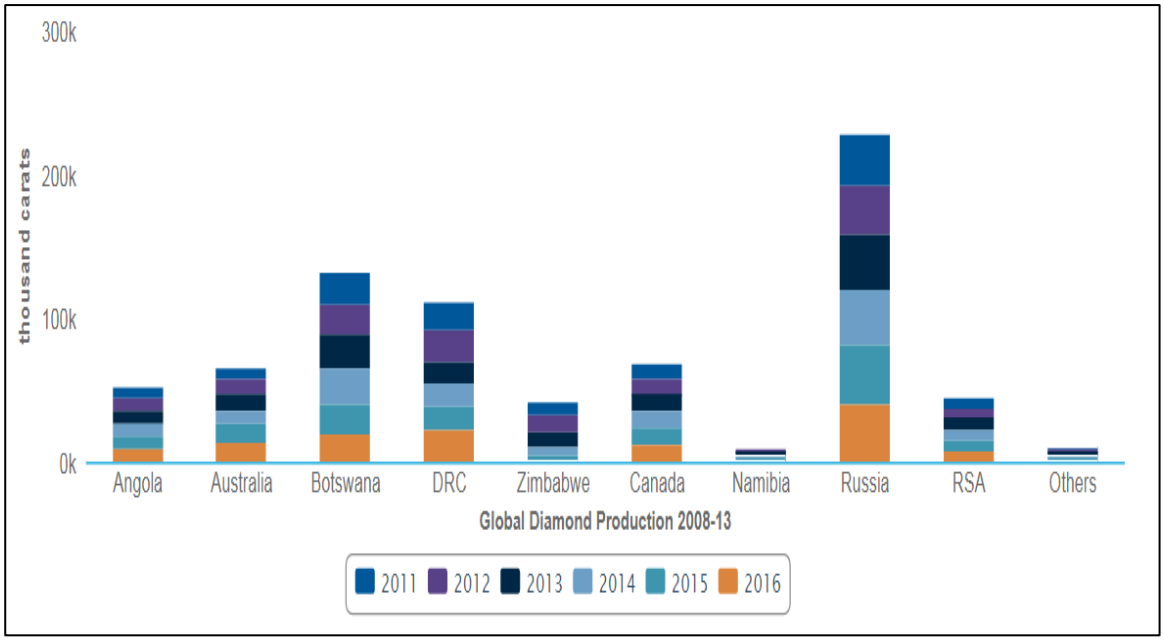


Figure 4. Global Diamond Production 2011-16 (thousands of carats) Kimberley Process companies' data

Russia ranks first in the world's diamond production. ALROSA Group accounts for 93% of the total diamond production in the Russian Federation in physical terms, and it is

the leader of the global diamond mining industry. Major mining companies are engaged in mining in the main diamond-producing countries, the exception being Zimbabwe and the DRC, where diamond deposits are developed by small companies and prospectors. The graph below represents the geography of the companies' activities including exploration.

Diamond Production by Leading Companies, 2016(* - *including Ekati; Companies' data)*

The world's diamond mining is concentrated in the major primary deposits accounting for about 60% of the global diamond production. The remaining production is concentrated in placer deposits, the principal of them located in the DRC (Mbiji-Mayii) and Zimbabwe (Marange).

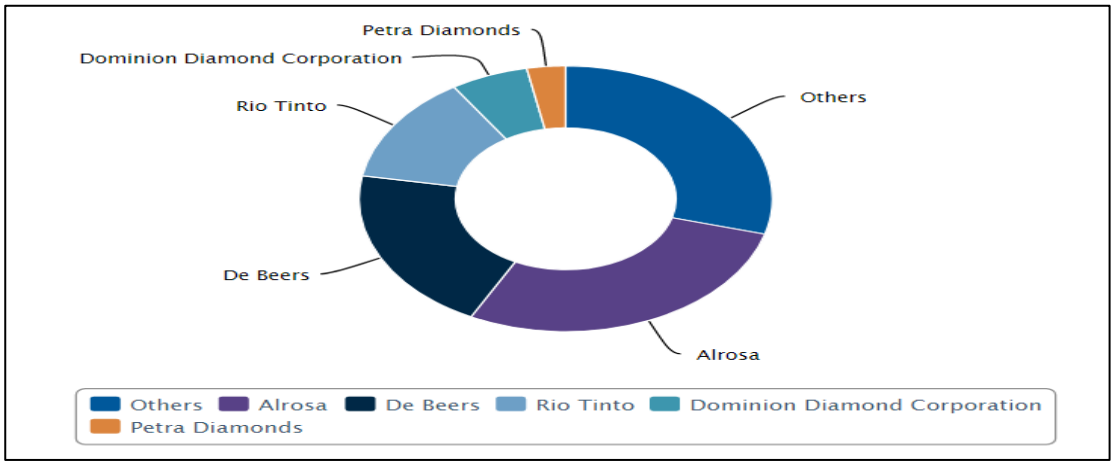


Figure 5. Diamond Production by Leading Companies, 2016(* - including Ekati; Companies' data)

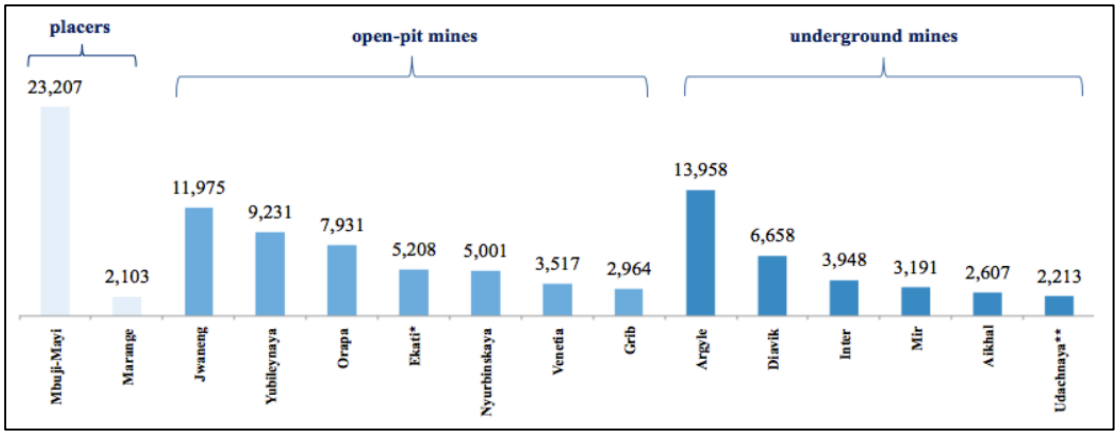


Figure 6. Production Output of the World's Major Diamond Deposits, 2016 (thousand carats) Kimberley Process and companies' data; * - Ekati includes open-pit and underground mining; ** - output, including further development of the open-pit.

By their attributes diamonds from deposits fall into two categories: gem quality and industrial grade diamonds. The former is used in diamond jewellery production, while the latter is used for industrial purposes (manufacture of drills, saws, and abrasive powders). Gem quality rough diamonds are sorted by size, colour, quality and shape, and then are sold to buyers in conformity with the sales policy adopted in a rough diamond production company. Depending on the quality of the mined rough diamonds, the current state of the market, the adopted marketing policy, companies use different

approaches to diamond sales: sights, tenders, auctions, spot transactions and long-term contracts.

The world's largest trading centres, which concentrate the bulk of trade in natural rough diamonds, are India, Belgium, the UAE, the USA, Hong Kong and Israel. Being sold from mines, natural rough diamonds arrive at cutting and polishing plants to become polished diamonds that will be used in jewellery making.

(The information above was sourced from the ALROSA website. ALROSA is a world leader in the world diamond mining industry, a Russian partially state-owned diamond mining company)

The Diamond Pipeline

The Diamond Pipeline can be defined as the route the diamond takes from mine to end consumer. The diamond pipeline, typically, comprises**.**

Figure 7. The Diamond Pipeline

***Exploration/Prospecting*;** involves geologists finding diamond deposits in different areas. Prospecting is vital to the future survival of any diamond business as there is a predicted supply-demand gap.

***Mining and Recovery*;** once diamonds have been discovered and surveys shown that it is financially viable to mine them; they are now recovered from the ground. The manner in which they are mined and recovered depends on their source, thus, where they are found.
Sorting and valuing; process of sorting and valuing of diamonds, categorizing them according to size, quality, model and colour.

***Cutting and polishing*;** refers to manufacturing of diamonds; the process of turning rough diamonds into polished.

***Polished Market*;** this is referred to as the 'diamond exchange bourse', a place where diamonds are traded. These are located in some of the world's major diamond manufacturing centres, e.g. Belgium.

Retailing; polished diamonds find their way to Jewellers and Consumers through Wholesalers and Retailers.

International Diamond Market Trends

Although global financial stability has proven quite volatile over the past 4-5 years, the diamond industry appears to have stabilised somewhat, with moderate increases in diamond prices forecast for the immediate future.

Desirability:

No	Description	Yes/No
1	Does the proposed land use / development fit the surrounding area?	Yes
2	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	Yes
3	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	Yes
4	Will the proposed land use / development impact on the sense of place?	Yes
5	Will the proposed land use / development set a precedent?	No
6	Will any person's rights be affected by the proposed land use / development?	Yes
7	Will the proposed land use / development compromise the "urban edge"?	No

Benefits:

No	Description	Yes/No
1	Will the land use / development have any benefits for society in general?	Yes
2	Will the land use / development have any benefits for the local communities where it will be located?	Yes

g) Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

The location of the mine is determined by the geological location of the mineral resource. Alluvial diamonds were mined in the At Last Ox-bow and adjacent properties, in particular by operators such as Sonop Mining (Chris Potgieter), Gemrock and medium to small scale miners. Other nearby mining operations along the Vaal River are located at the well-known Caerwinning mine, Sydney on Vaal (opposite At Last, operated by Sonop mining), Erindale, Winters Rush, Longlands, Waldecks Plant and Gong Gong.

An estimated total of 17 500 carats were historically being mined within the At Last Ox-bow by previous operators.

Cooke (2006) reported that 919.8ct were recovered on At Last at an average diamond grade of 1.39 cpht from the treatment of 6 617 tonnes during the period 1994 to 1997.

During August - December 2009, Renaissance excavated a bulk sample on At Last, totalling 11 300 ton yielding 184.62cts. The diamonds were sold at all-time low prices as achieved during the global financial crises for between US$220/ct – US$406/ct, averaging US$290/ct (instead of normal estimated prices of US$420/ct).

Alluvial diamonds were mined in the De Bad Ox-bow and adjacent properties, in particular by operators such as Sonop Mining (Chris Potgieter), Gemrock and small scale

miners. Other nearby mining operations along the Vaal River are located at the well-known Schmidtsdrift mine 10km upstream of De Bad.

An estimated total of 6 950 carats were historically mined within the De Bad Ox-bow by previous operators. Unverified historic reports stated that during this period a total of 258.17 carats was sold for a total value of R1,587,010. The diamonds sold were of high quality – averaging a selling price of R6 000 (approximately US$ 900/ct). Taking into account the style of the mineralisation and insufficient exploration data available at De Bad, a conservative value of US$850/ct is estimated for the resource.

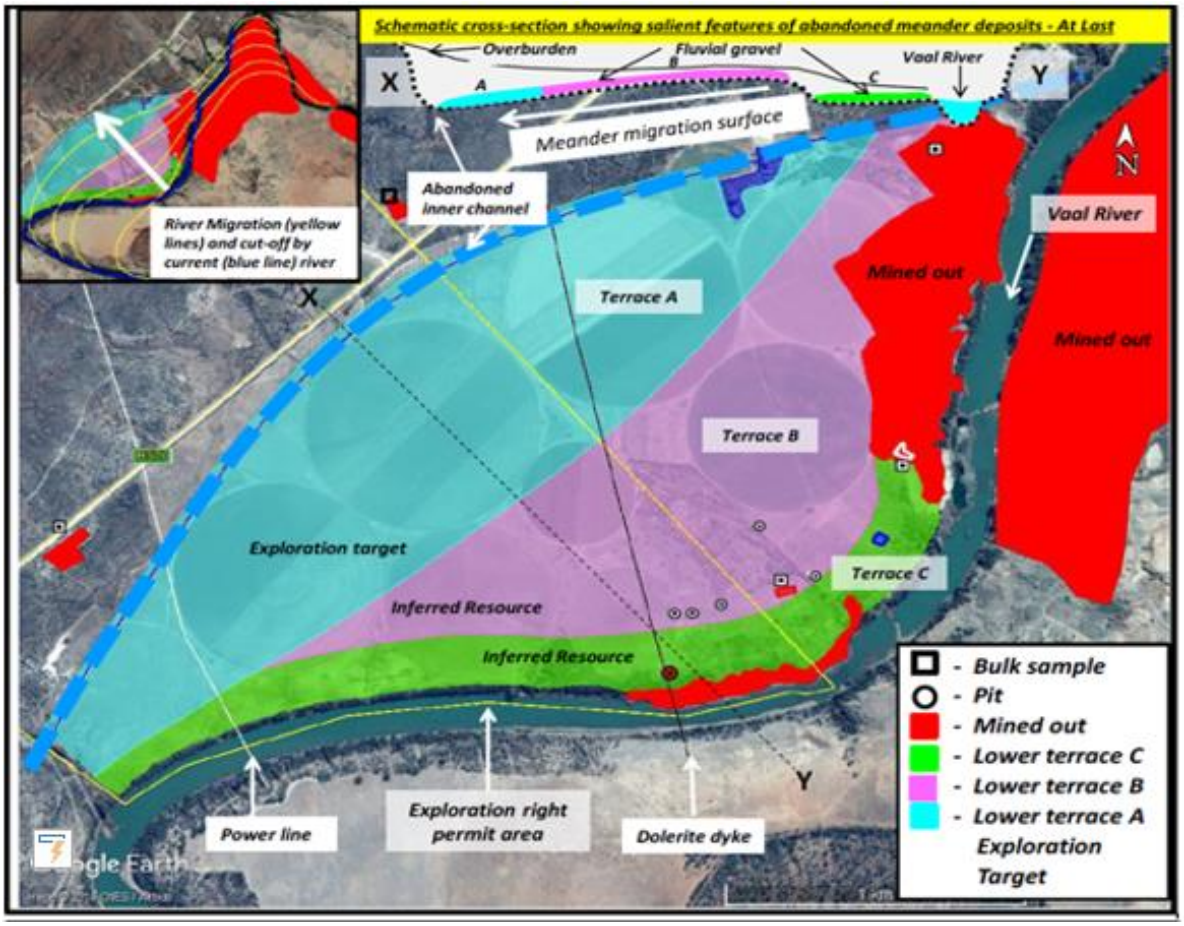


Figure 8. Property maps showing extrapolation of the inferred resources beyond nominal sample spacing.

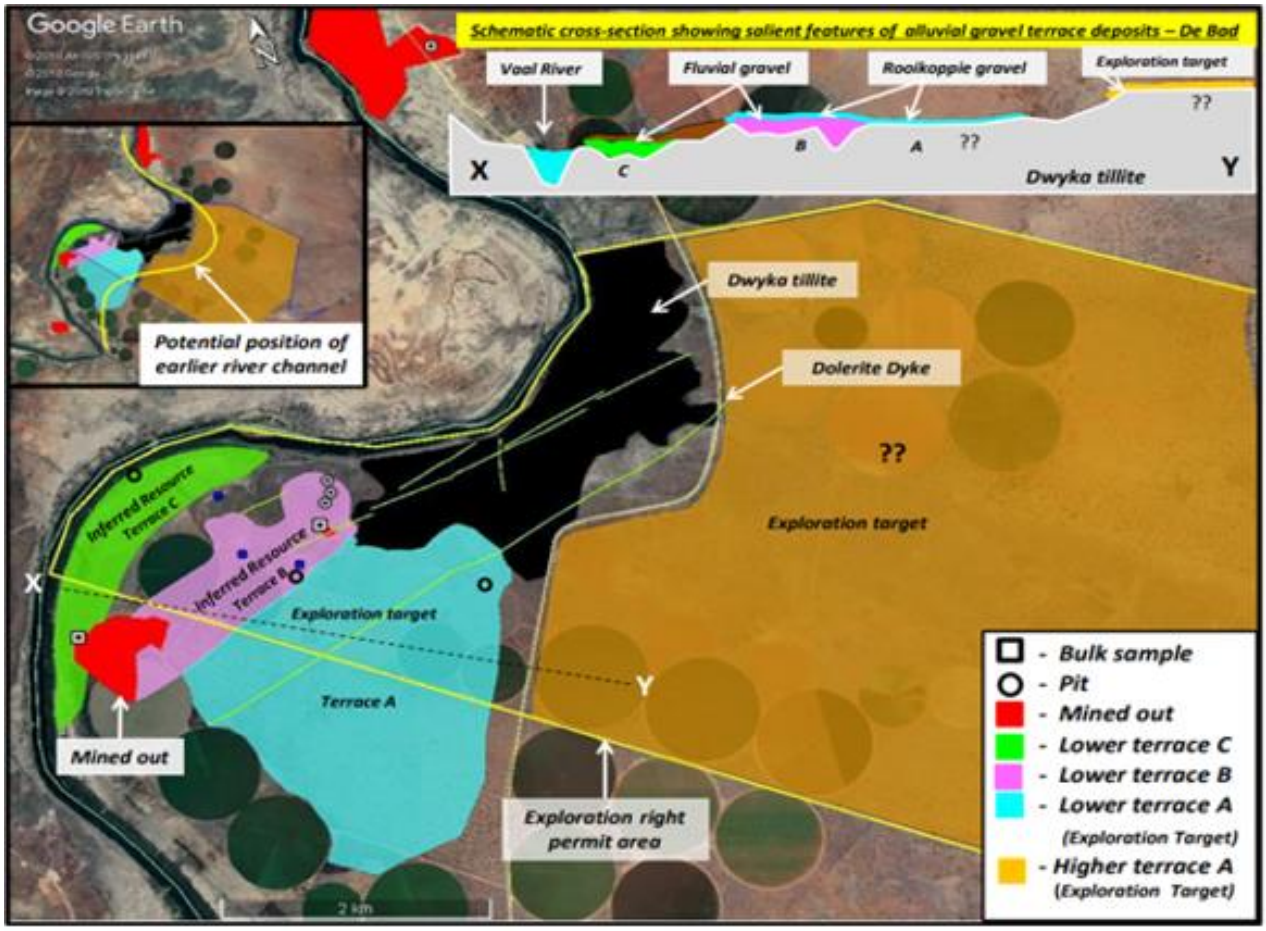


Figure 8. Property maps showing extrapolation of the inferred resources beyond nominal sample spacing.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Figure 2 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

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

(a) The property on which or location where it is proposed to undertake the activity:

The registered description of the land to which the mining right application relates:

Property: Portion of Portion 2 of the Farm 232 (At Last 232), Barkly-Wes and Portions 2,3,4,5 and 6 of the Farm De Bad 155, Kimberley.
District: Barkly West and Kimberley
Province: Northern Cape
Extent: 6 221.1955 ha
(2 723.7718 ha (At Last) + (3 497.4237 ha (De Bad)

The property on which the Mining right was applied for is determined by the geological location of the mineral resource. Therefore, there are no alternatives for the location of the activity, except for not proceeding with the operation. This will however cause the underutilisation of a national economic resource.

The area is accessible via tar and gravel roads from different directions.

Infrastructure in the Dikgatlong and Sol Plaatje area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale diamond mining. Water for Processing Plant will be a crucial element that needs to be secured towards the successful operating of the project. A water application will be submitted to the Department of Water and Sanitation which may include a Section 21 (a), (b), (g), (i) and (c) application.

Alternatives considered: -

As the area covered under the Mining Right had been selected based on the assumption of alluvial gravels and indication of the presence of alluvial gravels, it will not be viable to consider an alternative site for the mine. Alternatives for land are thus not available, as the mining right application cannot be considered over another area.

Therefore, there are no alternatives to the area.

(b) The type of activity to be undertaken:

The planned mining technique is that of a opencast alluvial diamond mining operation with oversize material from the gravel scalping and the tailings from the plant, being used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the nearby treatment facility using articulated dump trucks. **No irrigation pivots will be disturbed or mined without prior agreement from the farm owner.**

Alternatives considered: -

The mining blocks is within the target area known to carry diamonds and therefore no alternative to the application area can be considered. The only alternative land use on the area that will be selected for the processing plant is agriculture / grazing; No pivots or agricultural lands will be disturbed.

(c) The design or layout of the activity:

The site infrastructure will need to be strategically placed by incorporating mining project demands and environmental sensitivities identified during the Environmental Impact Assessment process. Thus, the site layout will primarily be based on proximity to the nearby access roads, proximity to the areas earmarked for

mining as well as limited additional impact on the environmental (non-perennial drainage lines, pivots the river and wind direction), heritage resources and discussions with the relevant interested and affected parties.
The following infrastructure will be established and will be associated with the mining operation outside the 1:100-year flood line zone with permission of the relevant competent authority and the surface owners:

- Processing Plant: 2 - 4 X 16 feet pans with conveyers and recovery per property.
- Ablution Facilities: In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.
- Clean & Dirty water system: Berms
  It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
- Fuel Storage facility (Concrete Bund walls and Diesel tanks):
  It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
- Mining Area: Opencast mining to mine for alluvial diamonds.
- Roads (both access and haulage road on the mine site):
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 - 4 km of roads, with a width of 15 meters.
- Salvage yard (Storage and laydown area).
- Product Stockpile area.
- Waste disposal site
  The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:
  - Small amounts of low-level hazardous waste in suitable receptacles;
  - Domestic waste;
  - Industrial waste.
- Temporary Workshop Facilities and Wash Bay.
- Water distribution Pipeline.
- Water tank:
  It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

Alternatives considered: -

Alternatives for fuel storage include surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential, because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage tanks. Mobile tanks are a viable option for infield screening activities, but the best viable long-term option is the instalment of fuel tanks within a concrete bund wall.

In terms of water use alternatives; the operation is located next to the Vaal River and the Mining area is next to the river. Plastic pipelines are considered to be the best long-term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment.

In terms of power generation, the options available was for Generators or ESKOM power. All of the electricity needs for the operations will be generated by a diesel generator and there would therefore be no additional pressure on the Eskom Electricity Grid.

In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.

(d) The technology to be used in the activity:

- Technique
  The area will be excavated (opencast method) with an excavator up to bedrock, stockpiled next to an open area and loaded onto the trucks by a frond end loader. The trucks will transport the gravel via a newly constructed road, which will be constructed to the required safety standard. No provincial roads will be used.
  At the processing plant the run of mine will be fed onto a grizzly for the screening out oversize material. The gravel will be processed through a screening section for delivery to a recovery plant and associated equipment. In terms of the processing it should take place outside the 1:100 year floodline and a processing area will be negotiated with the Department. This area will be used for all processing and stockpiling operations with an agreement entered into with the relevant Department).

- Technology
  At the processing plant the run of mine will be fed onto a grizzly for the screening out oversize material. The gravel will be processed through a screening section for delivery to a recovery plant and associated equipment. In terms of the processing it should take place outside the 1:100 year floodline and a processing area will be negotiated with the Department. This area will be used for all processing and

stockpiling operations with an agreement entered into with the relevant Department).

Alternatives considered:-

The planned mining activities include (opencast method) with an excavator up to bedrock. The operation is also associated with processing techniques that make use of modern technologies. These are the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative mining method for the mining and extraction of alluvial diamonds.

(e) The operational aspects of the activity:

The gravels will be loaded with an excavator on to dump trucks for conveyance to the Processing Plant. At the Processing Plant the run of mine gravels will be fed onto a grizzly for screening out oversize material. The material will be processed through a screening section for delivery to a recovery plant. Concentrate from the recovery plant will be processed through an X-Ray/Sortex plant to extract the diamonds. An area will be used for all processing and dumping operations outside the 1:100 year floodline. The expected lifespan of the mine is 10 years.

Mining activities will primarily make use of existing roads created by previous mining activities, but there is a possibility for additional roads that could be created.

Alternatives considered:-

The conventional opencast load-haul-mining method has been proven to be the most economic viable method currently being used by the diamond fraternity. There is no other feasible, alternative mining method for the mining and extraction of alluvial diamonds.

(f) The option of not implementing the activity:

De Bad and At Last are situated in a rural area, with major land uses in the region including mining and agriculture. According to AGIS, both sites are highly suitable for irrigation. De Bad falls within the Douglas East Potential Agricultural Area (PAA), with a B rating, while At Last falls within the Delportshoop PAA, with a D rating. The agricultural region is demarcated for cattle farming, with the grazing capacity estimated at 13 - 15 Ha/LSU. Currently, the property is used for agricultural activities, with extensive crop irrigation, especially along the river, while the remaining natural pastures are utilised by domestic stock. Existing infrastructure include homesteads, farm tracks, power lines and grazing camps, while large areas have been transformed for agriculture and evidence of historic mining activities are also visible. If mining does not continue the farming practices on the properties will continue.

Socio-Economy

The operation will make provision for ±46 job opportunities. This will be lost if the project does not proceed. Substantial tax benefits to the State and Local Government will also be lost.

Heritage and Cultural Resources

On the farm At Last

Stone Age

For thousands of years before modern times, the area was occupied by hunter-gatherers who subsisted on stone tool technologies. However, the ground survey on At Last yielded far fewer stone tools when compared to other studies in the locality.

Iron Age

No sites or relics dating to the Iron Age were found.

Burial grounds

No burial grounds were reported on the farm.

Buildings

The principal dwelling house at the farmstead is a remarkable monument. It has a hipped roof and veranda on two sides. There are two chimneys. The façade represented by the two veranda sides has ornate finishes. The date of construction inscribed on the cornerstone is 1936. The building will not be affected by mining operations. There are other buildings at the farmstead which are not architecturally important.

On the Farm De Bad

General Observations

It has been observed more than 60% of the farm De Bad is under cultivation, or has been cultivated in the recent past. No ancient relics such as stone tools can be expected to be found in an undisturbed context. Stone tools were found outside the fields along the edge of the Vaal River.

Stone Age

The Stone Age finds include hand axes found in two instances and a cleaver. These tools suggest occupation by Early Stone Age communities more than 250 000 years BP.

Iron Age

A single potsherd was found a short distance from the edge of the Vaal River. Pottery in the Lower Vaal and Middle Orange Rivers has been associated with a possible transition to the Iron Age.

Burial grounds
The Farmer reported two places with graves on the property. The graves were not located during the survey. If the graves will be located in a mining area, a 100 m servitude must be reserved.

Should any other heritage features and/or objects be located or observed, a heritage specialist will be contacted immediately. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that a heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. If the mining operation is approved, the heritage resources if any other had been encountered will be protected through the demarcation of no-go zones and fencing off.

Biodiversity
The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. Most of De Bad comprises natural or transformed areas, but the local catchment of the Vaal River, south of the site comprise of Critical Biodiversity Areas Two. The remaining section of Vaal River on site, along with the ephemeral pans are classified as Ecological Support Areas.

At Last mainly comprise of Ecological Support Areas, but an ephemeral tributary to the Vaal, including its buffer zone, lines the site's northern boundary and is classified as Critical Biodiversity Areas One. According to the Mining and Biodiversity Guidelines (DENC et al. 2013) no areas on De Bad is considered important, but the ephemeral drainage line on At Last and a small section of the Vaal River buffer in the south have Highest Biodiversity Importance. These areas constitute the highest risk for mining. These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining in order to support mainstreaming of biodiversity issues in decision making in the mining sector.

ii) Details of the Public Participation Process Followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

Description of the consultation process: -

The consultation process as described by NEMA for Environmental Authorisation was followed and is still in process. The following steps were already taken:

- Notification letters were sent to all interested and/or affected parties on the 24 January 2022. Attached to each of these letters was a Draft Scoping report, containing information relating to the proposed project for comments.
- A newspaper advert was be placed in the DFA local newspaper on 28 January 2022.
- Notices were placed at the entrances to the farms and along the fence line and in the library in Barkly-West.
- On 30 September 2022 the EIA / EMP Report was sent by registered post to identified persons with a cover letter. Letters was also sent to various neighbouring people with adjacent farms or further away. All Government Departments identified were also notified by registered letters with the EIA / EMP Report attached.
- The EIA EMP was also made available on the Wadala mining Website.

Proof of consultation (attendance registers, minutes of meetings and response forms) is attached as **Appendix 3**. The consultation process is still in process.

iii) Summary of issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

Please refer to Appendix 3

iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) Baseline Environment

(a) Type of environment affected by the proposed activity

(its current geographical, physical, biological, socio-economic, and cultural character)

(1) GEOLOGY:

All information is taken out of the Independent Statement of diamond resources and exploration targets done in January 2019 by Mr. Stephen H. le Roux on At Last, De Bad and Lanyon Vale projects.

Geological Setting

Alluvial geology of the Kimberley area1:
The erosion of diamondiferous kimberlites liberates diamonds onto the land surface, for redistribution by streams and rivers. The processes that lead to the deposition and concentration of diamonds in river sediments are obviously of direct importance in the formation of economic alluvial diamond deposits.

The South African alluvial deposits are distributed in a southwest-trending belt that stretches from the Limpopo River to the Namaqualand coast. The major deposits are concentrated along the Vaal and Orange River valleys and some tributaries of the Vaal River. The deposits invariably consist of gravel resting on Precambrian bedrock.

This bedrock contains trap sites for diamonds in the form of scour channels, potholes, gulleys and plunge pools, and in all cases, its competence and irregularity are sufficient to trap coarse debris that, in turn, act to entrain diamonds. The bedrock comprises a wide variety of rock types, including granite, gneiss, lava, dolomite, tillite, shale and quartzite, and cross-cutting dykes perpendicular to the fluvial channels and paleochannels are important in the development of trap sites.

The diamonds were originally derived from kimberlites on the Kalahari Craton, mostly within South Africa and transported by rivers to their placer sites. Many of these placers were subsequently reworked during the Cenozoic and redeposited as younger placers in downstream locations as depicted in the schematic illustration below (figure 10).

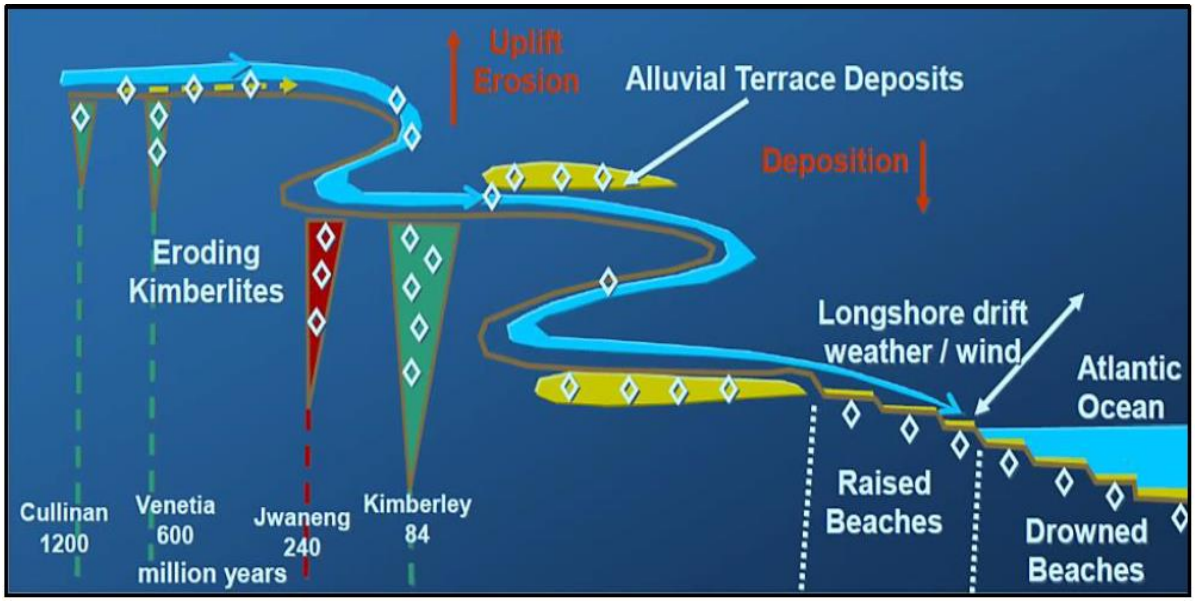


Figure 10. Origin of Alluvial Diamond Deposits.

The age of the alluvial placers ranges from Late Cretaceous to Quaternary with depositional peaks coinciding with fluvial phases during the Late Cretaceous, Miocene and Plio-Pleistocene. These ages post-date the emplacement of all the diamondiferous kimberlites on the Kalahari Craton from which the diamonds were derived.

Deposits of Miocene, Pliocene and Pleistocene age occur along the Vaal River valley between Christiana and Douglas and along the Orange River valley between Hopetown and Prieska. These deposits are located at elevations between present river level and 120m above present river levels. The diamonds were probably transported from kimberlites located near Kroonstad, Welkom, Theunissen, Boshof, Koffiefontein, and in northern Lesotho via former drainage courses of the Vals, Vet, Riet and Orange Rivers and a so-called Kimberley River that tapped the Boshof kimberlites prior to being captured by the Modder River during the Pliocene.

Studies of the Lower Vaal, Harts and Middle Orange River (MOR) alluvial deposits show that there are five broad phases of prominent alluvial deposit development in these areas reflected by several deposit types.

Cretaceous aged Nooitgedacht-Droogeveldt Terraces are considered to be the oldest alluvial deposits and they occur between 80 - 120 meters above the modem Vaal River S-W of Barkly West. These deposits probably conform in age to the initial period of late-Cretaceous uplift which triggered a period of accelerated river incision and simultaneous erosion and lowering of the land surfaces, accompanied by the supply of detritus, including diamonds.

Miocene-age Holpan and Klipdam Channel deposits occur at approximately 60 meters above the Vaal River. Younger terraces include the Pliocene-age Proksch Koppie and Wedburg Terraces, which occur at 30 - 45 and 20 - 30 meters respectively.

Pliocene - Holocene deposits or the youngest terraces, which include the current Vaal River channel, occur between 0 - 20 meters and are collectively referred to as the Rietputs and Riverton Terraces.

Younger deposits, through a process of progressive weathering, deflation and winnowing of the above deposits, 'secondary' deposits known as Rooikoppies developed over large areas of the landscape. Typically, these deposits are found to be broadly associated with older terraces and buried channels, these readily accessible deflation deposits were extensively mined by the old timers and Diggers. In many cases the presence of Rooikoppie deposits was useful in respect of highlighting the presence of older buried deposits.

Hundreds of thousands of carats and numerous large stones have been produced from these terraces at various projects with grades varying between 0.1 and 2.0 cpht.

Geology of the Lower Vaal and Middle Orange River Deposits

Prior to the Karoo period, the (pre-Karoo) Vaal River cut a network of channels closely approximating the present floodplain. These channels were then utilized by the subsequent glaciers and were finally filled with Dwyka tillites and shales (at ±250 million years). The post-Karoo Vaal River, subsequently, incised into these formations and deposited gravels and large quantities of fine sediments.

The geological settings of the diamondiferous gravel deposits vary from thick remnant palaeo-river terraces and channels of late Cretaceous age through to young surface deflation or Rooikoppie deposits of 0.5 – 1.0 meters thick.

Through geological time, erosion and deflation of the very extensive primary gravel deposits lead to the formation of extensive lag deposits or Rooikoppie which in places were particularly rich. These deposits are generally associated with underlying primary gravels but mass weathering, material creep and movement of the heavier lag deposits down slopes has resulted in deposits which may be far more extensive than the underlying primary deposits.

Rooikoppie gravels have been extensively dug by the old-time diggers in the past, using unsophisticated mining and diamond recovery techniques. Highly fractured Ventersdorp lavas or Dwyka tillites underlie the Rooikoppie gravels. Iron has stained the entire assemblage, giving it a reddish colour and hence the
name Rooikoppie.

Magmatic intrusions are in the form of Karoo-aged dolerite sills and dykes and Cretaceous-aged kimberlites.

In the Lower Vaal and MOR area dry periods lead to the precipitation of an extensive hard calcrete horizon which effectively defines the "interface"

between the surface Rooikoppies and lower primary gravel deposits in many areas.

The calcrete prevented old time diggers from mining below the Rooikoppies and consequently large areas of primary gravel are being mined in areas such as the MOR by drilling, blasting and stripping the hard 1 to 2 meter calcrete layer and mining and processing the underlying preserved primary alluvial gravels.

Property Geology – At Last

The At Last alluvial gravel deposit can be describe as a cut-off meander or paleo channels which formed as part of continuous channel migration during the deposition and reworking of the younger Rietputs C and B gravels, within a relatively wide, alluvium-filled flood plain causing continuous erosion and recycling of alluvium, located between 1 – 10m above the river.

The bedrock in the area consists of +2,700-million-year-old Ventersdorp lavas overlain by younger Dwyka tillites and sedimentary rocks comprising of a sequence of siltstone, shale quartzite, dolomite and limestone. A thin surface layer of calcrete covers a large part of the project area.

Alluvial diamondiferous gravel varying from 1 – 3m thick are found underneath a thick layer of soil, sand and calcrete almost across the entire stretch of the farm.

Locally, bedrock features including large boulders (glacial erratics) protruding from and released by the Dwyka diamictites of the floor rocks, and fractures and potholes found on Ventersdorp bedrock played an important role in diamond concentration of the alluvial deposits.

Well-developed splays (e.g. Windsorton and Waldecks Plant on the Vaal River), dolerite dykes, faults and contrasting rock competencies also lead to grade enhancement in younger deposits. Locally plunge and scour pools lead to a high concentration of diamonds.

A dolerite dyke was found on At Last, cutting through the river in the south and running in a northwesterly direction. As in the case of the Saxendrift dolerite dyke, grades are expected to be high on either side of the dyke.

The model presented for the At Last alluvial deposit is based on field observations regarding these deposits, information gained from trial mining and bulk sampling exercises on the property and the basic concepts of fluvial dynamics and Ox-bow formation. This model is meant as a first working model to direct further exploration and facilitate the understanding of exploration areas and should be updated/adapted as more information is gained.

The At Last alluvial gravel deposit can be describe as a cut-off meander or paleo-channels which formed as part of continuous channel migration during the deposition and reworking of the younger Rietputs C and B

gravels, within a relatively wide, alluvium-filled flood plain causing continuous erosion and recycling of alluvium, located between 1 – 10m above the river. No Rooikoppie gravels are present on the property.

Rietputs C gravels are usually found in or near the present river channel and were mined extensively on the farm and adjacent property - all within the At Last Ox-bow. The greatest recorded height of these younger gravels above the present stream is about 23 metres (at Gong-Gong) and the greatest depth below the river bed drops as low as 18 meters (also at Gong-Gong) a depth that is due to the filling of potholes in the bed rock (Photo 3).

Progressive channel migration and incision over a few million years during the Pleistocene period produced a downward spiralling and widening meander system that left the preserved alluvial gravel as elevated islands encircled by shallow dipping meander migration surfaces (MMS) and abandoned channels on the outside, normally filled with fluvial sand. Meander maturation occurs when the current river cut severely into the preserved inner gravel to form the current Vaal River as found at At Last.

The younger clast-supported, cobble/boulder Rietputs C gravels on At Last are overlain by calcretized sands (1 – 3m thick) of the Riverton Formation which are, in turn, succeeded by 1m of red Hutton sands, clayey silt and sand.

Overburden thickness varies between 10 – 18m across the At Last ox-bow with gravel thicknesses varying between 2 – 4m thick and gravels are lying directly on shale or tillite as encountered by historic trial mining and bulk sampling exercises. Potholes (most favourable trap site) are normally filled with wellrounded pebbles/cobbles of andesite and finer gravel of resistant material.

Studies in the surrounding area showed that Ilmenites (96%) are by far the most abundant kimberlitic indicator minerals followed by garnets (4%).

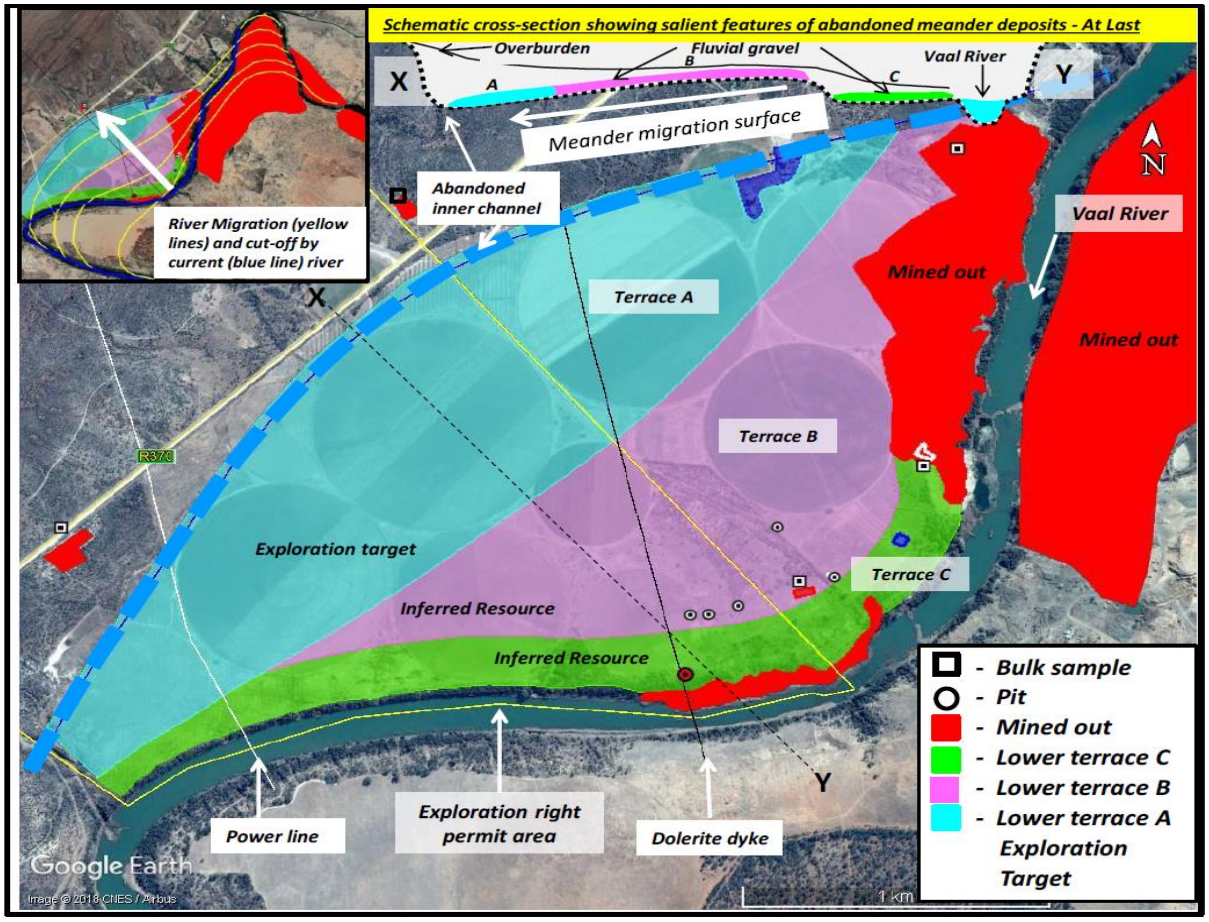


Figure 11. Satellite image showing the position of Alluvial Diamond Deposits and Inferred Resources on At Last.

Property Geology and Geological Model – De Bad

On De Bad, diamondiferous gravels are found within the:

(1) Rietputs C, B and A terraces,
(2) Rooikoppie Gravels

The **Rietputs C** fluvial alluvial gravels are found adjacent to the present-day Vaal River (1 – 5m above the river) which has a total length of 3,5km within the De Bad Ox-bow. The extent of the gravels along the river within the De Bad exploration right is 1.9km. The gravels are generally found in the deeper sections of the channel and may be locally very rich.

Areas of enrichment are usually associated with alluvial traps such as bedrock irregularities, rock bars, plunge pools and the presence of large boulders. This gravel has a bimodal nature to it and consists of angular to well-rounded cobbles and boulders of lava together with rounded to well-rounded pebbles and cobbles of quartzite, agate and chert.

Many years ago, adjacent to the river a pit was made in the Rietputs C gravels, where a few cobbles and boulders can still be found, whilst a small portion of the same gravels were mined by Sonop mining on the adjacent property. A bulk sample was also excavated during the same period on the lower terrace.

The **Rietputs B** fluvial alluvial gravels are found some 800m away from the river, located on elevated terraces, 16 – 18m above the present river. The clast supported, pebble-cobble gravels are 1 – 2 m thick and slightly to massively calcretised, showing weak imbrication. The gravels are overlain by a thin layer of Rooikoppie gravel with an average thickness of 0.5m. The 'rolling' bedrock consists of soft Dwyka tillite. Thicker gravel deposits are found in the deeper, low lying areas on the bedrock.

The **Rooikoppie Gravels** occur as a thin layer covering the Rietputs B fluvial alluvial gravels and extend further away from the terrace to the southeast, up to a height of roughly 21m above the present-day Vaal River. Rooikoppie gravels consist of sub-rounded to well-rounded of the most durable lithologies, such as quartz, quartzite, agate, jasper, chalcedony, fossilized wood and minor BIF. In places Red Hutton sands and soils covers the Rooikoppie gravels.

Rietputs A fluvial alluvial gravels may be present to the southeast of Terrace B up to a height of 21 m above the present river. Well-rounded cobbles mixed with Rooikoppie gravel were found in a small excavation on the northeastern corner of Terrace A. This area requires further investigation.

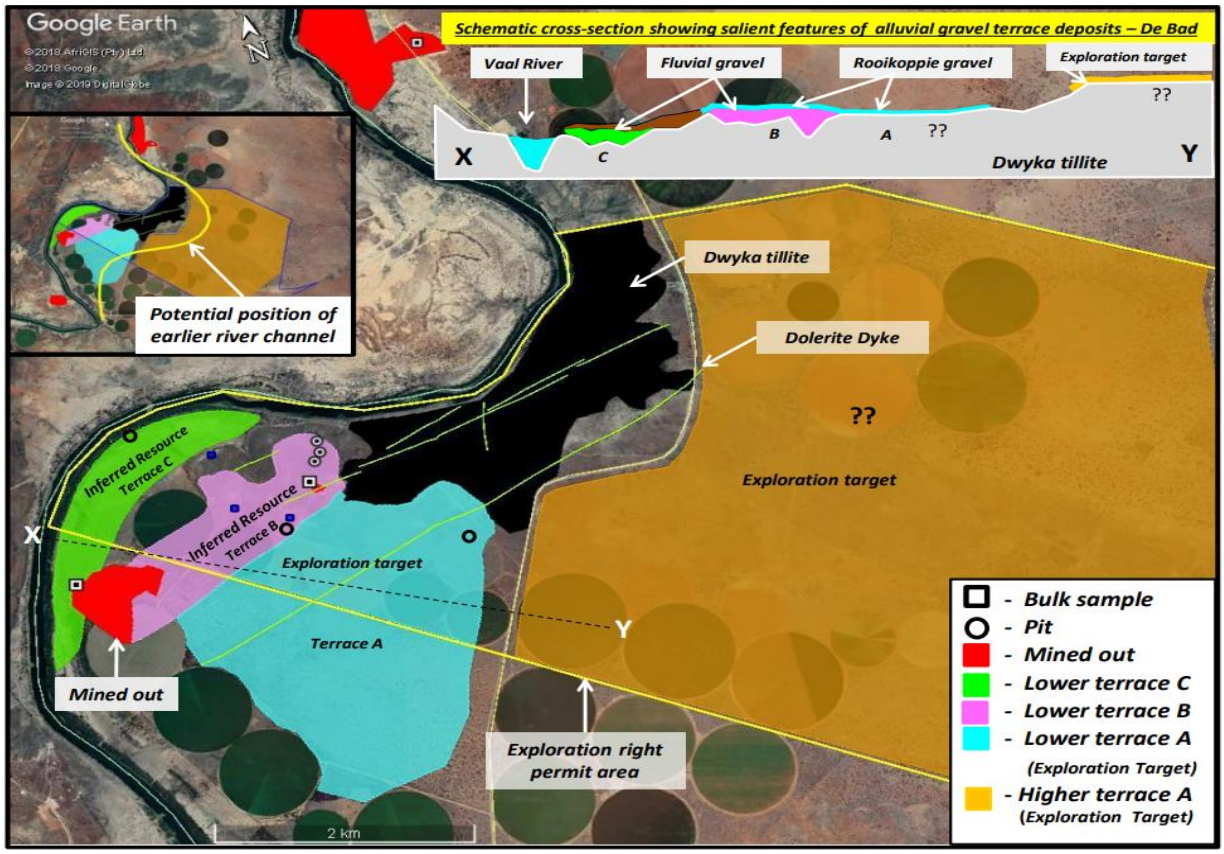


Figure 12. Satellite image showing the position of Alluvial Diamond Deposits and Inferred Resources on De Bad.

4.6 Mineral Resource Map

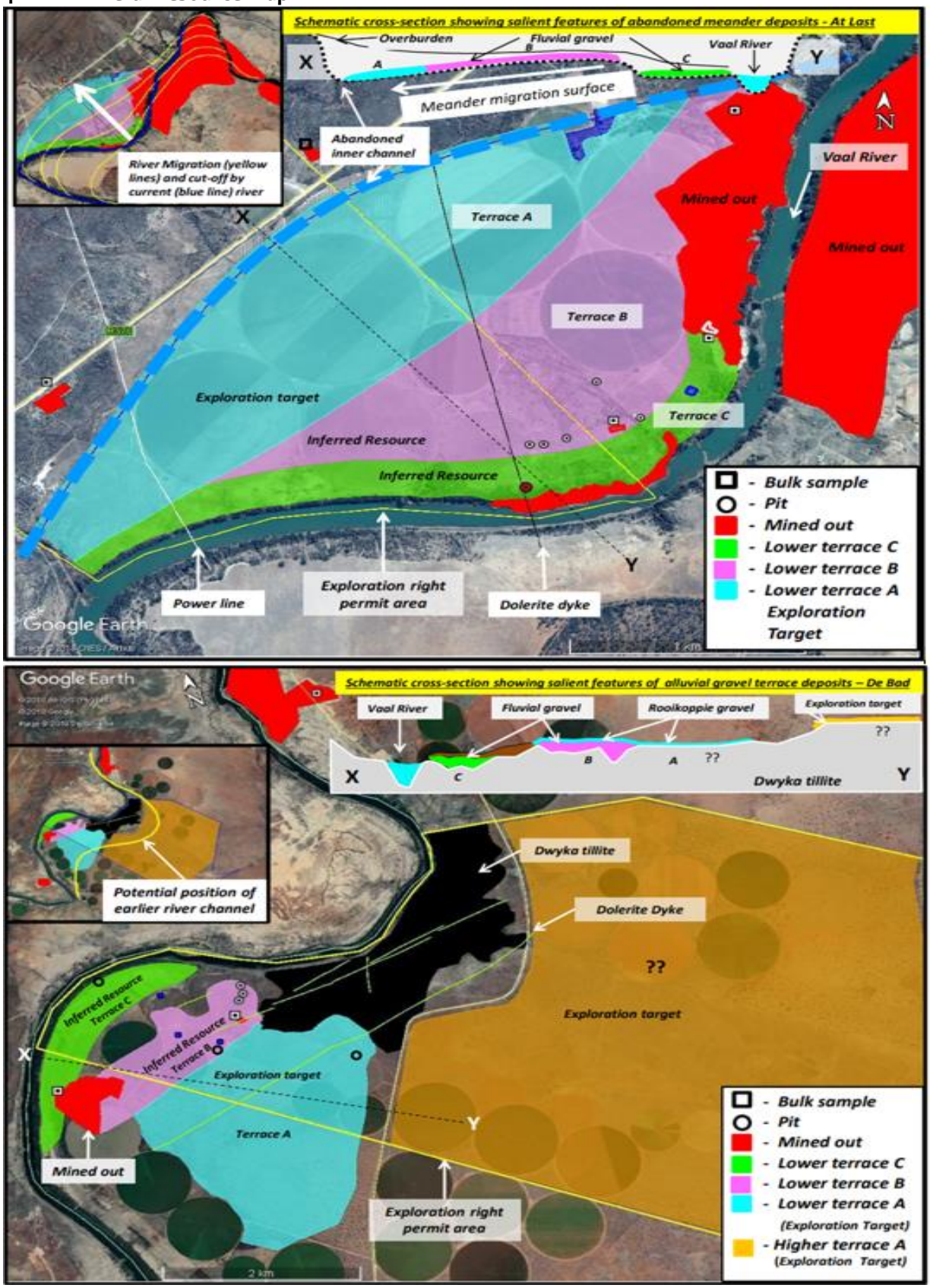


Figure 13. Property maps showing extrapolation of the inferred resources beyond nominal sample spacing.

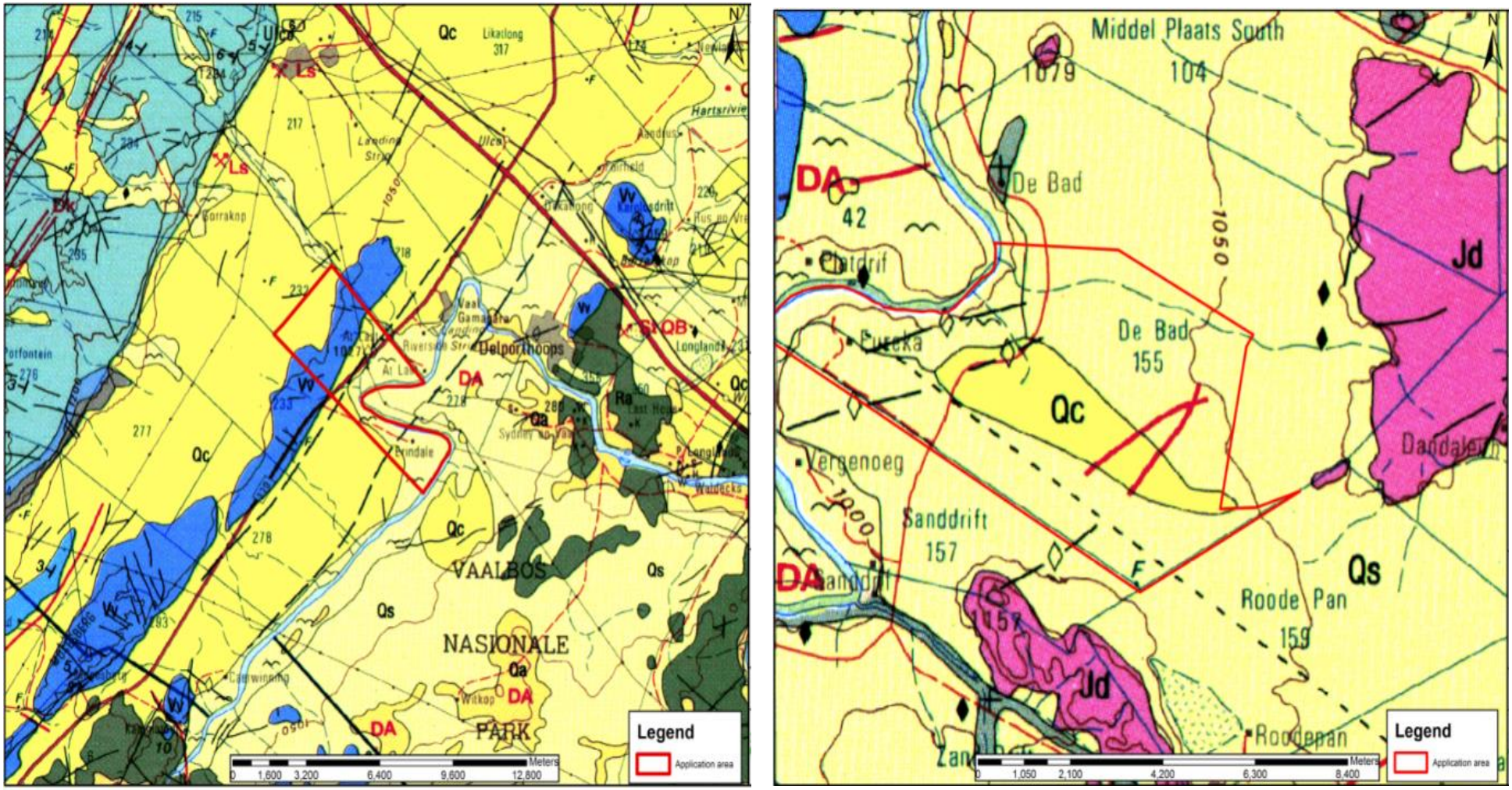


Figure 14. Geological maps of At Last and De Bad

(3) *CLIMATE:*

Regional Climate

The climate of the area is described as semi-arid. The area receives between 250mm and 500mm of rain per annum whilst annual potential evaporation rates varies between 2 600mm and 2 800mm.

Rainfall events generally comprise showers and thunderstorms occurring the summer months during October to March (February and March are generally peak rainfall months). The summers are very hot with cool winters. The data from the weather stations at Kimberley will be used.

Rainfall

Average monthly and annual rainfall for the site and number of days per month with measurable precipitation is presented in the table 2 below:

MONTH	60 MINUTES	24 HOURS	24 HOURS IN 50 YEARS	24 HOURS IN 100 YEARS
January	35.8	57	65.1	73.8
February	70.1	82	58.9	66.5
March	63.7	67.8	72.1	81.4
April	25.7	51.6	65.9	75.2
May	14.6	54.6	36.8	42.4
June	19.1	67.5	26	30.4
July	12	26.7	26.6	31
August	17	58.2	23.4	27.3
September	16.3	26.7	24.1	28
October	37.6	59.2	5308	61.8
November	25.2	60.1	41.2	46.7
December	59.9	64.5	70.7	80.9

Source: Directorate: Climatology South African Weather Bureau Station: 0290468 – Kimberley 1970-2003.

Average monthly maximum and minimum temperatures are presented in the table 3 below:

MONTH	DAILY MAXIMUM °C	DAILY MINIMUM °C
January	32.8	17.9
February	31	17.3
March	28.8	15.2
April	24.8	10.9
May	21.4	6.5
June	18.2	3.2
July	18.8	2.8
August	21.3	4.9
September	25.5	8.9
October	27.8	11.9
November	30.2	14.6
December	32.1	16.6
YEAR	26.1	10.9

Source: Directorate: Climatology South African Weather Bureau © 2000Station: 0290468 – Kimberley: 1960-2000

Wind

The prevailing wind direction for the area is north to north-north-west for the months January to September and changing from north to sometimes westerly winds during October to December averaging 3.5 m/s (Kimberley 01/01/1990 - 31/08/2000, Station 0290468).

Humidity and Evaporation

The average monthly humidity is presented in the table 4 below:

MONTH	AVERAGE (%)	MAXIMUM (%)	MINIMUM (%)
January	47	91	8
February	54	94	12
March	57	96	15
April	60	96	16
May	56	96	16
June	54	97	15
July	49	97	13
August	42	94	10
September	36	91	8
October	39	89	8
November	42	92	8
December	43	90	7
Year	48	94	11

Source: Directorate: Climatology South African weather Bureau © 2000Station: 0290468 – Kimberley: 1960-2000

The average monthly evaporation is presented in the table 5 below:

MONTH	**EVAPORATION IN mm**
	SYMONS PAN
January	365.6
February	279.1
March	235.8
April	169.1
May	135.1
June	108.6
July	130.1
August	181.2
September	252.6
October	314.9
November	345.5
December	378.6
YEAR	2896

Source: South Africa Weather Bureau Station: 0290468 – Kimberley: 1957-1987

Incidents of Extreme Weather Conditions

- **Hail**

Hail is sometimes associated with thunderstorms and mainly occurs in early to late summer (November to February). It occurs on average three times a year and although these storms may sometimes be severe and cause much damage, they usually impact on a relatively small area.

- **Frost**

The period during which frost can be expected lasts for about 120 days (May to August). With extreme minimum temperatures to below -8°C at night in the winter, frost development can be severe.

- **Droughts**

Droughts are common and may vary from mild to severe. During these periods dust storms sometimes occur, depending mainly on denudation of the surface.

- **Wind**

High winds are unusual but when they do occur can uproot trees and take off roads.

(4) ***TOPOGRAPHY:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area topography was described and included in this report.

The topography of De Bad is characterised by plains with open low hills or ridges, with the slopes towards the river being classified as rolling or irregular plains with low hills or ridges. At Last is associated with plains with open high hills or ridges. Altitude ranges from 1 000 m above sea level along the river for both sites, to 1 020 – 1 046 m along the plains on De Bad and 1020 – 1080 m on At Last. The terrain is indicated by a gentle slope of around 1 % across the plains but increases slightly to 2 % towards the ridges that slope towards the river.

Since no exploration or mining activities will be undertaken in the present river channel, bank-full discharge conditions will have no effect on operations. Even during floods, the effect on operations will be negligible, since the modern-day floodplains are not exploration targets.

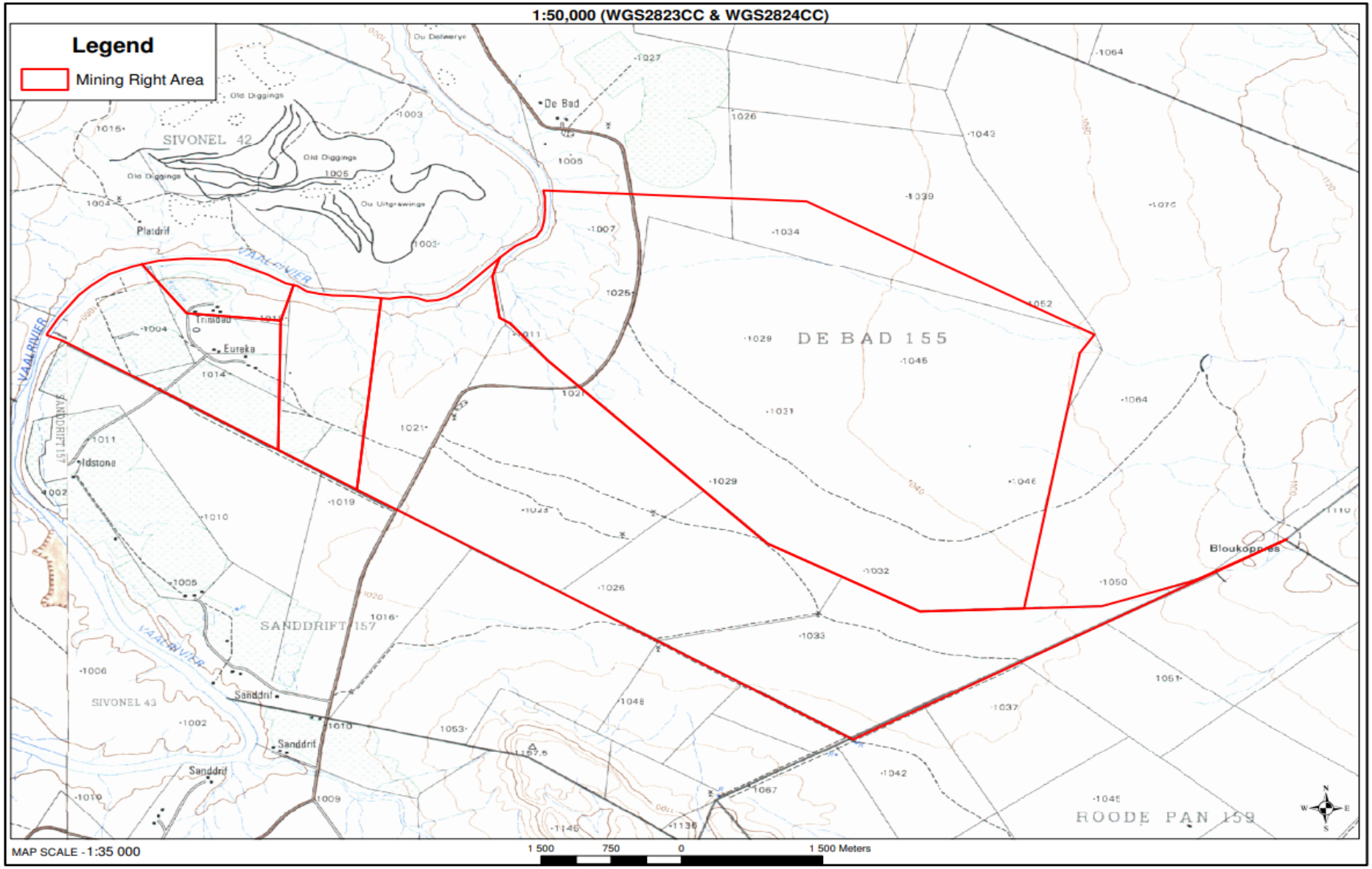


Figure 15. Topographical Map of De Bad in Kimberley district 1:50 000 application area indicated by RED line.

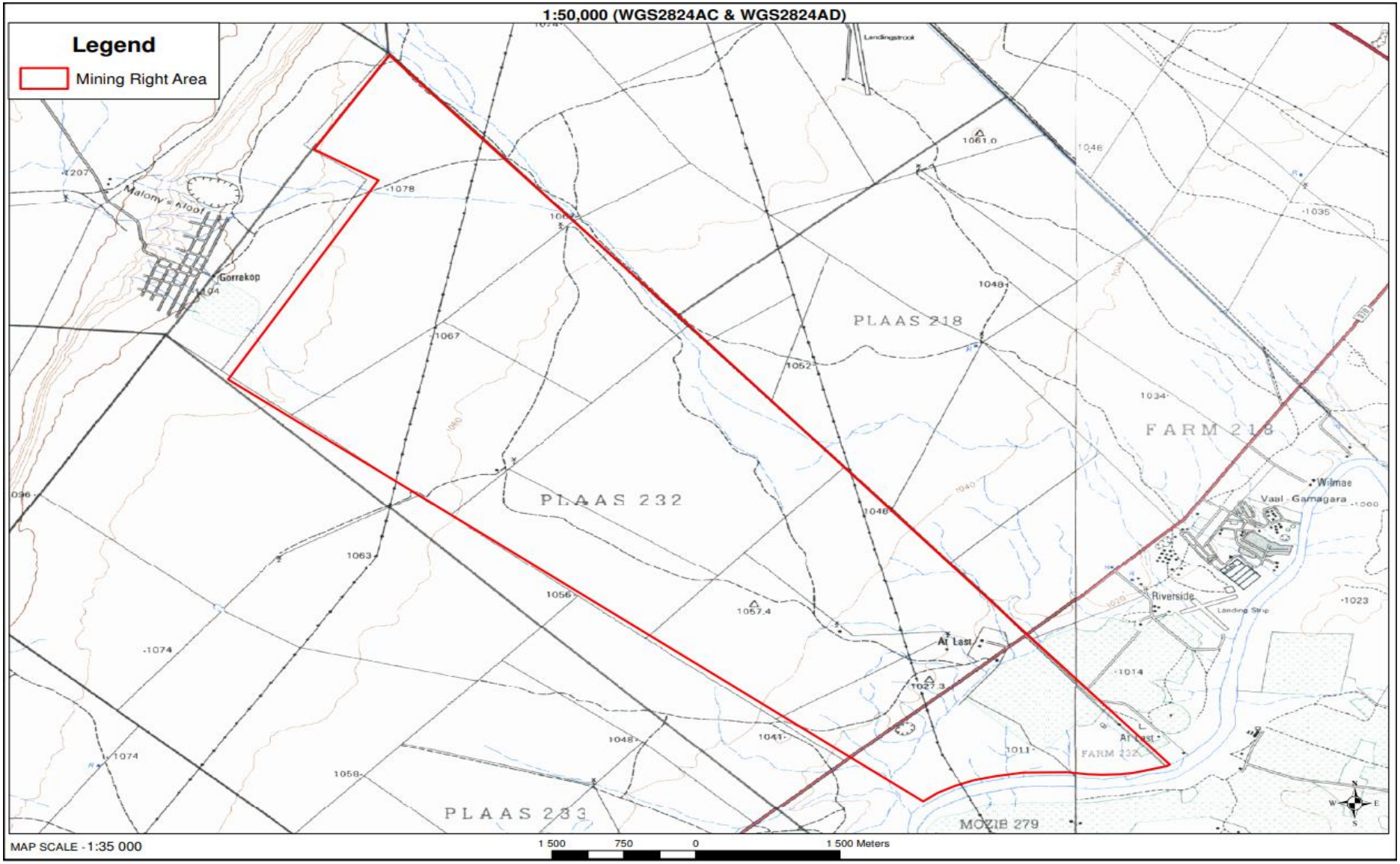


Figure 16. Topographical Map of At Last in Barkly-Wes district 1:50 000 application area indicated by RED line.

(5) ***SOILS:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area soil was described and included in this report.

Land types include Fc7 and Ae15 on De Bad, and Fc5 and Dc5 on At Last. Soils associated with the Fc5 and Fc7 land types are typically Glenrosa and/or Mispah forms, with lime generally present in the entire landscape. Dc5 land types include soils where prismacutanic and/or pedocutanic diagnostic horizons are dominant, but with one or more of vertic, melanic, red structured diagnostic horizons also being present. The Ae15 land type is associated with red-yellow apedal, freely drained soils, red, with a high base status and that are more than 300 mm deep, without dunes. The Vaal River is typically represented by terrain unit 5, while the plains are associated with terrain unit 4. The ridge slopes are presented by unit 3.

The generally level to gently sloping land of the plains produces low water erosion risk, but due to shifting sands being present it is highly susceptible to wind erosion. Erosion risks on the steeper slopes of the ridges are higher in terms of water erosion, and any pure sands found here will also be highly susceptible to wind erosion. The soils also have moderately high susceptibility for crusting and compaction.

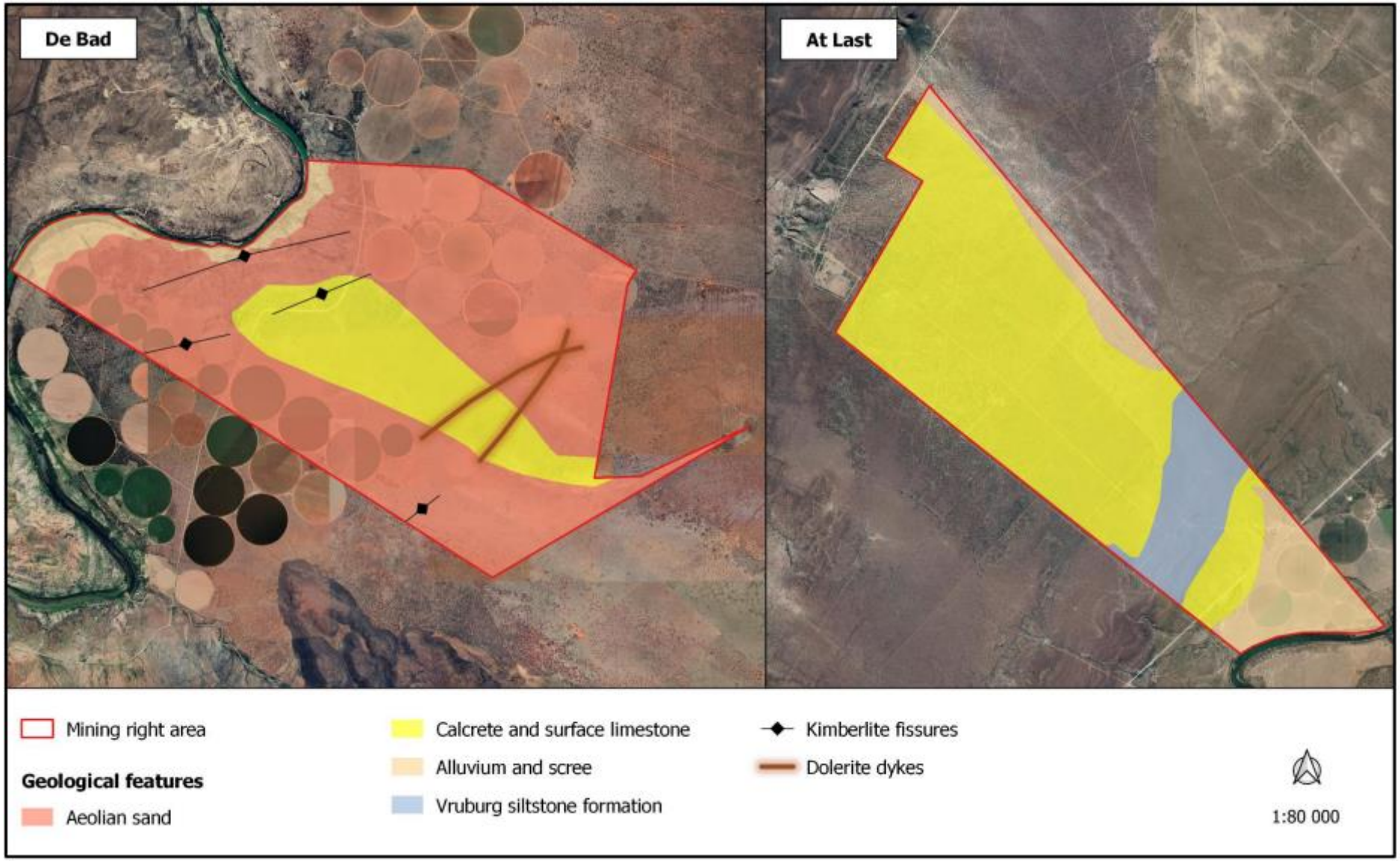


Figure 17. The distribution of geological features in the study area

(6) *LAND CAPABILITY AND LAND USE:*

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area Land capability and land use was described and included in this report.

Pre-mining Land Capability

De Bad and At Last are situated in a rural area, with major land uses in the region including mining and agriculture. According to AGIS, both sites are highly suitable for irrigation. De Bad falls within the Douglas East Potential Agricultural Area (PAA), with a B rating, while At Last falls within the Delportshoop PAA, with a D rating. The agricultural region is demarcated for cattle farming, with the grazing capacity estimated at 13 - 15 Ha/LSU.

Currently, the property is used for agricultural activities, with extensive crop irrigation, especially along the river, while the remaining natural pastures are utilised by domestic stock. Existing infrastructure include homesteads, farm tracks, power lines and grazing camps, while large areas have been transformed for agriculture and evidence of historic mining activities are also visible.

Land Use Prior to Mining

Currently, the property is used for agricultural activities, with extensive crop irrigation, especially along the river, while the remaining natural pastures are utilised by domestic stock.

Historical Agricultural Activities and evidence of Abuse

Large areas have been transformed for agriculture and evidence of historic mining activities are also visible.

Existing Structures

Existing infrastructure include homesteads, farm tracks, power lines and grazing camps, while large areas have been transformed for agriculture and evidence of historic mining activities are also visible.

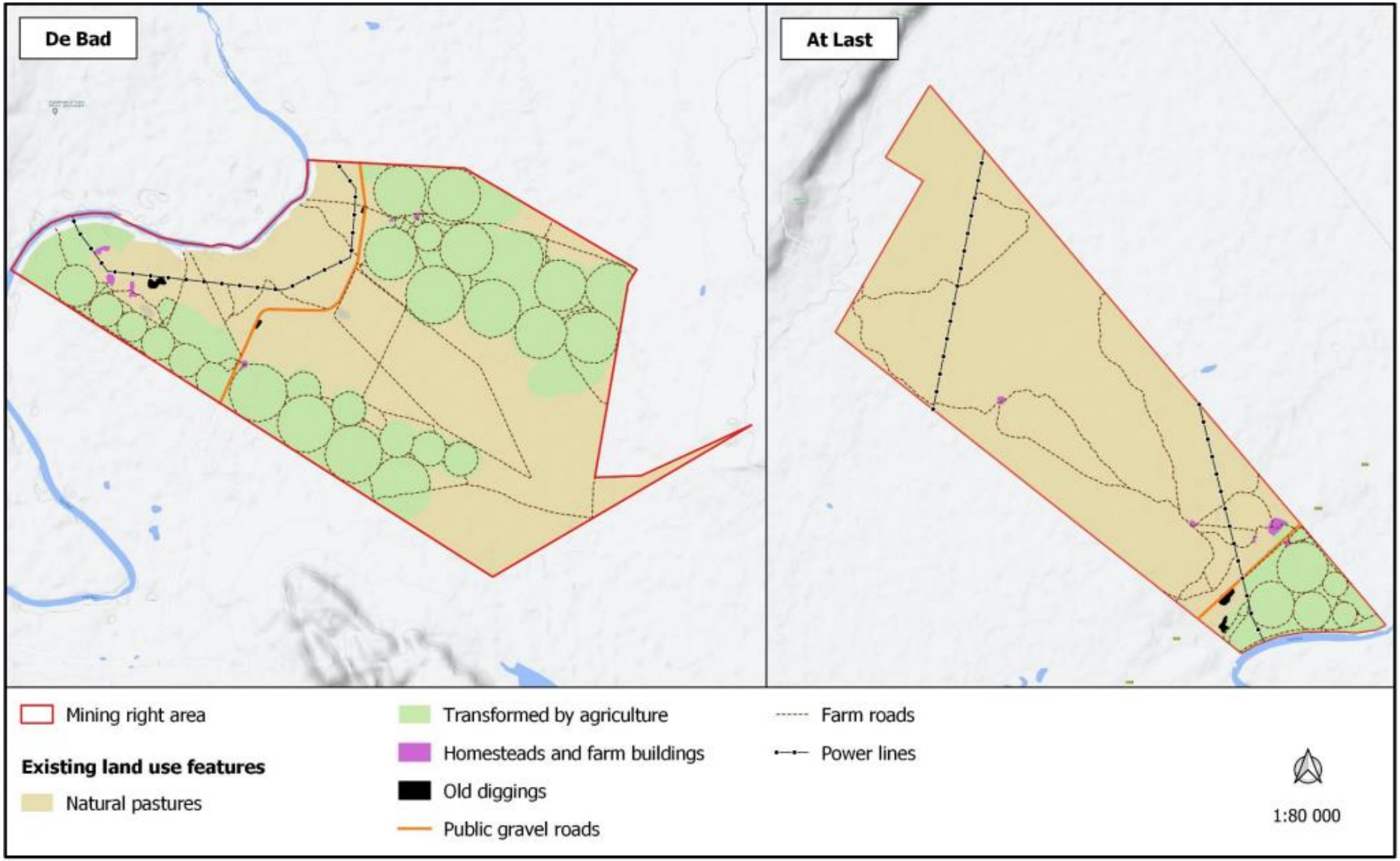


Figure 18. Evidence of existing infrastructure and past disturbance in the study area.

(7) ***NATURAL FAUNA:***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area Natural Fauna was described and included in this report.

According to Section 3(a) and 4(a) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009, no person may, without a permit by any means hunt, kill, poison, capture, disturb, or injure any protected (Schedule 2) or specially protected (Schedule 1) wild animals. Furthermore, Section 12 (1) of NCNCA states that no person may, on a land of which he or she is not the owner, hunt a wild animal without the written permission from the landowner. According to the act "wild animal" means a live vertebrate or invertebrate animal, and the egg or spawn of such animal.

The landscape features on the De Bad & At Last site provides several habitat opportunities to faunal communities and wild animals likely to be found in the study area are discussed in their respective faunal groups below.

Mammals

As many as 59 terrestrial mammals and nine bat species have been recorded in the region, of which Vervet Monkey, Steenbok, Suricate, Slender Mongoose and Kudu were encountered during the site visit. Small rodent burrows and Black-backed Jackal scat were also observed.

Seven listed terrestrial mammal species and two listed bat species potentially occur in the area. Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA.

The African Straw-coloured Fruit-bat, Aardvark, Aardwolf, Cape Fox, Bat-eared Fox, African Striped Weasel, African Wildcat, Black-footed cat, Honey Badger, Striped Polecat and South African Hedgehog all have a high chance of occurring on site, given their wide habitat tolerances and preference for the dominant savanna habitat found on site. Cape Clawless Otter and Spotted-necked Otter also have a high likelihood to occur in the study area, but they are expected to be restricted to the Vaal River.

Dent's Horseshoe Bat has a low potential to be found on site. It prefers rocky outcrops and caves and no suitable roosting sites have been

observed on site. Temminck's Ground Pangolin and Brown Hyaena also have a low potential to occur on site. Although their habitat requirements and natural distribution ranges overlap with that of the study area, they are both rather sensitive to anthropogenic habitat disturbances. Farm fences and the extensive agricultural activities on site are expected to restrict their occurrences across their natural distribution range in the area.

Problem animals confirmed on site are Vervet Monkey and Black-backed Jackal, but Caracal is also expected to occur in the study area.

Reptiles

The De Bad and At Last mining area lies within the distribution range of at least 55 reptile species. No listed species are known to occur in the area, but most reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA, except for agamas, geckos and skinks. Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard) and Chamaeleo dilepis dilepis (Common Flap-neck Chameleon). The Karusa Lizard is a rock-dwelling species, while the Common Flap-neck Chameleon is typically found high up in bushes or trees.

Three species from the region are endemic to South Africa, i.e. Homopus femoralis (Greater Padloper), Pachydactylus mariquensis (Common Banded Gecko) and Agama aculeata distanti (Eastern Ground Agama).

Amphibians

Fifteen amphibian species are known from the region. The Vaal River and ephemeral pans are considered to be the most important habitats for amphibians in the study area, as most frogs are dependent on water, specifically for breeding. Higher amphibian diversity is expected in these habitats, while the adults of those species which are relatively independent of water (Tandy's Sand Frog, Tremolo Sand Frog, Boettger's Caco, Karoo Toad) are likely to be common in the terrestrial habitats, where they normally aestivate under logs, stones and animal burrows during the dry season.

The Giant Bull Frog (Pyxicephalus adspersus) is listed as Near Threatened in the Southern African Frog Atlas and is protected according to Schedule 1 of the NCNCA. They prefer seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna, but mainly remain buried up to 1 m underground until conditions become favourable. The site lies within the known distribution of this species, and the ephemeral pans on De Bad present ideal habitats for it.

All other amphibians of the study area are protected according to Schedule 2 of NCNCA.

Avifauna

The study site does not fall within or near (<50 km) any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 283 bird species have been recorded from the region, of which as many as 24 are listed and classified as Vulnerable, Near Threatened, Endangered or Critically Endangered. Furthermore, all birds are protected either according to Schedule 1, 2 or 3 of NCNCA. Plants in general, from grass tufts to shrubs and tall trees provide important micro-habitats to birds in the terrestrial habitats. The Vaal River and ephemeral pans further increases habitat opportunities to birds and therefore the study area is expected to host a diverse avifauna community.

Many of the species of conservation concern are expected to occur on site either by occasionally passing over, foraging or nesting. The most common listed bird species expected to occur in the terrestrial habitats on site include Ludwig's Bustard, Kori Bustard, Short-clawed Lark, Tawny Eagle, Martial Eagle, Secretarybird, while most of the specially protected (Schedule 1) owls and raptors are also expected to occur here. African Fish Eagle were heard calling from the Vaal River during the field survey and they usually occupy tall trees in the riparian woodland. The ephemeral pans might attract protected water birds such as Black-winged Pratincole, Yellow-billed Stork, Maccoa Duck, Lesser Flamingo, Greater Flamingo and Greater Painted-snipe; but only during wet seasons.

Fish

In addition to those regulations in the NCNCA pertaining to wild animals, Section 32 and 33 of the NCNCA states that no person may, without a permit angle and not immediately release, catch, import, export, transport, keep, possess, breed, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) fish. No fish are expected to occur in the ephemeral pans, even when filled, mainly due to their ephemerality. However, nine fish species are expected to be found in the Vaal River.

Most of the fish species in the study area are listed as least concern, but the Vaal-orange Largemouth Yellowfish is listed ar Near-Threatened. It is endemic to the Orange-Senqu and Vaal River systems in the Orange-Senqu River Basin and although it is widespread in these systems and their tributaries, it is not abundant. It is being threatened by the continuous decline in water quality, the destruction of suitable

spawning beds due to erosion, as well as a slow growth rate and late maturing with low fecundity. It prefers lotic systems, with clear water that has a gravel or sand bottoms. Juveniles feed on a wide variety of aquatic organisms while adults are mostly piscivorous and act as apex predators. Furthermore, all fish species of the study area are protected either according to Schedule 1 or 2 of the NCNCA. Specially protected (Schedule 1) species include the Vaal-orange Largemouth Yellowfish, Vaal-orange Smallmouth Yellowfish and Moggel.

Invertebrates

Invertebrates dominate inland habitats and play a significant role in the overall function of the ecosystem (Kremen et al. 1993, Weisser and Siemann 2004). In general, they are widely distributed and extremely diverse, which makes it almost impossible to list all species that may possibly occur on site without a dedicated study. Invertebrates have also not been surveyed as comprehensively as plants, mammals and birds and therefore current available data on their distribution is much scarcer. Nevertheless, key morphospecies and species of conservation concern are discussed here, as well as the major habitats which delimit possible invertebrate communities on site.

Eight invertebrate species of the Northern Cape appear on the IUCN Red Data list of threatened species and are listed. However, none of these species' distribution ranges overlap with that of the study area. In addition, those species that are specially protected according to Schedule 1 of the NCNCA include all Velvet worms as well as some baboon spider species, Stag Beetles and the Flightless Dung Beetle. Of these, common Baboon Spiders (Harpactira sp.) have been recorded in the region.

All Rock- Creeping- and Burrowing Scorpions are protected according to Schedule 2 of the NCNCA, along with several beetles, butterflies and moths. Of these, Burrowing and Rock Scorpions as well as some Gossamer-winged Butterflies, Skippers, Brush-footed Butterflies and Satyrs have the highest likelihood to be found on site. All other invertebrates from the class Insecta and Arachnida are protected according to Schedule 3 of the NCNCA.

Three major habitats delimit possible invertebrate communities in the study area:

Terrestrial vegetation classified as Karoo for insect preference (Picker et al. 2004)

All of the terrestrial vegetation communities on site fall within this karoo habitat. Invertebrate communities associated with the karoo vegetation

represent unique species assemblages, with an above-average representation of beetles, grasshoppers, flies, wasps and lacewings. The protected butterflies, scorpions and baboon spiders discussed above are expected to be associated with this habitat. Invertebrate activity during the site visit was low, but termitaria most likely belonging to Trinervitermes trinervoides, and scorpion burrows were observed.

Ephemeral wetlands

Ephemeral wetlands (pans) host aquatic invertebrate species that are specifically adapted to ephemerality. Crustaceans in particular are specialists of these pans and dominate them. Their eggs lie dormant in the soil until the pans are inundated. They then hatch and mature rapidly to produce eggs that accumulate in the top few centimetres of the sediment. These eggs are heat and drought resistant and ensure the continued existence of species in a habitat. The egg banks are essentially the vault that contains the biodiversity of the aquatic habitat during times of drought. Any disturbances to the soil will expose the eggs to erosion and crushing, which will result in species losses and possible extinction. Not much is known about the species distribution or conservation status of species in the Northern Cape, but Spinicaudata (Clam shrimps) hatched from sediment collected on site. They usually co-occur with other crustaceans such as Notostraca (Tadpole shrimps), Anostraca (Fairy shrimps), Cladocera (water fleas), Ostracoda (Seed shrimps) and Copepoda (Copepods). Within a few days after the wetlands are inundated a number of wetland birds will arrive to forage on the crustaceans as their main food source. If the pans remain wet enough the water birds will stay longer to start nesting and breeding. Therefore, the crustaceans are essential components in the food web. These pans also act as important breeding and feeding links to birds in terms of connectivity, by providing stepping-stone corridors in an arid landscape. The disturbance or destruction of these pans will not only impact the specialised pan invertebrate communities locally but will also have a regional and landscape-level effect.

Vaal River

Invertebrates expected to be associated with the Vaal River include Flatworms, earthworms, leeches, freshwater crabs, mussels and prawn, basket clams, freshwater bivalve- and pulmonate snails, bladder snails, pond snails, prong-gilled mayflies, small squaregill mayflies and numerous other species of mayflies, jewel damselflies, narrowwinged damselflies, clubtail dragonflies, emerald dragonflies, skimmers dragonflies, grass moths, giant water bugs, water boatmen, water striders, water treaders, marsh treaders, creeping water bugs, water mites, sponges, water scorpions, backswimmers, pygmy backswimmers, riffle bugs, long-horned caddisflies, microcaddisflies,

net-spinning caddisflies, diving beetles, riffle beetles, whirligig beetles, water scavenger beetles, long-toed water beetles, minute moss beetles, biting midges, meniscus midges, mosquitoes, house flies, black flies, horse flies, crane flies and nematoceran flies. generalist species like water boatmen, predaceous diving beetles, whirligig beetles, biting midges, non-biting midges and mosquitos.

NATURAL FLORA:

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area Natural Flora was described and included in this report.

Broad-scale vegetation patterns

The study area falls within the Savanna Biome (Mucina and Rutherford 2006). According to the vegetation map of Mucina and Rutherford (2012), the sites are represented by two broad-scale vegetation units, i.e. Kimberley Thornveld and Schmidtsdrif Thornveld. This vegetation map however does not reflect the true character of the site, because it has not been mapped at a very fine scale. Therefore, field-based classification of small-scale vegetation patterns are discussed in the next section.

Kimberley Thornveld is distributed in the North-West, Free State and Northern Cape Provinces at altitudes between 1 050 and 1 400 m. It is found in the Kimberley, Hartswater, Bloemhof and Hoopstad Districts, but is also within the Warrenton, Christiana, Taung, Boshof and Barkly West Districts. The unit is typically presented as slightly undulating sandy plains with a well-developed tree and shrub layer and an open grass layer. Andesitic lavas of the Allanridge Formation occur in the north and west, while fine-grained sediments of the Karoo Supergroup are found in the south and east. Soils are deep, sandy to loamy, and of the Hutton form. The most common land types are Ae and Ah.

Figure 19. The distribution of land types in the study area.

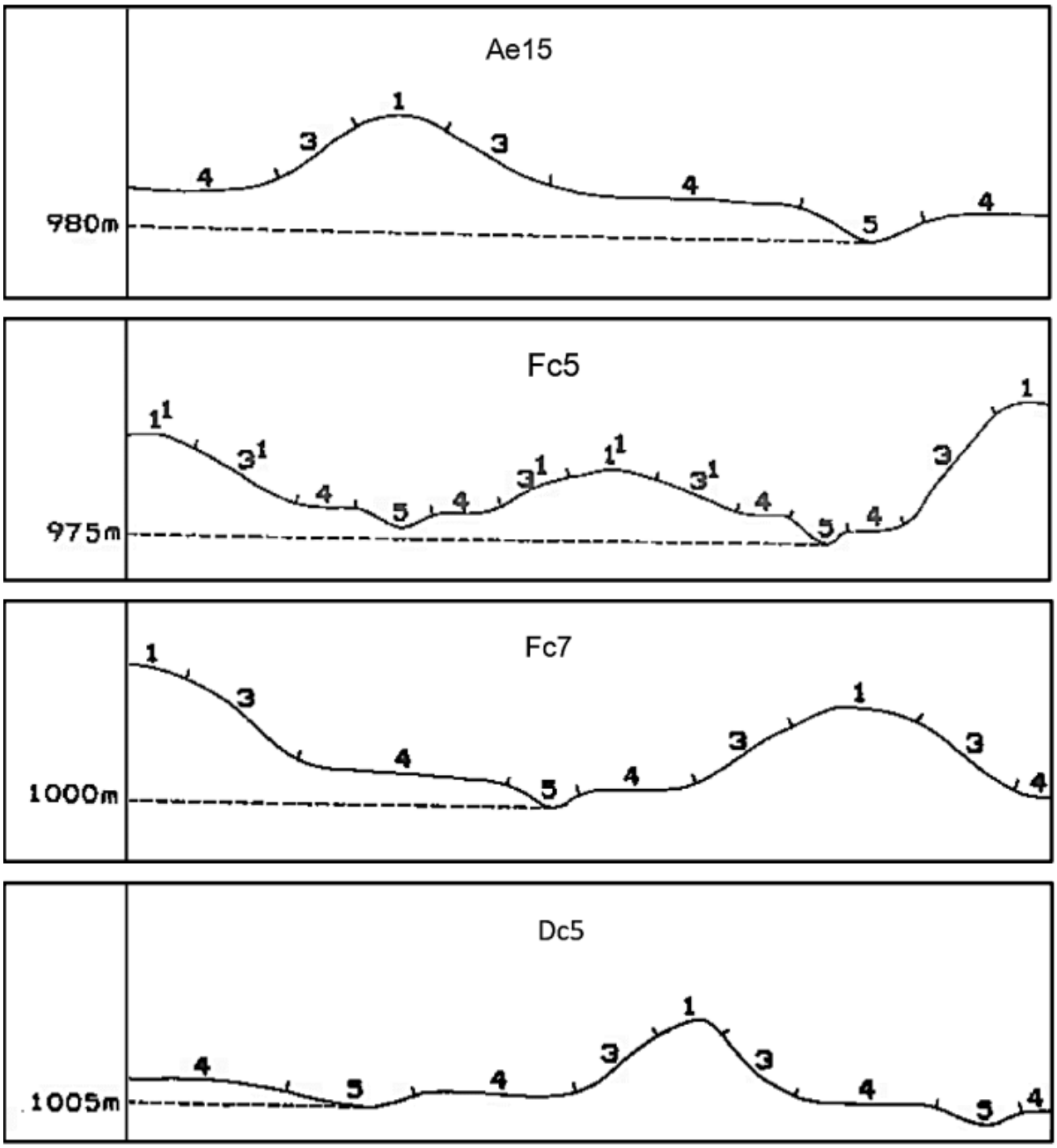


Figure 20. The land types and terrain units associated with the study area.

The unit is classified as being least threatened, but 18 % has already been transformed, predominantly by cultivation. Only 2 % is currently conserved in statutory reserves and no endemic species are known from this unit. It is specifically prone to Acacia mellifera encroachment following overgrazing, but the occurrence and risk of erosion is very low.

Figure 21. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area

Schmidtsdrif Thornveld is distributed in the Northern Cape, Free State and North-West Provinces at altitudes between 1 000 and 1 350 m. It stretches from the footslopes and midslopes to the southeast and below the Ghaap Plateau from around Douglas in the southwest via Schmidtsdrif towards Taung in the northeast. A small less typical section is found east of the Ghaap Plateau from Warrenton towards Hertzogville. The unit is typically presented as a closed shrubby thornveld dominated by Senegalia mellifera and Vachellia tortilis. Apart from grasses, bulbs and annual herbs are also prominent. The vegetation is very disturbed in some areas due to overgrazing by goats and other browsers. Dwyka diamictites and Ecca shales of the Karoo Supergroup are the most significant geological features in this unit, Shale and dolomite of the Schmidtsdrif Subgroup (Griqualand West Supergroup) are also present. Surface limestone occurs sporadically. The soils are well drained, stony and shallow (< 0.3 m), with large angular rocks found on the surface. A soil rock complex with Mispah soil form is typical, while the unit is mainly associated with the Ae and Dc land types. The unit is least threatened, with 13 % being transformed mainly by cultivation. A very small portion (0.2 %) used to be conserved in the de-proclaimed Vaalbos National Park, but it is no longer statutorily conserved. Erosion is very low to low. No endemic species are known from this unit and Prosopis spp. are significant alien invaders.

Fine-scale vegetation patterns

The proposed finer scale vegetation communities were delineated according to plant species correspondences and changes in soil structure. The vegetation of the study area can be divided into six distinct units, which are described below. These descriptions include unique characteristics and the dominantspecies found in each unit. A complete plant species list, including those species historically recorded in the region, is presented in Appendix 1 of the ecological study. Areas that have already been transformed by agriculture are indicated on the map but will not be discussed further.

i) Senegalia mellifera - Stipagrostis uniplumis thornveld on rocky ridge slopes

This community occurs along the ridge slopes on De Bad. The vegetation is presented as thornveld with tall shrubs scattered in a grassy matrix. Much of this community has been degraded by historic land use activities. Red sand and rock constitute approximately 5 – 10 % of the ground cover. Crustose lichens and biological soil crusts are also conspicuous in some areas, but for most parts the latter has been destroyed by trampling.

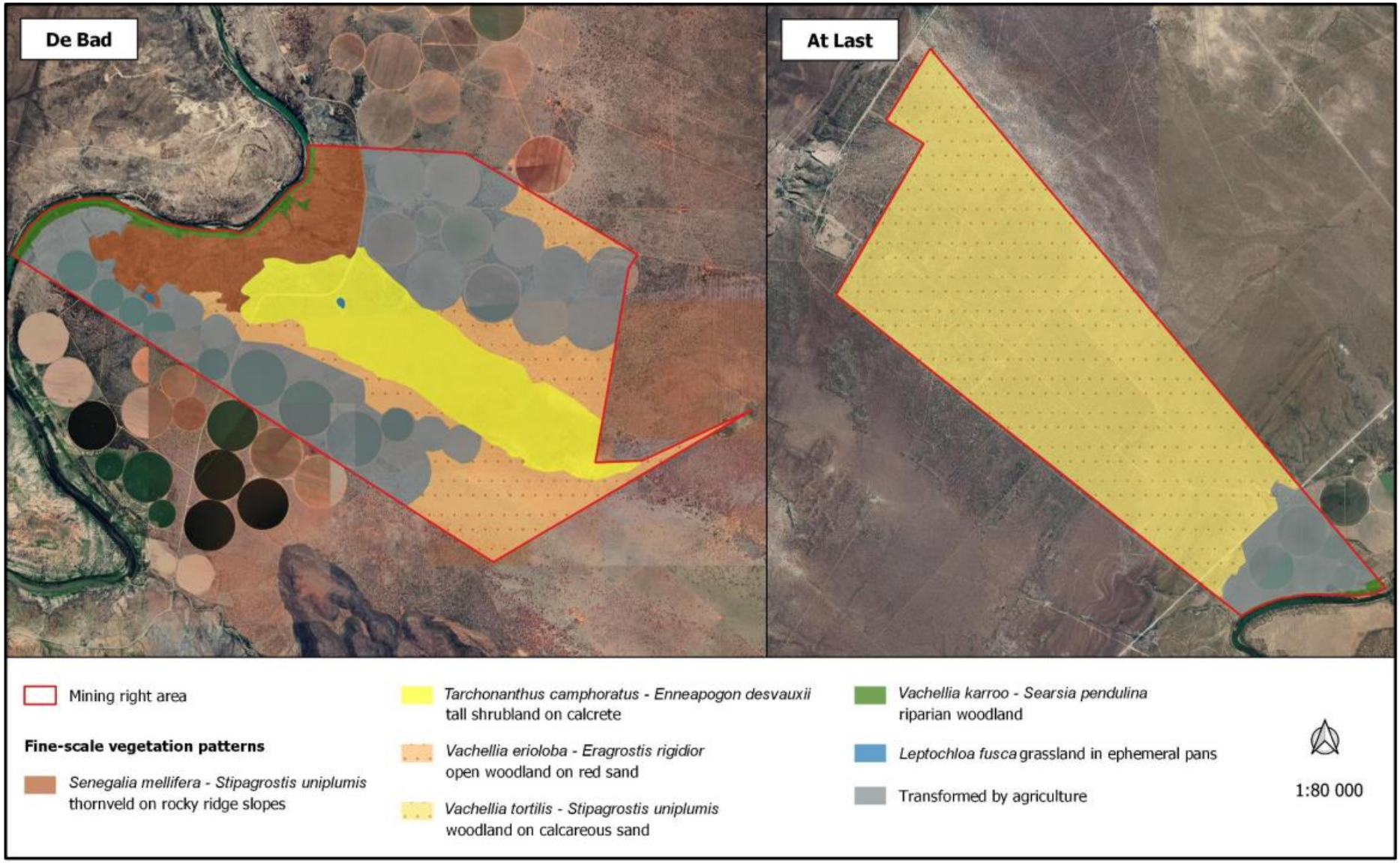


Figure 22. The distribution of fine-scale plant communities in the study area.

The tallshrub layer is dominated by Senegalia mellifera, with Grewia flava also being very abundant. Other common tall shrubs include Phaeoptilum spinosum, Tarchonanthus camphoratus, Ehretia rigida, Ziziphus mucronata subsp. mucronata, Gymnosporia buxifolia and Rhigozum trichotomum. Trees, Vachellia tortilis, V. erioloba and Olea europaea subsp. africana are also scattered across the thornveld. Low shrubs include Plinthus karooicus, Lycium cinereum, Pentzia incana, Lasiosiphon polycephalus, Leonotis pentadentata, Aptosimum marlothii, A. indivisum, Asparagus laricinus, Justicia incana, Melolobium candicans, Kleinia longiflora and Viscum rotundifolium.

The grass layer is dominated by Stipagrostis uniplumis, but Eragrostis lehmanniana is also abundant. Other common grasses include Fingerhuthia africana, Cenchrus ciliaris, Eragrostis echinochloidea, Heteropogon contortus, Enneapogon cenchroides and Aristida congesta subsp. barbicollis.

Herbs include Lessertia annularis, Helichrysum argyrosphaerum, Nemesia fruticans, Sebaea exigua and Oxalis lawsonii. Succulents, Aloe claviflora and A. grandidentata are also found here.

The herbaceous weed Bidens pilosa, along with invasive Prosopis trees and shrubs are also common in this unit.

ii) Tarchonanthus camphoratus - Enneapogon desvauxii tall shrubland on calcrete

This community is associated with the calcrete and surface limestone deposits in the centre of De Bad. Here, the vegetation comprises tall shrubland within a grassy matrix, intermixed with low shrubs. It is found on shallow, rocky soil, which constitutes approximately 5% of the ground cover.

The tall shrub layer is dominated by Tarchonanthus camphoratus, but Senegalia mellifera is also abundant. Other common species include Ziziphus mucronata subsp. mucronata,
Rhigozum trichotomum, Grewia flava and Cadaba aphylla. Low shrubs include Justicia divaricata, Pentzia calcarea, Eriocephalus ambiguus, Felicia fascicularis, Lycium cinereum, Thesium hystrix and Rosenia humilis.

The grassy matrix consists of a clear short- and tall grass component. Enneapogon desvauxii dominates the short-grass component, while Aristida vestita dominates the tall-grass component. Other common grasses include Enneapogon cenchroides, Fingerhuthia africana,

Cenchrus ciliaris, Eragrostis lehmanniana, E. echinochloidea, Heteropogon contortus and Themeda triandra. Herbs include Senecio consanguineus and Helichrysum argyrosphaerum.

iii) Vachellia erioloba - Eragrostis rigidior open woodland on red sand

This community is restricted to deep red sand, which comprise the majority of De Bad, but most of it has been completely transformed for crop irrigation. Here, the vegetation is presented as an open woodland, where tall trees are scattered in an extensive grassland matrix. Bare ground constitutes approximately 5% of the ground cover.

Vachellia erioloba dominates the tree layer, with large adult individuals providing refugia for other tall shrubs, such as Lycium hirsutum and Grewia flava, the grass Setaria verticillata, as well as the herb Senecio consanguineus. Senegalia mellifera is also starting to encroach on the grassland.

The grassland is strongly dominated by Eragrostis rigidior, but Eragrostis lehmanniana, E.pallens, Pogonarthria squarrosa and Stipagrostis uniplumis is also common. Low shrubs found in the grassy matrix include Lasiosiphon polycephalus, Selago densiflora and Plinthus karooicus. Herbs include Nemesia fruticans, Oxalis lawsonii and Lotononis laxa. The bulb Trachyandra bulbinifolia is also found here.

iv) Vachellia tortilis – Stipagrostis uniplumis woodland on calcareous sand

This community covers most of At Last and is found on sandy soil over rock, with calcrete being prevalent. The vegetation is presented as woodland, with tall trees scattered in a grassy matrix.

The tree layer is dominated by Vachellia tortilis and a secondary tall shrub layer, dominated by Senegalia mellifera has also encroached the matrix. Other trees and tall shrubs scattered across this community include Boscia albitrunca, Diospyros lycioides, Grewia flava, Searsia burchellii, S. tridactyla, S. lancea, Tarchonanthus camphoratus, Ziziphus mucronata and Rhigozum obovatum. Common low shrubs include Pentzia calcarea, Felicia fascicularis, Lycium horridum, Asparagus glaucus, Viscum rotundifolium, Lasiosiphon polycephalus, Seddera capensis, Justicia divaricata and Jamesbrittenia tysonii.

The grass layer is dominated by Stipagrostis uniplumis, but other common grasses include Eragrostis echinochloidea, E. lehmanniana, Cenchrus ciliaris, Enneapogon cenchroides, Cymbopogon pospischilii, Themeda triandra, Aristida meridionalis, Setaria verticillata and Aristida congesta subsp. congesta. The herb Salvia disermas is also found here.

v) Vachellia karroo - Searsia pendulina riparian woodland

The riparian woodland lines the Vaal River on both De Bad and At Last. Although it is the main vegetation along the riverbank, it is broken up by bare areas and floodplains that have been degraded through land use activities and erosion. The woodland is fairly monotonous, and the vegetation seems to have been severely degraded, most likely by recent flooding events. Vachellia karroo dominates, but Searsia pendulina, Lycium bosciifolium, Diospyros lycioides subsp. lycioides, Asparagus sp., and Eucalyptus camaldulensis are also common woody components. The understory has been infested with Bidens bipinnata and Argemone ochroleuca in places. Phragmites australis is common along the water line, and the floodplains are dominated by the grass Cynodon dactylon and the bulb Moraea pallida.

vi) Leptochloa fusca grassland in ephemeral pans

The ephemeral pans on De Bad are occupied by monotonous grassland vegetation in the centre, with tall shrubs lining the periphery. Leptochloa fusca dominates the grassland, with Eragrostis rigidior occurring sporadically. The low shrub Selago densiflora, herb Lotononis laxa and bulb Ornithogalum flexuosum are also found here. The woody component lining the peripheries include Diospyros lycioides subsp. lycioides, Ziziphus mucronata subsp. mucronata, Lycium bosciifolium and Grewia flava. Argemone ochroleuca has infested the understory in places.

Population of sensitive, threatened and protected plant species

The SANBI Red List provides information on the national conservation status of South Africa's indigenous plants, while the National Forests Act (No. 84 of 1998) (NFA) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) restricts activities regarding sensitive plant species. Section 15 of the NFA prevents any person to cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a
licence granted by the Minister. Section 49 (1) and 50 (1) of the NCNCA states that no person may, without a permit pick, transport, possess, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) plants. Furthermore, Section 51(2) states that no person may, without a permit, pick an indigenous plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

Most species of the region are classified as least concern; a category which includes widespread and abundant taxa. However, one species, i.e. Salsola microtricha is listed as "Data Deficient - Taxonomically Problematic" under the National Environmental:

Biodiversity Act (Act No. 10 of 2004) (NEMBA). The genus Salsola needs taxonomic revision because its species are poorly defined and difficult to separate. Therefore, based on currently available data, the risk of extinction of this species cannot be assessed. This species was not encountered on site, but it has been recorded in the region in the past.

Species protected in terms of the National Forests (NFA) Act No 84 of 1998 include Vachellia erioloba, V. haematoxylon and Boscia albitrunca. The latter species is also protected according to the NCNCA (Schedule 2). It was not recorded on De Bad but is expected to occur on At Last, in the pristine woodland to the west of the public gravel road,
which has not been earmarked for mining.

Vachellia erioloba was most abundant in the woodland on red sand, where it was found at very high densities of 20 - 30 individual per hectare. Here, all size classes were also present, from saplings of 80 cm (h) x 60 cm (d), all the way through to large mature adults of 5 m (h) x 15 m (d). It also occurred in the thornveld on rocky ridge slopes, but at very low densities of <1 individuals per hectare. Here, they primarily occurred as young adult trees of 3 m (h) x 2.5 m (d). Vachellia haematoxylon was not recorded in the study area.

All Lessertia species are protected in terms of Schedule 1, and Lessertia annularis was recorded in the thornveld on rocky ridge slopes.

Species protected in terms of Schedule 2 include Olea europaea subsp. africana, all Aizoaceae species previously included in the family Mesembryanthemaceae, all species in the family Asphodelaceae and Iridaceae, as well as all Gymnosporia, Ornithogalum, Oxalis, Jamesbrittenia and Nemesia species.

Weeds and invader plant species

Weeds and invasive species are controlled in terms of the National Environmental Management: Biodiversity (NEMBA) Act 10 of 2004, the Conservation of Agricultural Resources (CARA) Act 43 of 1993, as well as the NCNCA (Schedule 6). These are species that do not naturally occur in a given area and exhibit tendencies to invade that area, and others;
at the cost of locally indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds and invader species into categories. All declared weeds and invasive species recorded in the study region are listed, along with their categories according to CARA, NEMBA and NCNCA.

Indicators of bush encroachment

Bush encroacher species are controlled in terms of Regulation 16 of CARA; where land users of an area in which natural vegetation occurs and that contains communities of encroacher indicator plants are required to follow sound practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs. Declared indicators of bush encroachment in the Northern Cape, recorded in the study area, are listed in Table 6.

Table 6. Declared indicators of bush encroachment in the Northern Cape recorded in the study area.

Scientific name	Common name
Grewia flava	Velvet raisin
Rhigozum trichotomum	Three – thorn rhigozum
Senegalia mellifera	Black thorn

(8) ***SURFACE WATER AND WETLANDS***

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area surface water and wetlands was described and included in this report.

De Bad and At Last fall within the Vaal D/S Bloemhof quaternary catchments C92A and C92B of the Lower Vaal Water Management Area. These quaternary catchments have been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) by Delport and Mallory (2002) and information regarding their mean annual rainfall, evaporation potential and runoff is provided in Table 7.

According to The South African Inventory of Inland Aquatic Ecosystems (SAIIAE), De Bad and At Last fall within the Eastern Kalahari Bushveld Bioregion, where 1.3 % of the land area is covered by inland wetlands, including depressions, floodplains, seeps and valley-bottom wetland types (Van Deventer et al. 2019).

Table 7. Catchment characteristics for the Vaal D/S Bloemhof quaternary catchments in which the study area fall, as presented by Delport and Mallory (2002).

Mining site	Quaternary catchment	Catchment Area (km^2)	Mean Annual Rainfall (mm)	Mean Annual Evaporation (mm)	Mean Annual Runoff (10^6 m^3)
At Last	C92A	3 923	367	2 250	13.91
De Bad	C92B	1 979	331	2 225	5.02

The spatial extent according to the present ecological status per wetland type is depicted in Table 8. Depressional wetlands are most abundant in this bioregion, with the majority being severely modified. Most of the remaining wetland types in this Bioregion are also moderately- to severely modified.

According to SAIIAE, the study area comprises depressional wetlands as well as a river channel that lines De Bad in the west and At Last in the east. All of the depressional wetlands on site are classified as Least Concern, but the Vaal River is classified as Critically Endangered.

Table 8. Percentage of inland wetland spatial extent according to the present ecological status per wetland type of the Eastern Kalahari Bushveld Bioregion.

Wetland type	Total Extent (%)	% Natural or near-natural (A/B)	% Moderately modified (C)	% Heavily to severely/critically modified (D/E/F)
Depression	57.1	70.5	5.7	23.8
Floodplain	2.2	0.6	48.8	50.5
Seep	17.2	10	15.1	75
Valley-bottom	23.5	0.9	29.6	69.5

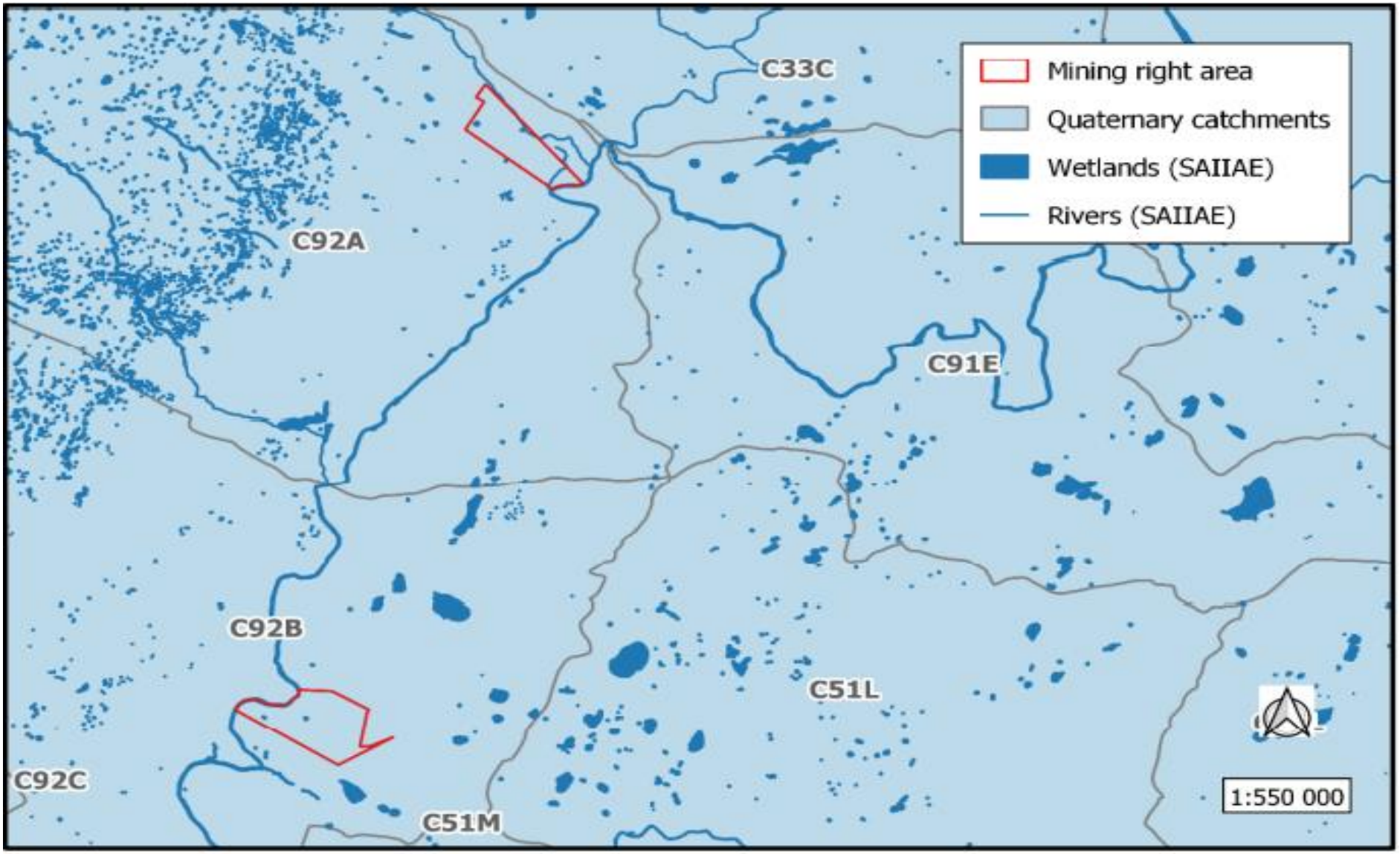


Figure 23. The locality of the proposed mining area in relation to the quaternary catchments of the Lower Vaal Water Management Area

WATERCOURSE DELINEATION AND CLASSIFICATION

Two depressional wetlands, one river (Vaal River), and several drainage lines were identified on site. The wetland features associated with the Vaal River includes an active channel, floodplains, and riparian woodland. A minimum GIS buffer of 200 m is indicated here for the depressional wetlands and river features and the post-mitigation buffer requirements for the drainage lines are 20m. However, it is recommended that a conservative approach be opted for and that the pre-mitigation buffer width of 30m be adopted where possible.

The depressional wetlands covers a total area of ± 2.4 ha, with their entire surface areas falling within the boundaries of the mining right area. Their catchments cover a total area of ± 350 ha of which all fall within the study area. The active channel of the Vaal River lines the boundaries of At Last, but ± 29 ha falls within the boundaries of De Bad. No floodplains are found on At Last, while the floodplains on De Bad cover ± 13 ha. Riparian woodland occupies a total of ± 37 ha within the study area. The drainage lines flow from the plains and ridges, downwards towards the river of which a total combined length of ± 50 km occurs within the study area.

The two depressional wetlands are the main assessment units considered for this mining right area due to the fact that both fall within the areas earmarked for core mining activities. They are found on plains terrain and their Hydrogeomorphic Unit (HGMU) classification is described below, up to Level 6. The river and ephemeral drainage lines will not be further defined, but their buffer requirements should be honoured during the mining operation to minimise impacts to these systems.

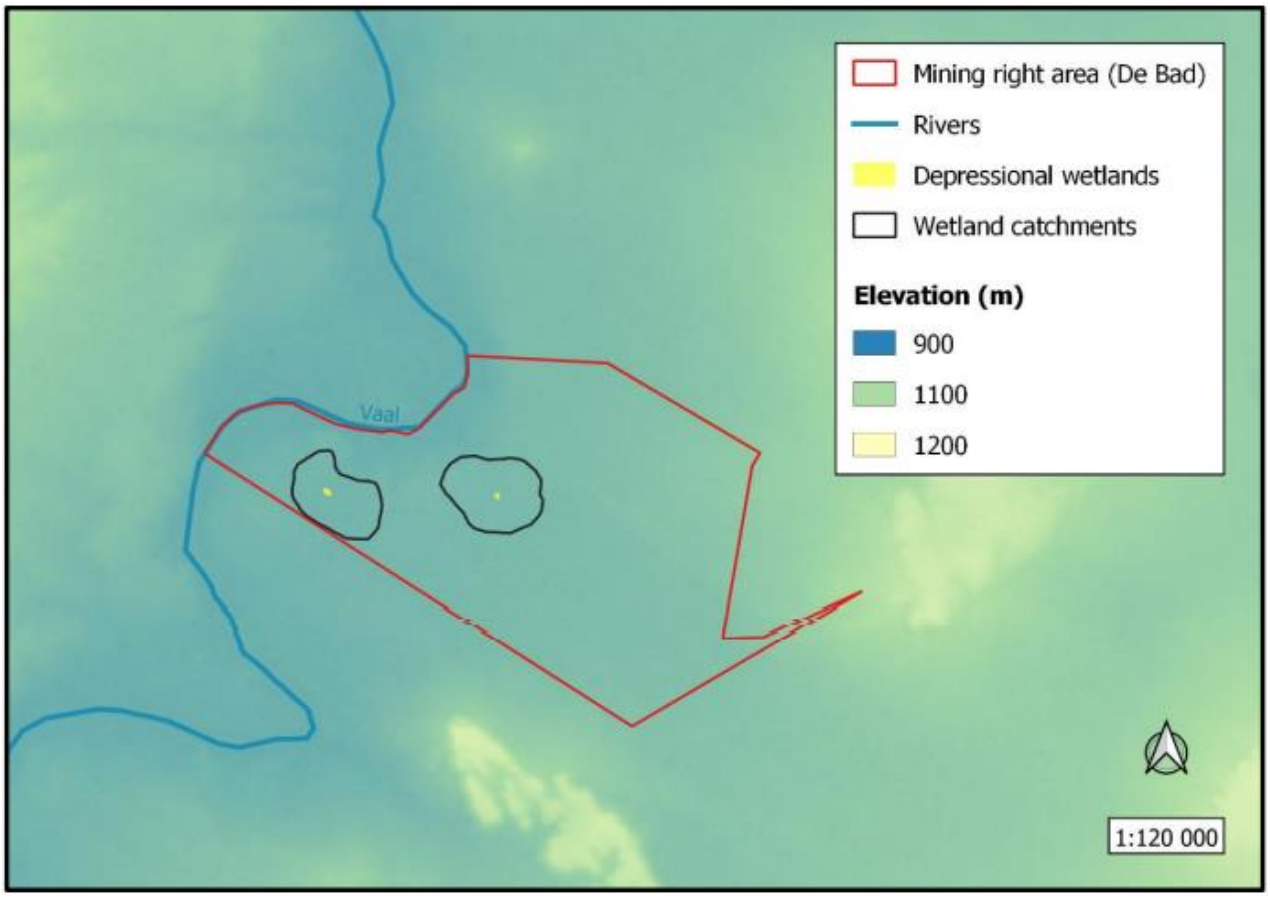


Figure 24. A digital elevation model, indicating the catchment areas of the depressional wetlands on De Bad.

HGMU1: NATURAL ENDORHEIC DEPRESSIONS

The wetlands are all classified as natural endorheic depressions, with high a confidence rating. Water enters the depressions primarily through direct precipitation and overland inflow. The wetlands are only filled after substantial summer rainfall events and are therefore intermittently and rarely inundated. The depressions have clear (turbidity < 100 NTU) and fresh (EC = 23 µS/cm) water, with neutral (6.8) pH. The soils are only intermittently saturated, and the soils do not show any soil wetness indicators. The substrata comprise sandy clay loam soils intermixed with some gravel. The depression floors are vegetated with grasses, bulbs and low-growing herbs, comprising indigenous species. The vegetation form is best described as grassland, dominated by facultative wetland species (Leptochloa fusca), intermixed with bulbs and mat forming herbs.

Wetland Health Assessment (PES)

Depression 1 is considered to be moderately modified (PES C), i.e. loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. Depression 2 is considered to be largely natural (PES B), i.e. a small change in natural habitats and biota may have taken place but the ecosystem functions

are still predominantly unchanged. The two assessment units are indicated in Figure 25, including their 200m GIS buffers and catchment areas. Impact sources are described in Figure 26.

For Pan 1, the natural hydrology and water quality have been most affected, while the natural geomorphology and vegetation are still considered to be unmodified. The most significant direct impacts occur from the adjacent crop irrigation activities, which falls within the buffer and catchment area. These increase the risk of pollution and artificial nutrient input to the pan, which ultimately affects the water quality. Indirect impacts include general surface disturbances, in the form of farm roads, that cut through the wetland buffer, altering its natural geomorphology and hydrologic regime. Farm buildings in the catchment area caused disturbances to the natural vegetation in increased the presence of alien invasive and bush encroaching species in the catchment. Old mining activities have also altered the geomorphology further up in the catchment, increasing the risk of sedimentation to some degree.

Pan 2 remains largely unmodified and the only main impact to this system is the public gravel road and smaller farm roads that cut through its buffer and catchment. These alterits natural hydrologic regime, with secondary risk of sedimentation, which affects the natural water quality.

The current state of the hydrology, geomorphology, water quality and vegetation are expected to remain stable if no mining takes place within the buffer or catchment areas. However, if proposed mining activities proceed within the catchment area, the geomorphology and vegetation is likely to deteriorate slightly, while the hydrology and water quality is likely to deteriorate substantially. Mining within the buffer and wetland itself will have more serious implications, to the effect that the wetlands will most likely be destroyed.

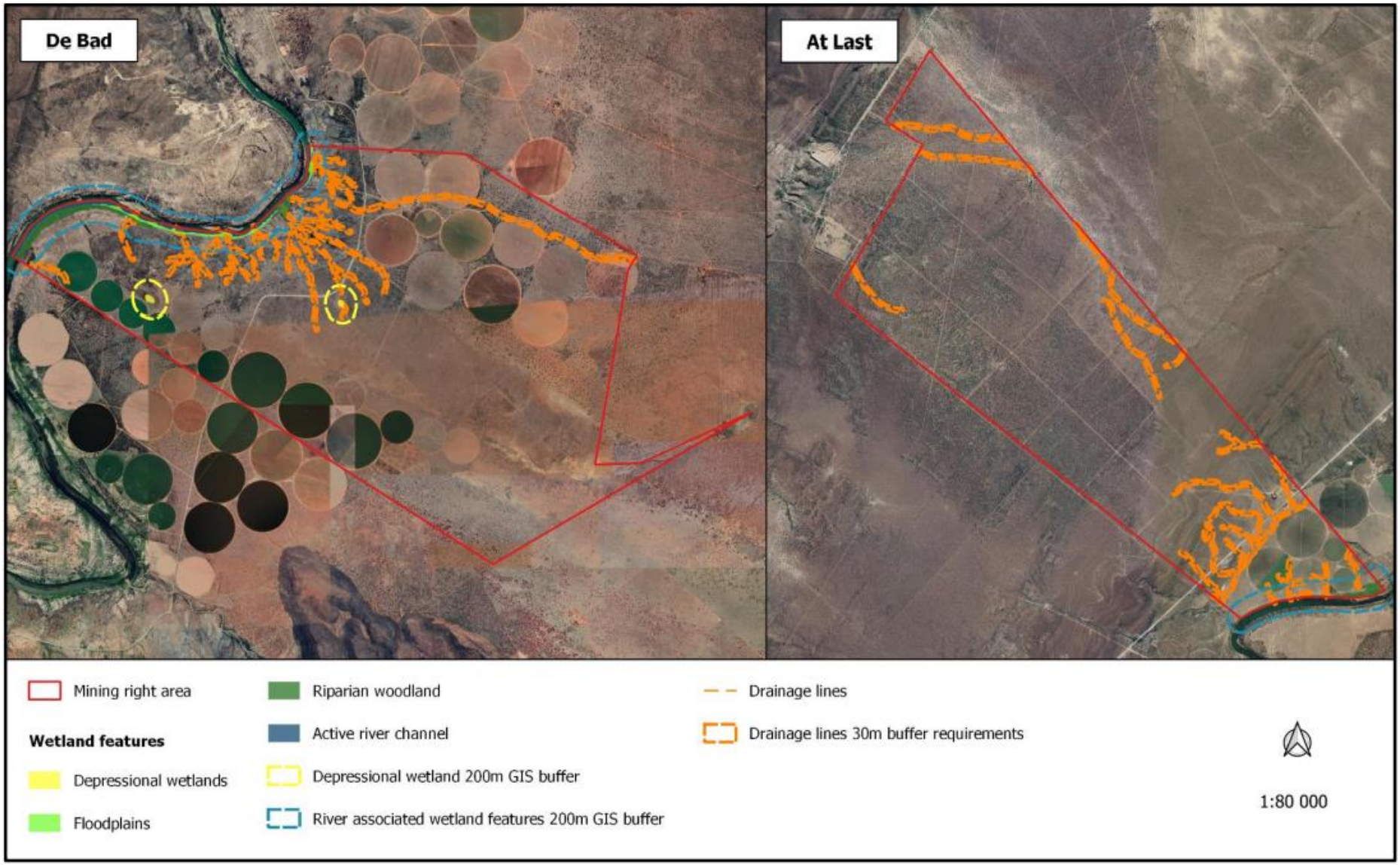


Figure 25. The delineation of watercourses in the mining right area, along with their GIS buffer requirements.

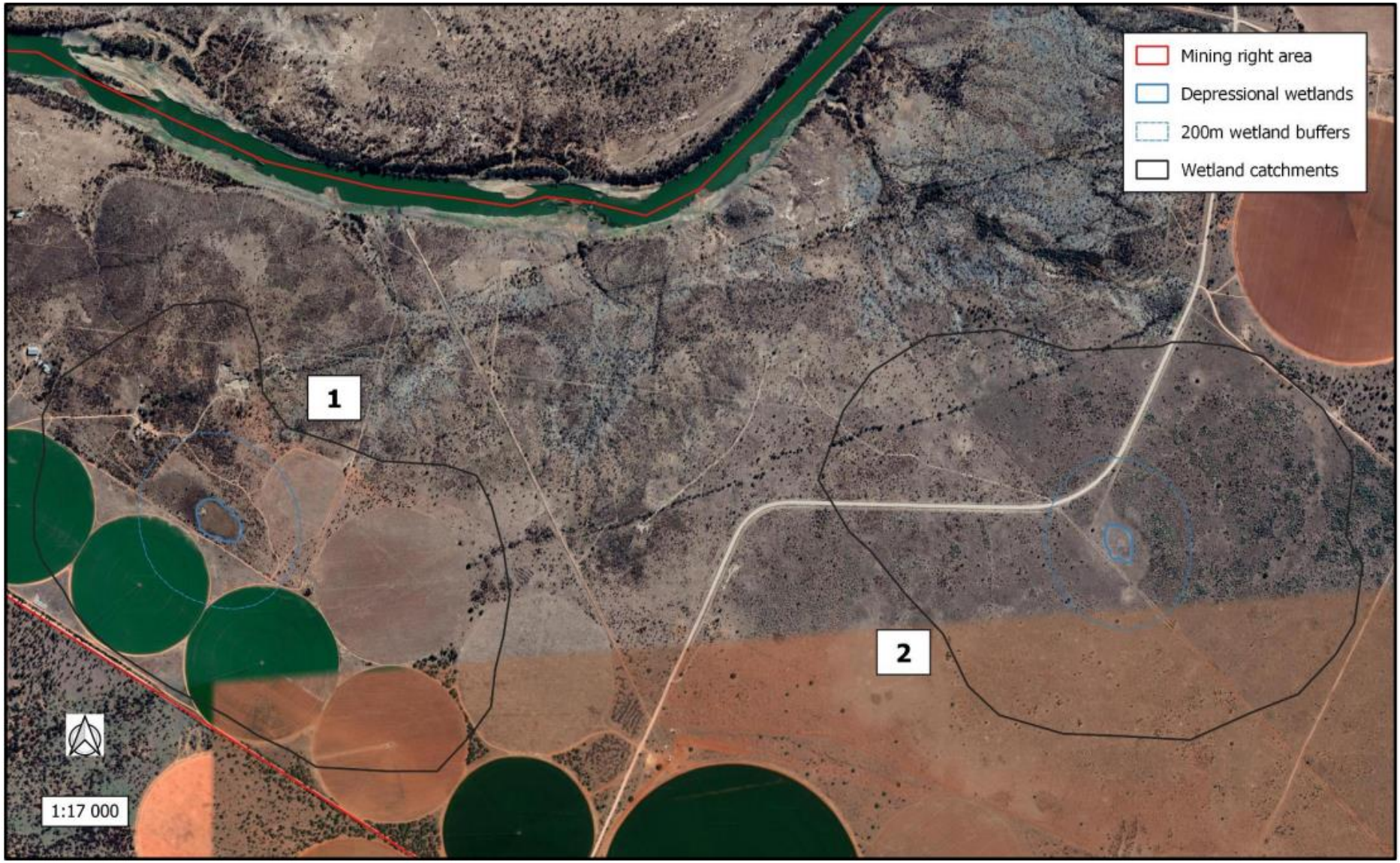


Figure 26. The depressional wetland assessment units on De Bad, indicating their 200m GIS buffer requirements and catchment areas.

Pan 1

Pan 2

Roads
A public gravel road without culverts cuts through the wetland buffer of depression 2 and farm roads traverse the buffers of both pans.

Source: External, secondary

Associated impacts:
- Impeded natural flow of runoff water
- Reduction in flood peaks
- Increased erosion and sedimentation

Irrigated crops
Extensive crop irrigation occurs in the catchment and buffer areas of Pan 1.

Source: External, direct

Associated impacts:
- Impeded natural flow of runoff water
- Reduction in flood peaks
- Increased erosion and sedimentation
- Loss of natural vegetation
- Artificial input of nutrients
- Pollution of water resource
- Change in water quality

Figure 27. Features impacting the PES of the De Bad depressional wetlands.

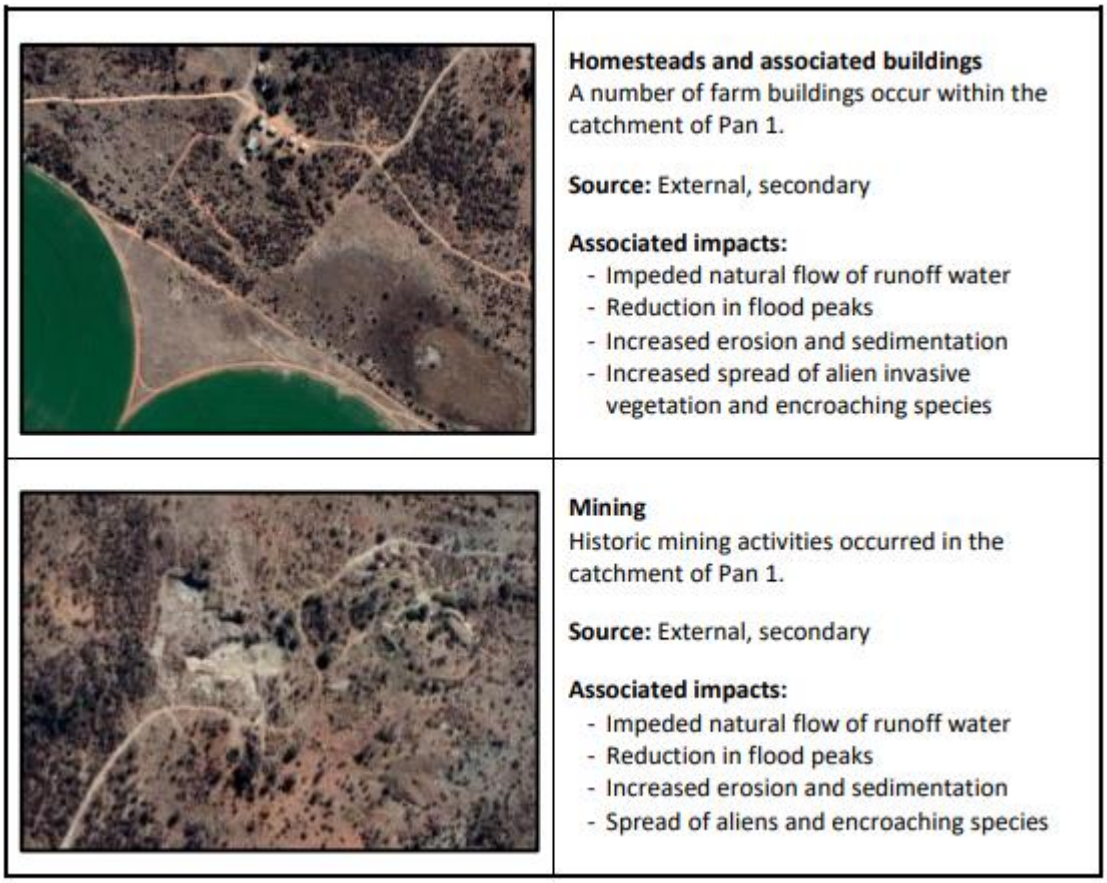


Figure 28. Features impacting the PES of the De Bad depressional wetlands.

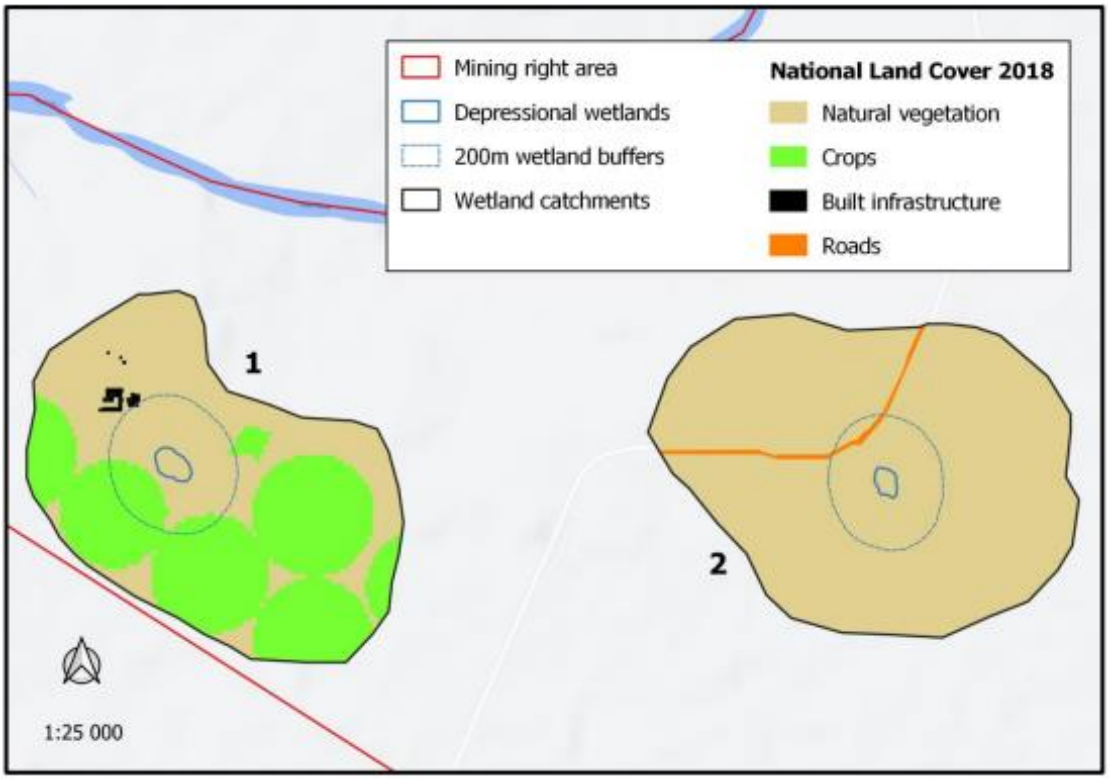


Figure 29. Refined landcover categories and disturbance units according to NLC2018, associated with the depressional wetlands on De Bad.

Wetland Ecological Importance and Sensitivity

The two depressions on De Bad have the same ecological characteristics and therefore were evaluated as a collective. These depressions are rated to have a High EIS and is considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. This assessment was mainly based on a "wet scenario" because the ecological importance of these watercourses will primarily only manifest during times of inundation. However, activities impacting the wetland during the dry phase has direct implications on its ability of to maintain the ecological integrity of the wet phase.

(9) *GROUND WATER:*

Ground water utilisation is of major importance in Lower Vaal WMA, it's the only source of water over much of the WMA. Ground water is mainly used for rural domestic supplies, stock watering, water supplies to several towns, but also for irrigation. There is also concern over impacts of upstream farm dams and alien vegetation on yield from ground water, there is major de-watering of ground water aquifers for mining purposes within the Lower Vaal WMA.

The quality of ground water is generally good although it does tend be brackish (mineralised) water in the drier areas. There has been pollution of dolomitic ground water experienced at Pering Mine near Reivilo within the WMA as a result of the mining activities.

Operation Demand

Processed water

The processed water and mine residue deposits will form part of a closed dirty water system and will not be allowed back into the Vaal River. Water for mining operations will be sourced from the Vaal River.

(10) *CULTURAL AND HERITAGE RESOURCES:*

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Renaissance Resources to provide an Heritage Impact Assessment Report for alluvial diamond mining on Portion 2 (AT LAST) of the Farm no. 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley and to determine the possible impact of mining on the application area.

On the farm At Last

Stone Age

For thousands of years before modern times, the area was occupied by hunter-gatherers who subsisted on stone tool technologies. However, the ground survey on At Last yielded far fewer stone tools when compared to other studies in the locality.

Iron Age

No sites or relics dating to the Iron Age were found.

Burial Buildings

The principal dwelling house at the farmstead is a remarkable monument. It has a hipped roof and veranda on two sides. There are two chimneys. The façade represented by the two veranda sides has ornate finishes. The date of construction inscribed on the cornerstone is 1936. The building will not be affected by mining operations. There are other buildings at the farmstead which are not architecturally important.

On the Farm De Bad

General Observations

It has been observed more than 60% of the farm De Bad is under cultivation, or has been cultivated in the recent past. No ancient relics such as stone tools can be expected to be found in an undisturbed context. Stone tools were found outside the fields along the edge of the Vaal River.

Stone Age

The Stone Age finds include hand axes found in two instances and a cleaver. These tools suggest occupation by Early Stone Age communities more than 250 000 years BP.

Iron Age

A single potsherd was found a short distance from the edge of the Vaal River. Pottery in the Lower Vaal and Middle Orange Rivers has been associated with a possible transition to the Iron Age.

Burial grounds

The Farmer reported two places with graves on the property. The graves were not located during the survey. If the graves will be located in a mining area, a 100 m servitude must be reserved.

Conclusion and recommendations

In light of the findings in this report, the Mining Right Application must be approved. The buildings recorded on the Farm At Last must be protected. The graves reported on the Farm De Bad must be protected. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the

provincial heritage resources authority or SAHRA notified for an investigation and evaluation of the finds to take place.

Palaeontology

Prof Marion Bamford, of the University of the Witwatersrand, sub-contracted by Archaeological and Heritage Services Africa (Pty) Ltd, Pretoria, South Africa has been appointed by Renaissance Resources to provide an Palaeontological Impact Assessment Report for alluvial diamond mining on Portion 2 (AT LAST) of the Farm no. 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley and to determine the possible impact of mining on the application area.

At Last 232, Barkly-Wes

A Palaeontological Impact Assessment was requested for the **Farm At Last 232** application. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

The project lies on the margin of the Griqualand West Basin that is one of three Palaeoproterozoic basins filled with sediments and volcanic tuffs of the Transvaal Supergroup. The latter overlies the Ventersdorp Supergroup. Much of the area has been covered by aeolian and fluvial sands of the much younger Kalahari Group.

The Quaternary Kalahari sands form an extensive cover of much younger deposits over much of the Northern Cape Province and Botswana. Haddon and McCarthy (2005) proposed that the Kalahari basin formed as a response to down-warp of the interior of the southern Africa, probably in the Late Cretaceous. This, along with possible uplift along epeirogenic axes, back-tilted rivers into the newly formed Kalahari basin and deposition of the Kalahari Group sediments began. Sediments included basal gravels in river channels, sand and finer sediments. A period of relative tectonic stability during the mid-Miocene saw the silcretisation and calcretisation of older Kalahari Group lithologies, and this was followed in the Late Miocene by relatively minor uplift of the eastern side of southern Africa and along certain epeirogenic axes in the interior. More uplift during the Pliocene caused erosion of the sand that was then reworked and redeposited by aeolian processes during drier periods, resulting in the extensive dune fields that are preserved today.

There are numerous pans in the Kalahari, generally 3–4 km in diameter (Haddon and McCarthy, 2005). Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette

dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape.

Tertiary calcretes cover large parts of the Northern Cape but they are difficult to date and there are several schools of thought (see Partridge et al., 2006). Nonetheless, it is accepted that calcretes form under alternating cycles humid and arid climatic conditions in strata that have calcium carbonate (Netterberg, 1969). More recent research using geophysical techniques to measure uplift of the continent during the Cretaceous and tertiary, combined with the fossil record (Braun et al., 2014) suggest that there were two predominant humid periods during the Tertiary. The whole of the Eocene (56-33 Ma) and a short period during the early Miocene (ca 20-19 Ma) were humid according to their estimation. It is possible that the Northern Cape calcretes formed during one of these periods.

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

New cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments (Matmon et al., 2015), South Africa, indicate that in the southern Kalahari, the majority of deposition occurred rapidly at 1.0–1.2 Ma. All earlier sediments in this region were eroded during previous sedimentary cycles. In summary, they showed that the stratigraphy, sedimentology, and cosmogenic nuclide data indicate:
1) the existence of a stable, shallow and low-energy water body over the southern Kalahari for at least 450 ka prior to 1–1.2 Ma;
2) rapid sediment accumulation that filled up the basin at 1–1.2 Ma; and
3) the establishment of the Kalahari sand cover shortly thereafter.

The authors acknowledge that this timeframe is far younger than expected from the conventional estimates for the Kalahari Group sediments (Haddon and McCarthy, 2005). The significant hiatus between the Pleistocene sequence and the underlying Archaean basement implies that evidence of earlier cycles of deposition and erosion are no longer preserved in the sedimentary record.

Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 30. The site for mining is in the Quaternary alluvium and sands (orange) and the Vryburg Formation (green). The latter is quartzitic and unlikely to be mined.

The Tertiary calcretes can trap fossils and artefacts when associated with palaeo-pans or palaeo-springs (Partridge et al., 2006). Where deflation has occurred, for example along the west coast of South Africa, any trapped materials in the different levels can be concentrated in the depo-centre of the pan or dune and thus it can be challenging to interpret the deposit (Felix-Henningsen et al., 2003).

The Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked. Conditions required for the preservation of organic material and formation of fossils are burial in a low energy, anoxic environment such as overbank deposits, lake muds or clays (Briggs and McMahon, 2016). Aeolian sands are high energy, well-oxygenated environments. In some regions the sands may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually, these geomorphological features can be detected using satellite imagery. No such features are visible.

Exploration and research along the palaeo-rivers of Southern Africa, now only present as abandoned palaeochannels, or captured by the present-day rivers, the Vaal and Orange Rivers in this case, the gravels and sands might include transported robust and fragmentary fossils. Examples of these are heavy bone fragments and silicified wood fragments, as well as diamonds (de Wit, 1999; de Wit et al., 2000).

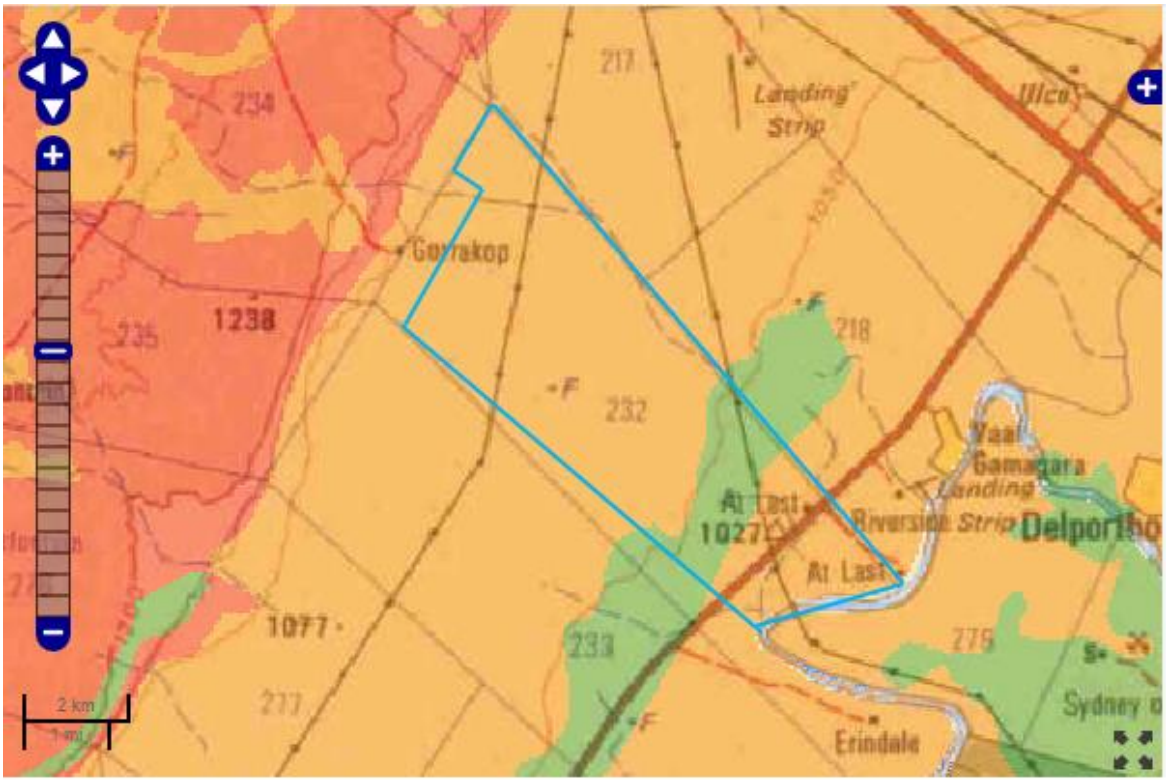


Figure 30. SAHRIS palaeosensitivity map for the site for the Mining Right Application on Portion 2 of Farm At Last 232 west of Delportshoop shown within the blue rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or the materials have been transported. Furthermore, the material to be mined or sifted through is transported, high energy and well oxygenated sand and this does not preserve fossils. Since there is a small chance that fossils from the Quaternary may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, granites, sandstones, shales and sands are typical for the country and might contain fossil plant or vertebrate material that has been transported from another site, and fragmented. The sands of the Quaternary period would not preserve fossils.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and

alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised.

De Bad 155, Kimberley

A Palaeontological Impact Assessment was requested for the **Farm De Bad 155** Mining Right Application. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

The project lies on the margin of the Griqualand West Basin that is one of three Palaeoproterozoic basins filled with sediments and volcanic tuffs of the lower Transvaal Supergroup. Much of the area has been covered by aeolian and fluvial sands of the much younger Kalahari Group.

The Quaternary Kalahari sands form an extensive cover of much younger deposits over much of the Northern Cape Province and Botswana. Haddon and McCarthy (2005) proposed that the Kalahari basin formed as a response to down-warp of the interior of the southern Africa, probably in the Late Cretaceous. This, along with possible uplift along epeirogenic axes, back-tilted rivers into the newly formed Kalahari basin and deposition of the Kalahari Group sediments began. Sediments included basal gravels in river channels, sand and finer sediments. A period of relative tectonic stability during the mid-Miocene saw the silcretisation and calcretisation of older Kalahari Group lithologies, and this was followed in the Late Miocene by relatively minor uplift of the eastern side of southern Africa and along certain epeirogenic axes in the interior. More uplift during the Pliocene caused erosion of the sand that was then reworked and redeposited by aeolian processes during drier periods, resulting in the extensive dune fields that are preserved today.

There are numerous pans in the Kalahari, generally 3–4 km in diameter (Haddon and McCarthy, 2005). Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins

of pans during periods where groundwater discharge was high (Lancaster, 1986). Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape.

Tertiary calcretes cover large parts of the Northern Cape but they are difficult to date and there are several schools of thought (see Partridge et al., 2006). Nonetheless, it is accepted that calcretes form under alternating cycles humid and arid climatic conditions in strata that have calcium carbonate (Netterberg, 1969). More recent research using geophysical techniques to measure uplift of the continent during the Cretaceous and tertiary, combined with the fossil record (Braun et al., 2014) suggest that there were two predominant humid periods during the Tertiary. The whole of the Eocene (56-33 Ma) and a short period during the early Miocene (ca 20-19 Ma) were humid according to their estimation. It is possible that the Northern Cape calcretes formed during one of these periods.

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

New cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments (Matmon et al., 2015), South Africa, indicate that in the southern Kalahari, the majority of deposition occurred rapidly at 1.0–1.2 Ma. All earlier sediments in this region were eroded during previous sedimentary cycles. In summary, they showed that the stratigraphy, sedimentology, and cosmogenic nuclide data indicate:
1) the existence of a stable, shallow and low-energy water body over the southern Kalahari for at least 450 ka prior to 1–1.2 Ma;
2) rapid sediment accumulation that filled up the basin at 1–1.2 Ma; and
3) the establishment of the Kalahari sand cover shortly thereafter.
The authors acknowledge that this timeframe is far younger than expected from the conventional estimates for the Kalahari Group sediments (Haddon and McCarthy, 2005). The significant hiatus between the Pleistocene sequence and the underlying Archaean

basement implies that evidence of earlier cycles of deposition and erosion are no longer preserved in the sedimentary record.

Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 31. The site for mining is in the Quaternary alluvium and sands (orange and green respectively).

The Tertiary calcretes can trap fossils and artefacts when associated with palaeo-pans or palaeo-springs (Partridge et al., 2006). Where deflation has occurred, for example along the west coast of South Africa, any trapped materials in the different levels can be concentrated in the depo-centre of the pan or dune and thus it can be challenging to interpret the deposit (Felix-Henningsen et al., 2003).

The Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked. Conditions required for the preservation of organic material and formation of fossils are burial in a low energy, anoxic environment such as overbank deposits, lake muds or clays (Briggs and McMahon, 2016). Aeolian sands are high energy, well-oxygenated environments. In some regions the sands may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually these geomorphological features can be detected using satellite imagery. No such features are visible.

Exploration and research along the palaeo-rivers of Southern Africa, now only present as abandoned palaeochannels, or captured by the present day rivers, the Vaal and Orange Rivers in this case, the gravels and sands might include transported robust and fragmentary fossils. Examples of these are heavy bone fragments and silicified wood fragments, as well as diamonds (de Wit, 1999; de Wit et al., 2000).

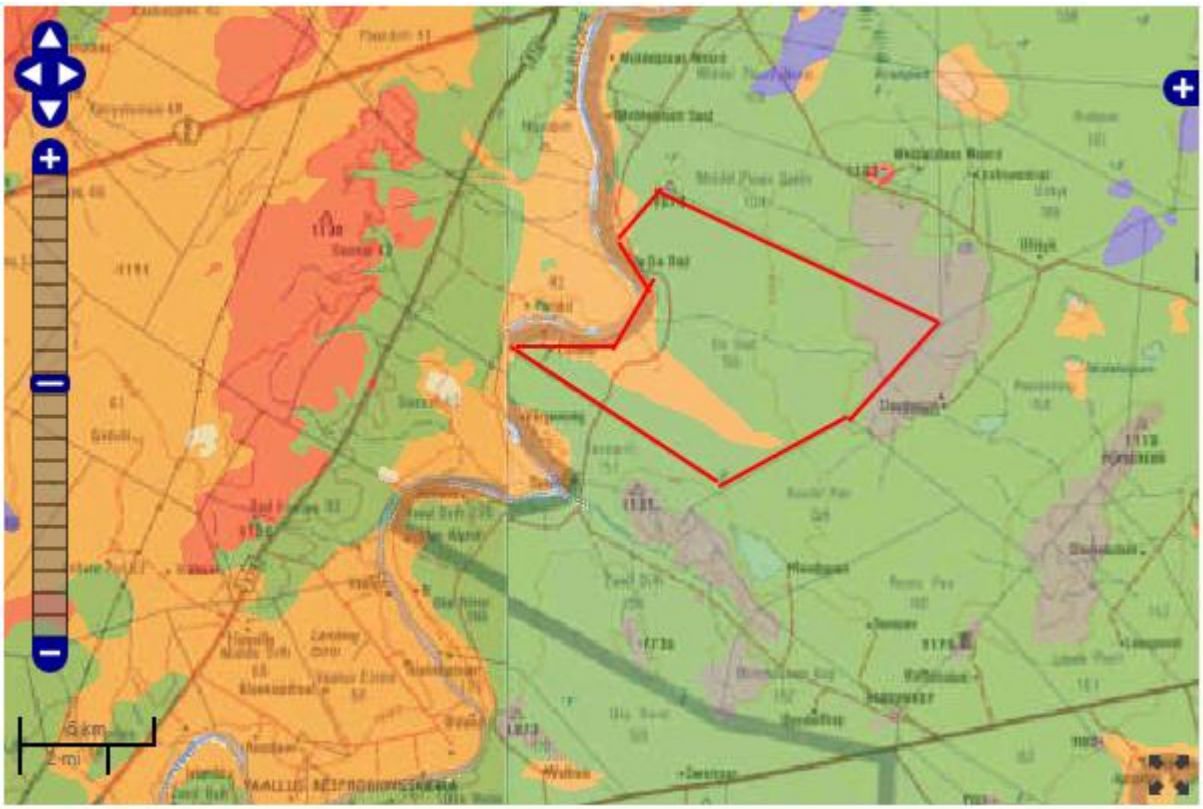


Figure 31. SAHRIS palaeosensitivity map for the site for the Mining Right Application on Farm De Bad 155 north of Olie River shown within the red outline rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or the materials have been transported. Furthermore, the material to be mined or sifted through is transported, high energy and well oxygenated sand and this does not preserve fossils. Since there is a small chance that fossils from the Quaternary may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, granites, sandstones, shales and sands are typical for the country and might contain fossil plant or vertebrate material that has been transported from another site, and fragmented. The sands of the Quaternary period would not preserve fossils.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, invertebrates) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

(11) ***AIR QUALITY:***

With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed mining activity.

Existing Sources
The current source of air pollution in the area stems from numerous mining operations along the Orange River and from vehicles traveling on the gravel roads of the area. Farming activity, especially ploughing of the irrigation fields, may generate dust during certain periods of the year.

New Source
The source of air pollution on the farm will be nuisance dust generated by the opencast mining process, the loading of gravels onto the transport trucks, the dumping of gravels over each sites primary screen or feeder bins as well as from the movement of trucks and vehicles on the mining roads. Gas emissions from machinery will be kept within legal limits.

Areas of Impact
The prevailing wind (occasionally slightly) is from the east (June & October) and the south-west (October - January) but the strongest winds are from the north-west. The average monthly wind speeds are generally below 6.3 m/s.

There is a potential for fall-out dust to impact on the surrounding farm properties – which can be described as the nearest potential area of impact. The dust management programme recommended should include daily dosing of access roads and stockpile areas.

If dust is generated, it is expected to be visible from the surrounding farmland or mines along the Orange River.

(12) ***Noise:***

Noise on site will come from the large vehicles (tip trucks, front-end loaders, back actors), from the working pans.

There are numerous mining operations on both sides of the proposed mining operation as well as across the Orange River. Although these operations do generate noise the overall impact can be described as negligible.

(13) ***VISUAL ASPECTS:***

The mining area is visible from the other side of the Orange river and to the neighbour to the west of the mining area. There are no residential

areas within the surrounding area. The mine is not located on any tourist route and will not be visible to the average tourist.

(14) *CRITICAL BIODIVERSITY AREAS AND BROAD-SCALE PROCESSES:*

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area. Critical biodiversity areas and broad-scale processes was described and included in this report.

The proposed mining site falls within critical biodiversity areas, as defined by the Northern Cape Critical Biodiversity Areas Map (Holness and Oosthuysen 2016). This map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. Most of De Bad comprises natural or transformed areas, but the local catchment of the Vaal River, south of the site comprise of Critical Biodiversity Areas Two. The remaining section of Vaal River on site, along with the ephemeral pans are classified as Ecological Support Areas (Figure 32). At Last, mainly comprise of Ecological Support Areas, but an ephemeral tributary to the Vaal, including its buffer zone, lines the site's northern boundary and is classified as Critical Biodiversity Areas One (Figure 33).

According to the Mining and Biodiversity Guidelines (DENC et al. 2013) no areas on De Bad is considered important, but the ephemeral drainage line on At Last and a small section of the Vaal River buffer in the south have Highest Biodiversity Importance. These areas constitute the highest risk for mining (Figure 34). These guidelines were developed to identify and categorize biodiversity priority areas sensitive to the impacts of mining in order to support mainstreaming of biodiversity issues in decision making in the mining sector.

According to the National Web based Environmental Screening Tool the study area is considered to have sensitive environmental features (Figure 35). This tool is a geographically based web-enabled application which allows a proponent intending to apply for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to screen their proposed site for any environmental sensitivity. According to this, De Bad and At Last are considered to be of

low sensitivity based on the Plant species Theme. Both sites however have high and medium sensitivity based on the Animal Species Theme. The high sensitivity is attributed to suitable habitat the sites provide for the listed Lanner Falcon, while the medium sensitivity on both sites is associated with regional records of Caspian Tern, Secretary bird, Tawny Eagle, White-backed Vulture and Ludwig's Bustard. No suitable habitat however exists in the study area for Caspian Tern. Highly sensitive areas are also present on both sites in terms of the Terrestrial Biodiversity Theme, which is a direct function of the Northern Cape Critical Biodiversity Areas Map. The Vaal River and ephemeral pans have very high sensitivity in terms of the Aquatic Biodiversity Theme, while the eastern parts of At Last also very high sensitivity, as it falls within a freshwater ecosystem priority quinary catchment.

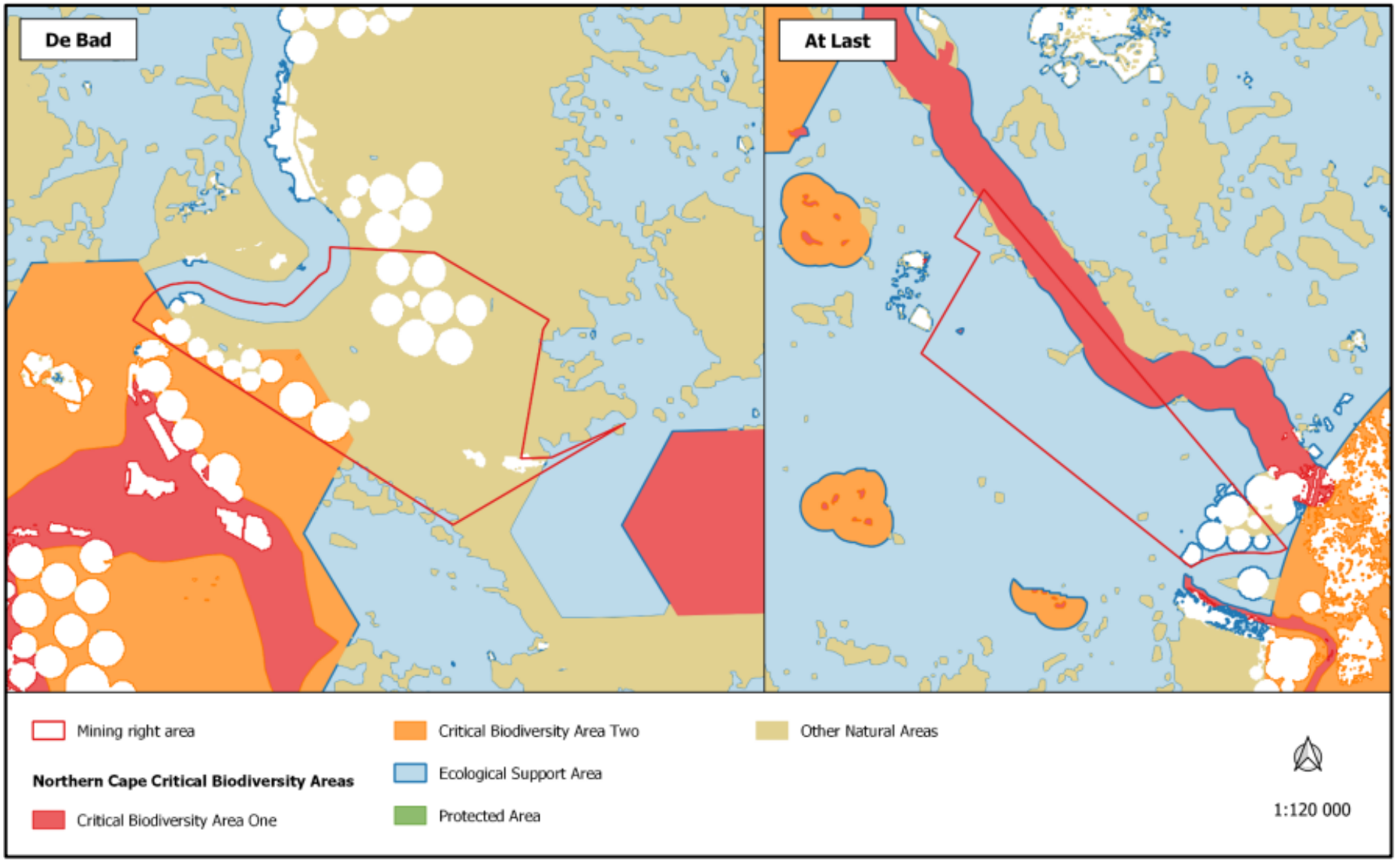


Figure 32. The study area in relation to the Northern Cape Critical Biodiversity Areas.

Figure 33. The study area in relation to the Mining and Biodiversity Guidelines.

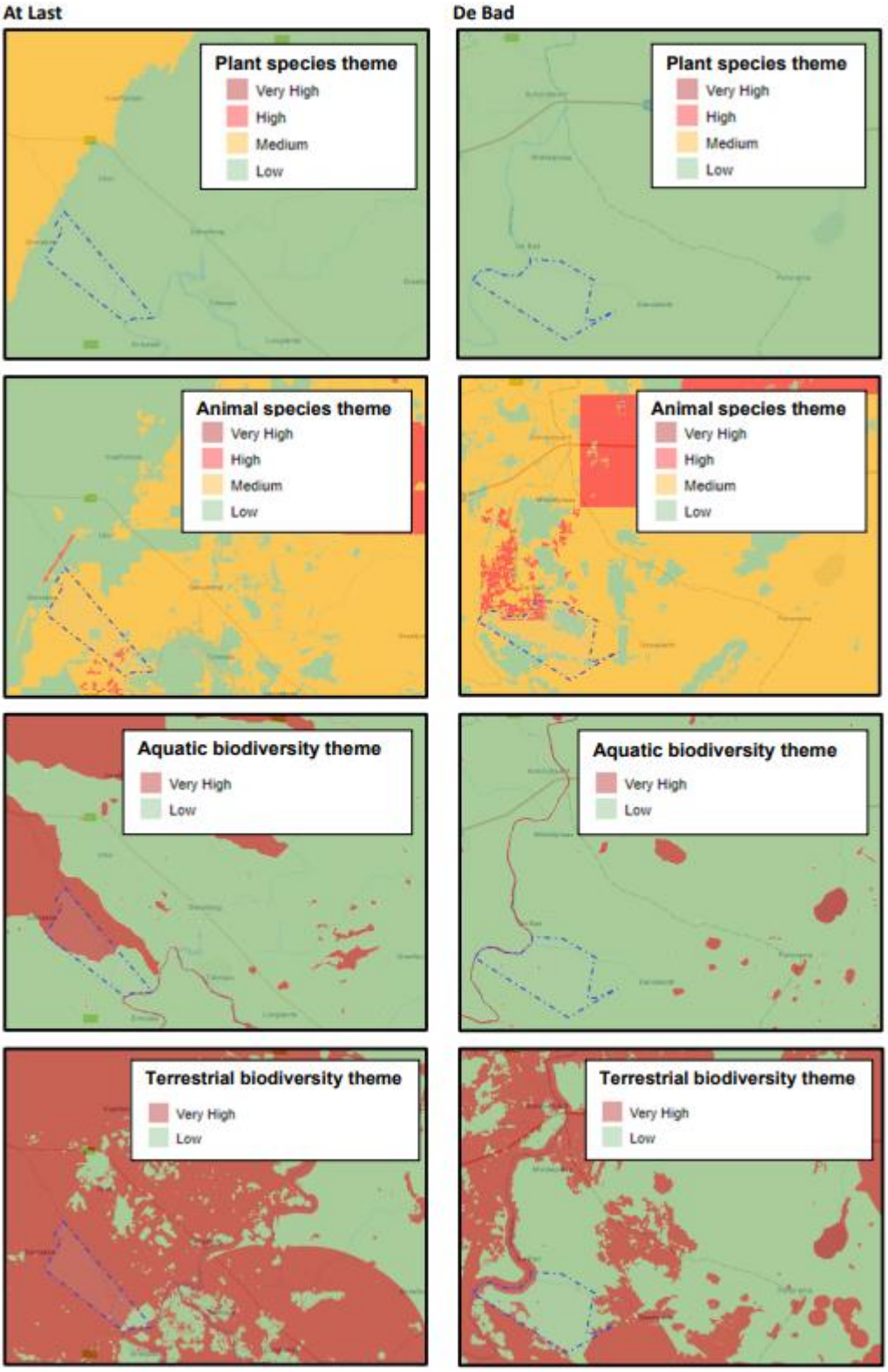


Figure 34. Environmental sensitivities in the study area, according to the National Web based Environmental Screening Tool.

According to the Pixley ka Seme Spatial Development Framework (relevant to De Bad) all rivers and wetlands, including a generic buffer of 100m, are regarded as ecological corridors. Their mandate is to conserve

existing ecological corridors and rehabilitate any remnants of corridors. The Frances Baard Environmental Management Framework, relevant to At Last, considers all Critical Biodiversity Areas and Ecological Support Areas as Biodiversity Environmental Management Zones. These zones highlight environmentally significant areas that should be managed sustainably to safeguard terrestrial and aquatic biodiversity within the municipality.

The study area also falls within the Griqualand West Centre (GWC) of Endemism (Frisby et al. 2019) (Figure 35). This area has a high concentration of plant species with very restricted distributions, known as endemics (Van Wyk and Smith 2001). Relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range-restricted species.

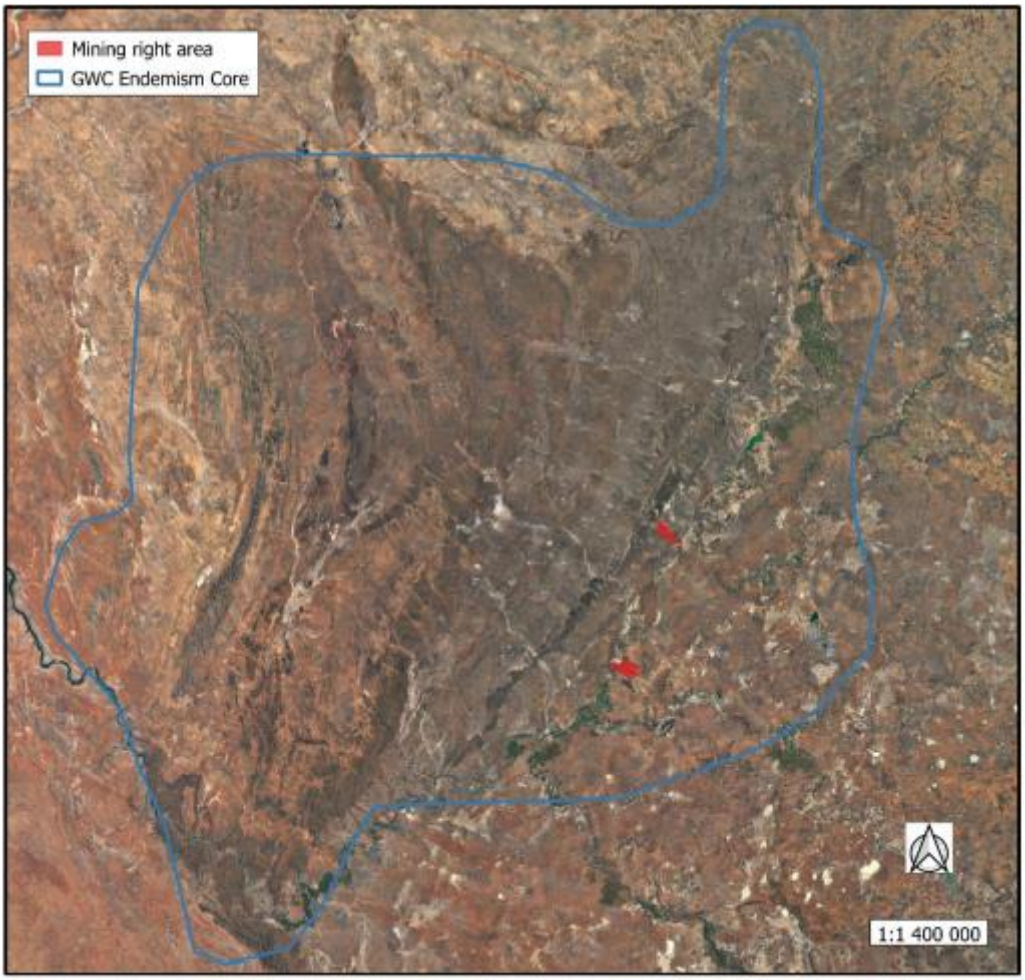


Figure 35. The De Bad & At Last study area in relation to the GWC core, according to Frisby et al. (2019).

Finally, the study area falls within a region where one of South Africa's largest economically most important alluvial diamond deposits are found (Figure 36), i.e. along the Orange and Vaal Rivers (Gresse 2003). The most

significant crop irrigation in the Northern Cape also stretches along these rivers (Durand 2006). These factors increase the proposed operation's cumulative impacts.

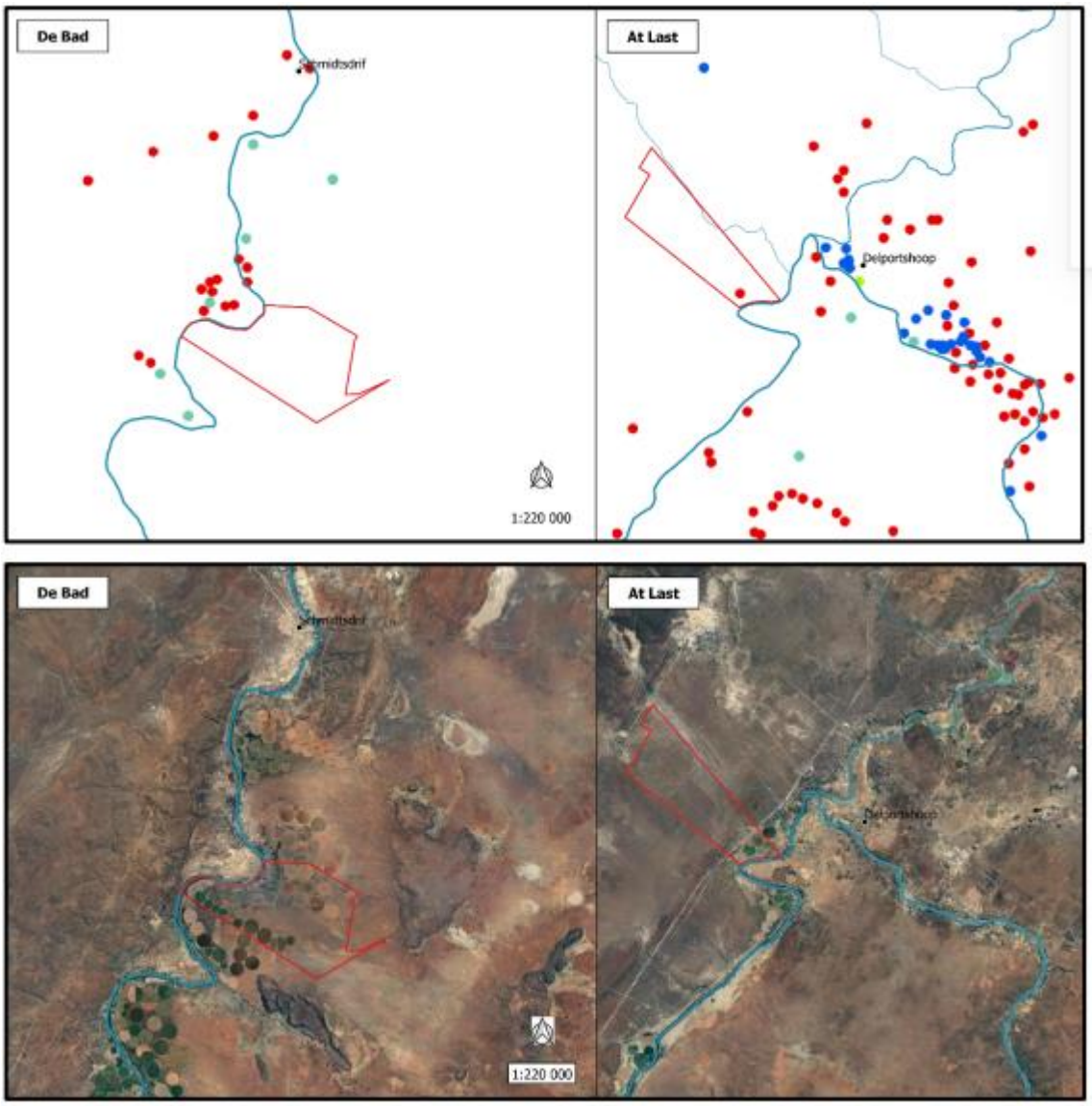


Figure 36. The distribution of mining properties (top) and crop irrigation (bottom) along the Vaal River.

(15) *SOCIO-ECONOMIC STRUCTURE OF THE REGION:*

The Northern Cape is geographically the largest province in South Africa having a land mass increased from 361,830 km² to 373,239 km² with the introduction of the new provincial boundaries and covers approximately one third of the country's surface area.

The following information is found in the Integrated Development Plan (IDP) 2017/18 – 2021/22 of the Frances Baard District Municipality.
The Frances Baard District Municipality (FBDM) forms part of the five District Municipalities of the Northern Cape Province. FBDM shares its

northern boundary with the North West Province and its eastern boundary with the Free State Province. Furthermore, FBDM comprises of four local municipalities; Dikgatlong, Magareng, Phokwane and Sol Plaatje municipality, which is the most populous as it is the heart of economic activities of the area.

The capital of the Northern Cape, Kimberley, is located less that 500km from Johannesburg and approximately 1,000 km from Cape Town.

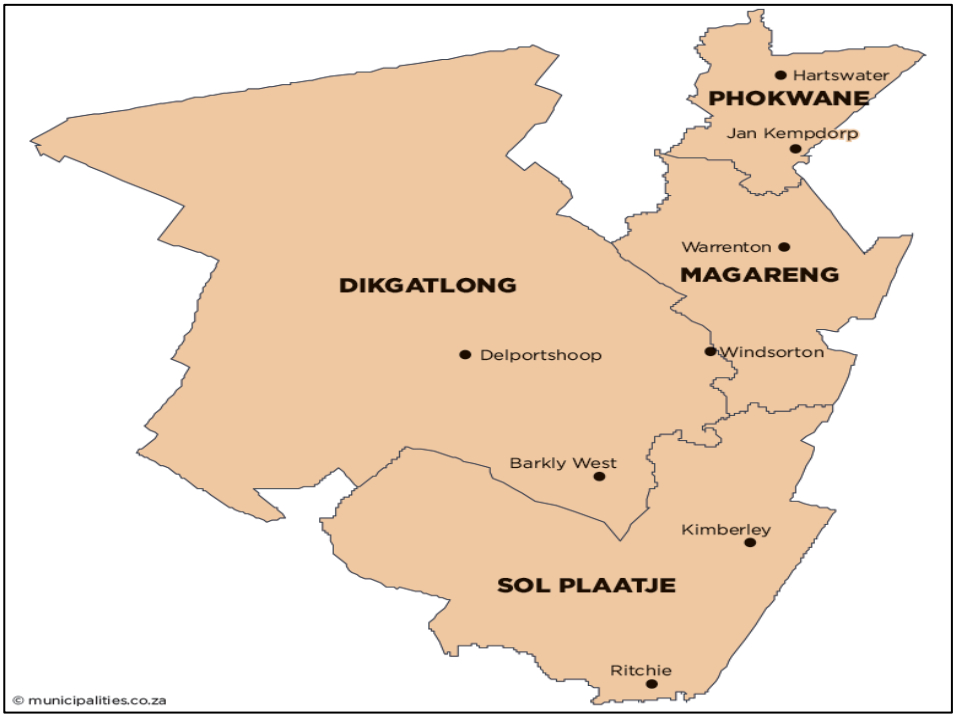


Figure 37. Locality Map

The At Last project falls within the Dikgatlong Local Municipality which is a Category B municipality with seven wards situated approximately 35 km north-west of Kimberley on the northern bank of the Vaal River. The municipal area covers approximately 7 315 km² and borders with the Magareng Municipality in the north-east and Sol Plaatje in the south-east. Agriculture and mining form the economic activities of the area.

The De Bad project is located in the Sol Plaatje Local Municipality which has a geographical area of 1877.1 km² and comprises of the urban areas of Kimberley, Ritchie and surrounding villages and farms. Kimberley is the administrative centre of the FBDM and the seat of the Northern Cape Provincial Administration. The main economic activities consist of retailers, industries as well as mining and farming. It accommodates about 255 351 people and contributes 78.85% to the GDP of FBDM. Over the years Sol Plaatje municipality decided to adopt a different approach in preparing its IDP different from the approach adopted by municipalities in the district. Instead of identifying community priority issues, it preferred instead to cluster development into themes i.e. Institutional Building Programme, Service Delivery Programme, etc.

Population

Currently, FBDM has a total population of 387 741 people, which represents 32.5% of the Northern Cape population. The chart in figure 38 clearly illustrates that Solplaatje consists of the largest population in the district of 66%, followed by Phokwane (16%); Dikgatlong (12%); and Magareng has the least population of 6%.

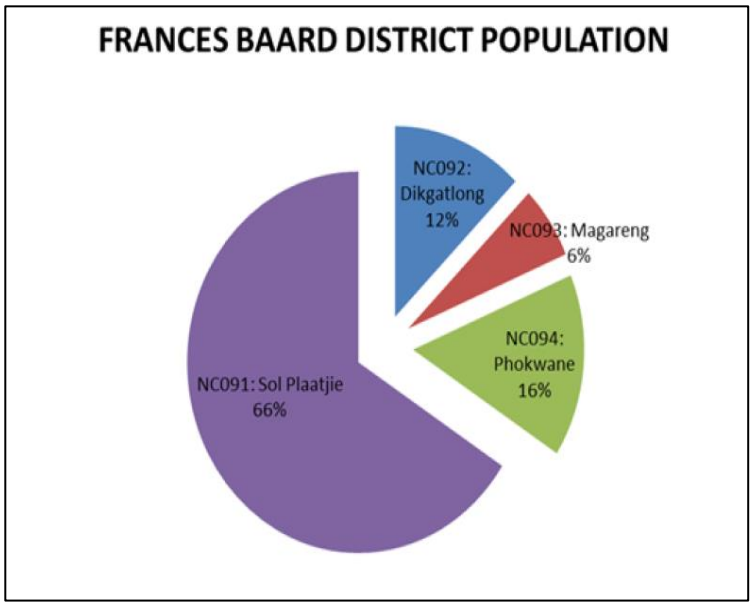


Figure 38. Frances Baard District Population. (Source: Community Survey, 2016).

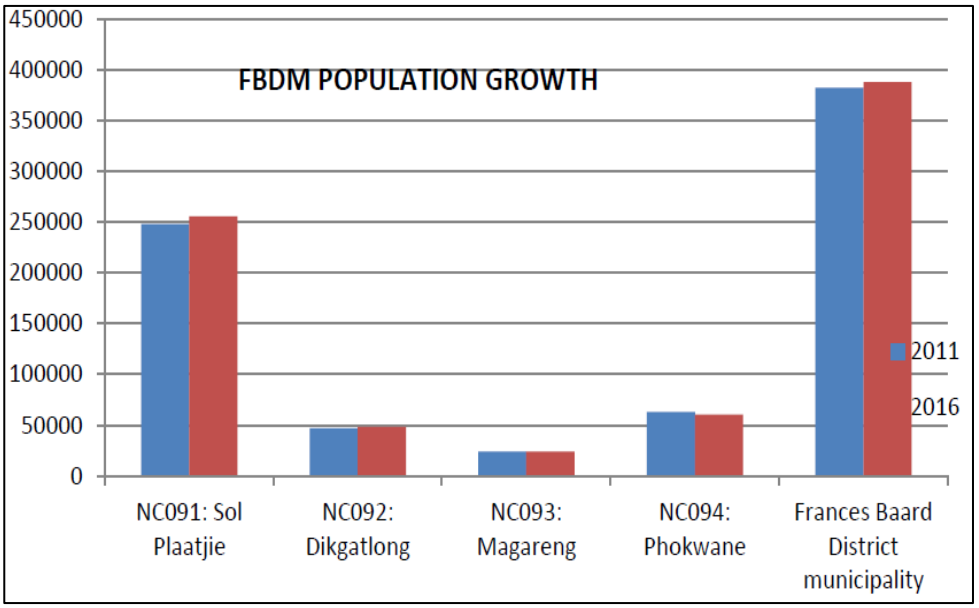


Figure 39. Population Growth (Source: Community Survey, 2016)

According to the 2016 community survey as depicted on figure 40 above, FBDM 's growth rate has increased by 1.5% since 2011 (382083 – 387741). A slight growth in Sol Plaatje Local Municipality (248037 -255351); and

Dikgatlong Local Municipality (46839-48164). Followed by a decline in Phokwane Local Municipality (63000 – 60168); and Magareng Local Municipality (24207- 24059).

According to Statistics South Africa census 2011, Dikgatlong Local Municipality has seen an increase in total population of 46 841 to 48473 with a total 3.5 increase in population over the last five years. The annual growth is 0.7% and if this trend continues the population will increase to 50 907 by 2023. The population is divided into various racial groups: the majority being Black African (58.47%), followed by Coloured (28.48%), other (8.88%) while Whites (3.62%) and Indians or Asian (0.28%) being the least represented.

The Sol Plaatje municipality is unique in the country reflecting the reality of the province. The spread of the population by race groups (Figure 41) shows a relatively large share of non-Africans in the total population, at 46% compared to 20% nationally. This implies that all race groups play an important role in shaping social relations.

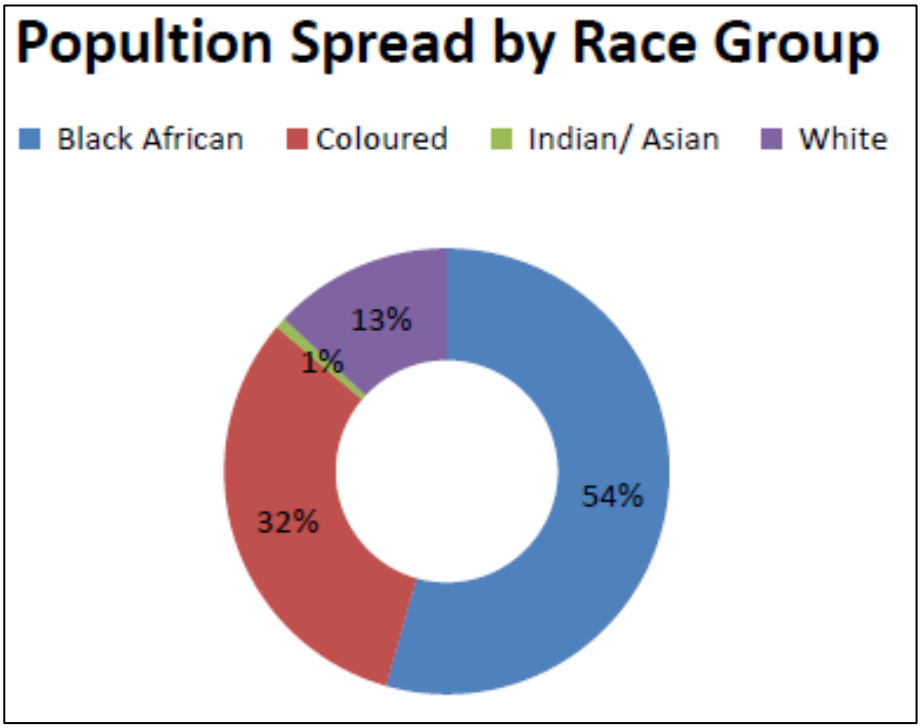


Figure 40. Population Spreas by Race Group for the Sol Plaatje Local Municipality (Source: Stats SA and Quantec).

Age & Gender Composition

The Age & Gender Profile of the local population is illustrated by Table 9. With regards to this profile, the following observations were made:

Table 9. Age Distribution (Source: Community Survey, 2016)

AGE	0 – 6	7 - 18	19 – 25	26 - 35	36 - 40	41 – 50	51 - 65	66 - 116
FBDM Actual	53847	83007	46632	58747	27374	44330	44794	29010
FBDM Age Distribution %	14%	21%	12%	15%	7%	11%	12%	7%
Sol Plaatje	34138	52640	31330	40449	18465	30341	29156	18831
Dikgatlong	6815	11438	5733	6572	3208	5236	5759	3402
Magareng	3414	5664	2962	2980	1572	2652	2685	2131
Phokwane	9480	13265	6607	8746	4129	6101	7193	4646

Based on table 9, the district population is fairly young with 69% of the population aged 40 years and younger. Those between the ages of 41 and 65 years account for 23% and only 7% of the population is of retirement age, i.e. 66 years and older.

Table 10. Age and Gender Distribution of the Dikgatlong Local Municipality (Source: Stats SA: Census 2011 (2016 Municipal Demarcations), Community Survey 2016).

Age	0-14		15-34		35-64		Older than 64		Total	
Gender	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Dikgatlong 2011	7484	7341	8103	8136	6466	6849	1009	1452	23062	23778
Dikgatlong 2016	7571	7197	7975	7435	7304	7198	1443	2350	24293	24180
Change in numbers	88	-144	-129	-702	838	349	434	898	1231	402
% Change between 2011 and 2016	1,2	-2,0	-1,6	-8,6	13,0	5,1	43,0	61,8	+5,3%	+1,7%

The Dikgatlong LM is seeing a slight aging in its population, with a 5,4% decline in the age category of between '15 and 34', while the '0-14' age category saw a slight decline and the '35-64' age category increased by 8,9% between 2011 and 2016. Similar to the other local municipalities, the 'older than 64' category saw a large increase of 54,1%. An interesting trend however is the decline in the female population aged between '15-34' by 8,6%.

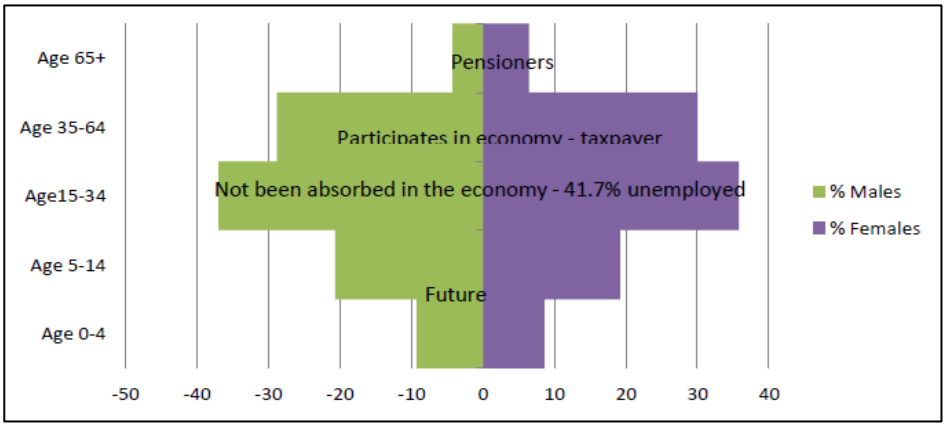


Figure 41. Age and Gender Distribution for the Sol Plaatje Municipality (Source: Stats SA and Quantec)

The age distribution indicates the presence of about two thirds (66.2%) of the population in the economic activity age groups. This bodes well for economic activity as this indicates a pool of labour available in the area however the low skills base needs to be taken into account.

HIV/AIDS Prevalence

In the IDP of the Frances Baard District Municipality, reference is made to the HIV/AIDS prevalence in the area. It indicates that the number one cause of death in 2015/2016 was HIV/AIDS. However, it was found that deaths caused by HIV/AIDS have decreased and the current disease responsible for the most deaths in the District is Tuberculosis (TB).

Water

Access to water is a constitutional right to everyone as stipulated by Section 27 (b) of the Constitution of South Africa 1996. Municipalities are mandated by amongst others the Municipal Structure Act 1998, the Municipal Structures Amendment Act 2000 and the Water Services Act 1999, to provide potable water to households within their areas of jurisdiction.

According to the Community survey 2016 by Statistics SA, it is estimated that about 5 493 households in the Frances Baard district have no access to water and about 16 317 households lack access to proper sanitation.

From the graph below (Figure 42) it is evident that a large number of households in the Dikgatlong Local Municipality receive water from a regional/local water scheme. However, there are still those households who drink water from the river/stream, dam/pool/stagnant water and those that could not be ascertained as to where they get their water from. Drinking water that has not been purified can make the households vulnerable to a number of communicable diseases such as diarrhoea. The municipality is the water service authority for ward 6, 7 and portion of ward 5. The rest of the municipal area is supplied with water by Sedibeng Water.

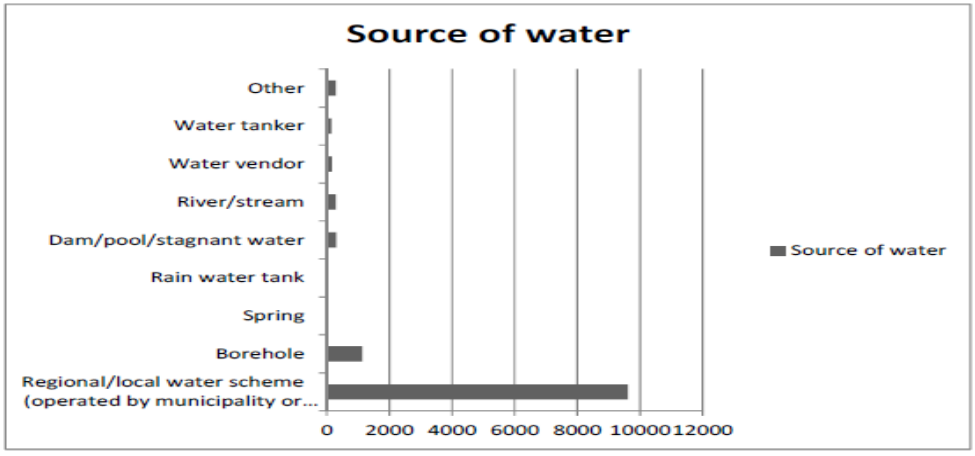


Figure 42. Sources of water in the Dikgatlong Local Municipality.

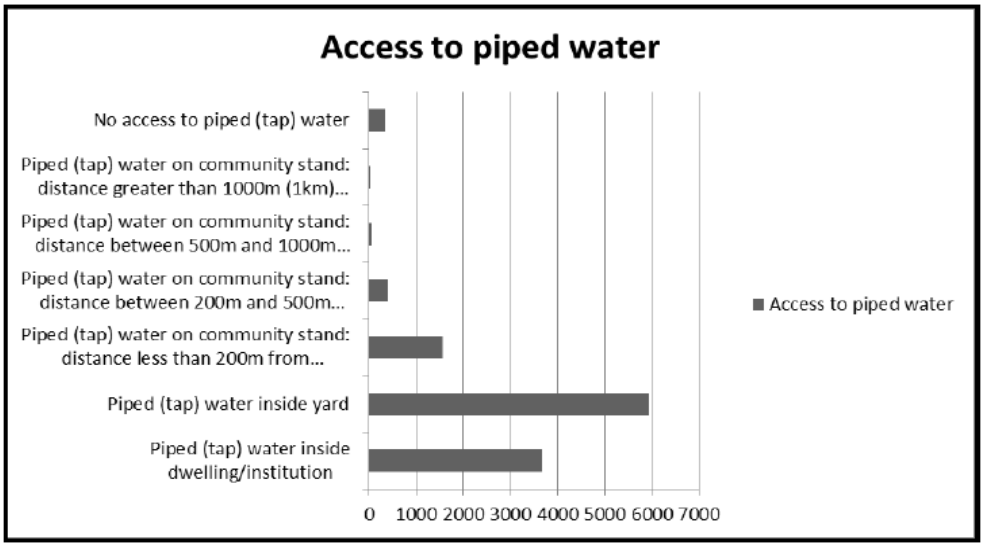


Figure 43. Access to piped water in the Dikgatlong Municipality.

The majority of household (5935) in the Dikgatlong Municipality have access to piped water inside their yard, followed by those who have access to piped water inside their dwelling (3670) (Figure 44). The concern is for those households that must travel more than 1km (more than 20 minutes) to access a community piped water stand (0.24%), as it technical indicates that such a service is not accessible. The concern is also for those who have no access to tap water (2.77%), as they might be drinking water that is un-purified and not good for health purposes.

Municipal services are provided to both domestic and commercial users within the Sol Plaatje Local Municipality. The estimate of service points for commercial users is around 3000. This figure is low and is unable to perform cross subsidization. Attraction of investment in property development, industries and commerce is required to build the base of commercial or no-residential users of municipal trading services.

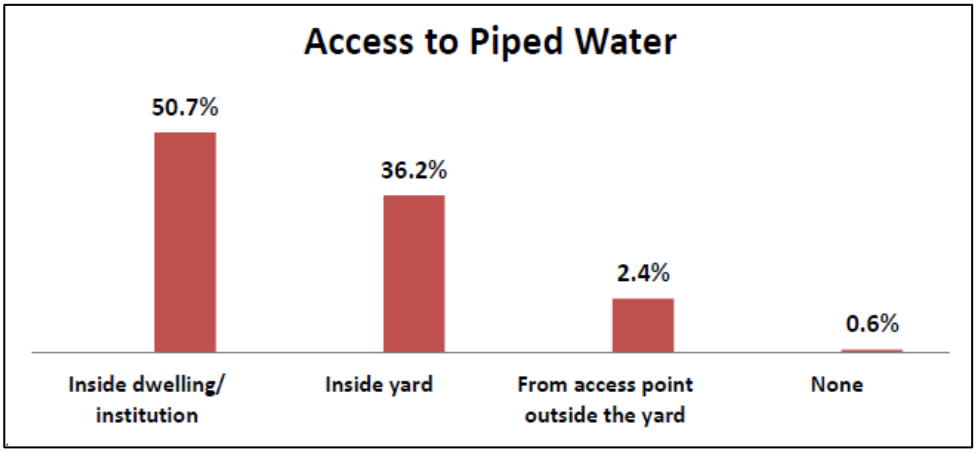


Figure 44. Access to pipe water in the Sol Plaatje Municipality. (Source: Stats SA and Quantec)

Sanitation

Sewerage and sanitation are basic needs of communities which can pose serious health and hygiene risks for communities and the environment at large if not properly managed and monitored.

According to the White Paper on Basic Household Sanitation, 2001, basic sanitation is defined as:
"The minimum acceptable basic level of sanitation is:

- Appropriate health and hygiene awareness and behaviour;
- A system for disposing of human excreta, household waste water and refuse, which is acceptable and affordable to the users, safe, hygienic and easily accessible and which does not have an unacceptable impact on the environmental; and
- A toilet facility for each household."

According to the Community survey 2016 by Statistics SA, it is estimated that about 16 317 households lack access to proper sanitation.

Within the Dikgatlong Municipality 13.72% of households do not have access to basic sanitation, while 1.84% still uses the bucket toilet. The 13.72% of none access, is higher that the Provincial one which is 8.04% of households with no access to basic sanitation. Council has started to address backlogs on sanitation with the implementation of Amaloo-loo and MUSA systems in all areas with buckets and where no sanitation system exists.

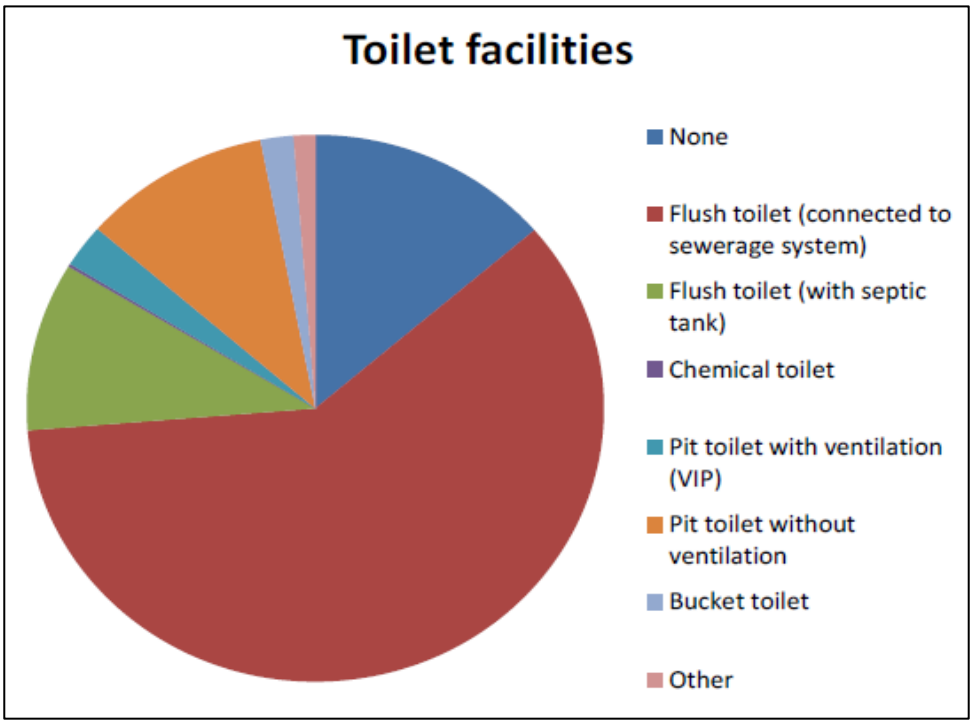


Figure 45. Toilet facilities in the Dikgatlong Municipality.

Within the Sol Plaatje Municipality 83.3% of households have access to flush toilets which is connected to sewage systems. Sanitation provision is dependent on land preparation and is linked to the formalisation of land and development. Pit (0.8%) and bucket (8.9%) latrines are more likely to be evident in informal dwellings. Only 4.5% of households have no access to sanitation facilities.

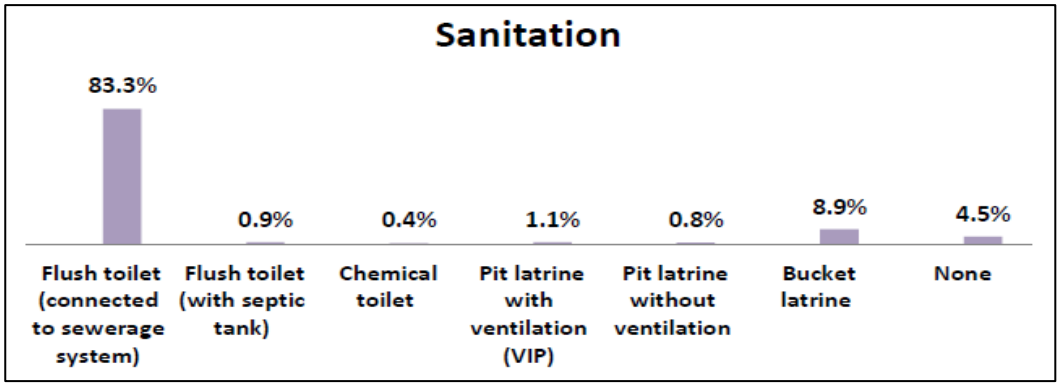


Figure 46. Sanitation facilities in the Sol Plaatje Municipality.

Refuse Removal

Proper waste management is important for sustainable development because if waste is not disposed of properly, it can cause environmental and health problems.

Table 11. Refuse removal in the France Baard District for Dikgatlong and Sol Plaatje (Source: Stats SA – Community Survey 2016)

District and local municipality	Removed by local authority/private company/ community members at least once a week		Removed by local authority/private company/ community members less often than once a week		Communal refuse dump		Communal container/ central collection point		Own refuse dump		Dump or leave rubbish anywhere (no rubbish disposal)		Other	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DC9: Frances Baard	**78 561**	**69,3**	**4 784**	**4,2**	**2 780**	**2,5**	**616**	**0,5**	**16 835**	**14,9**	**8 605**	**7,6**	**1 150**	**1,0**
NC091: Sol Plaatje	59 526	82,7	1 538	2,1	1 605	2,2	537	0,7	3 373	4,7	4 526	6,3	834	1,2
NC092: Dikgatlong	3 529	23,8	1 774	12,0	280	1,9	41	0,3	7 190	48,5	1 783	12,0	226	1,5

Table 11 indicates the type of refuse removal in the Frances Baard District Municipality as well as the Dikgatlong and Sol Plaatje Local Municipalities. Within the Dikgatlong Municipality 23,8% of households have their refuse removed by a local authority at least once a week, while 48,5% have their own refuse dump and 11.78% have no rubbish disposal. It is a great concern for those who have no rubbish disposal because they can dispose their refuse in a manner that is not in line with sustainable development principles. The other challenge confronting waste management is that all the landfill sites are not licensed and they are often vandalised. Waste management are faced with serious challenges since the start of violent protests which resulted in the setting alight of service delivery vehicles and escalation of illegal dumping. According to the Community Survey

conducted in 2016, 82.7% of households within the Sol Plaatje Municipality has their refuse removed at least once per week and 2.1% less often than a week by the local authority/private company/community members. 7,4% Of Households make use of either communal refuse dumps (2,2%), communal container (0,7%) or has their own refuse dumps (4,7%).

Electricity

In accordance with the Community survey 2016 over 92.7 % of the households in the Frances Baard district have access to electricity for lighting. This leaves a gap of 28 360 households, but with the recent completion of electricity master plans planning should improve.

The majority of household (75.86%) within the Dikgatlong Municipality use electricity as the source of energy for lighting, this was previously 68.5% (in 2001). The number of households that use candles has also decreased from 32% to 18.66% as well as those that use gas and paraffin. However there seems to be no visible efforts of using solar energy, to decrease the dependency of electricity.

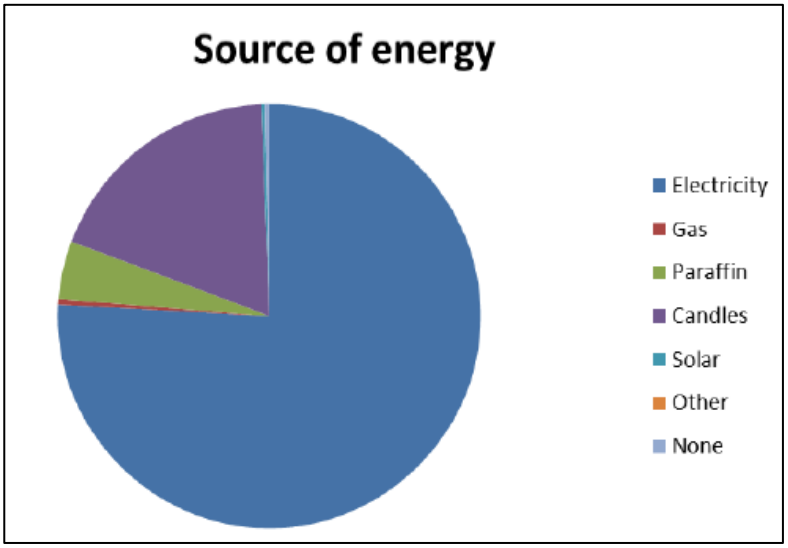


Figure 47. Source of energy for the Dikgatlong Municipality.

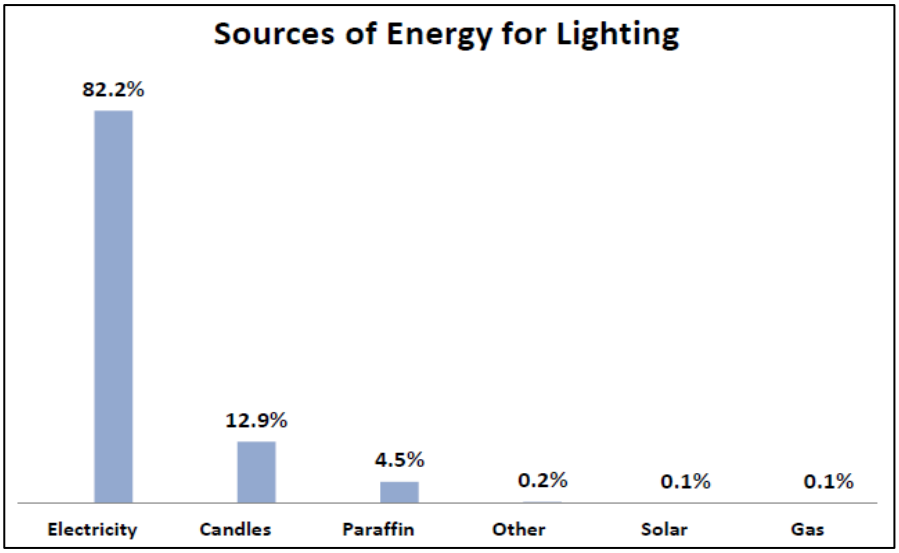


Figure 48. Sources of energy for the Sol Plaatje Municipality (Source: Stats SA and Quantec).

Electricity is used in 82,2% of households in the Sol Plaatje Municipality as a source of energy for light. Candles and paraffin are the second and third most sources of energy with 12,9% and 4,5% respectively. Very little use is made of other sources of energy including solar and gas sources.

Housing

Table 12 below indicates the form of dwellings in which the households within the Frances Baard District Municipality and the Sol Plaatje and Dikgatlong Local municipalities resides in.

Table 12. Distribution of households by type of main dwelling and municipality. (Source: Stats SA -Community Survey 2016)

	Formal dwelling		Traditional dwelling		Informal dwelling		Other	
District/municipality/province	N	%	N	%	N	%	N	%
DC9: Frances Baard	**94 869**	**83,7**	**294**	**0,3**	**17 660**	**15,6**	**508**	**0,4**
NC091: Sol Plaatje	61 793	85,9	129	0,2	9 829	13,7	188	0,3
NC092: Dikgatlong	11 255	75,9	117	0,8	3 204	21,6	248	1,7

According to table 8 75,9% of the households within the Dikgatlong Municipality resides in formal dwellings with 21,6% occupying informal dwellings. A total of 0,8% of households within the Dikatlong Municipality resides in traditional dwellings.

The households within the Sol Plaatje Municipality mostly resides in formal dwellings (85,9%) with only 13,7% occupying informal dwellings and 0,2 % residing in traditional dwellings.

Education

Education prepares individuals so that they are able to play an active role in the labour market, which directly affects their quality of life as well as the economy of a county and the area they live in. Through the education level, one can then understand the skills that an area has and its potential to contribute positively to the economy (Stats SA). According to the Community Survey of 2016, the District Comprises of large numbers of low levels of education. Table 13 indicates that 49,21% of the population of the Frances Baard District Municipality has an education level of between Grade 8 and Matric.

Table 13. Level of Education within the France Baard District Municipality.

Highest Level of Education	No of people	% of population
No schooling	55494	14.31%
Grade 0 - Grade 7/Standard 5/ABET 3	111538	28.77%
Grade 8/Standard 6/Form 1 - Grade 12/Standard 10/Form 5/Matric/NCV Level 4/ Occupational certificate NQF Level 3	190821	49.21%
NTC I/N1	203	0.05%
NTCII/N2	421	0.11%
NTCIII/N3	614	0.16%
N4/NTC 4/Occupational certificate NQF Level 5	1076	0.28%
N5/NTC 5/Occupational certificate NQF Level 5	506	0.13%
N6/NTC 6/Occupational certificate NQF Level 5	1275	0.33%
Certificate with less than Grade 12/Std 10	218	0.06%
Diploma with less than Grade 12/Std 10	285	0.07%
Higher/National/Advanced Certificate with Grade 12/Occupational certificate NQF	2109	0.54%
Diploma with Grade 12/Std 10/Occupational certificate NQF Level 6	5912	1.52%
Higher Diploma/Occupational certificate NQF Level 7	1675	0.43%
Post-Higher Diploma (Master's	1066	0.27%
Bachelor's degree/Occupational certificate NQF Level 7	5287	1.36%
Honours degree/Post-graduate diploma/Occupational certificate NQF Level 8	2612	0.67%
Master's/Professional Master's at NQF Level 9 degree	721	0.19%
PHD (Doctoral degree/Professional doctoral degree at NQF Level 10)	147	0.04%
Other	887	0.23%
Do not know	4569	1.18%
Unspecified	304	0.08%

Table 14. Total population older than 20 years with no schooling in 2011 and 2016 (Source: StatsSA: Census 2011 (2016 Municipal Demarcations), Community Survey 2016

	2011		2016		% Change 2011 to 2016
	Pop. 20+ with no Schooling	% Pop. 20+ with no Schooling	Pop. 20+ with no Schooling	% Pop. 20+ with no Schooling	
Sol Plaatjies	10758	7%	7412	5%	-31%
Dikgatlong	4864	18%	3079	10%	-37%
Magareng	2371	17%	1834	13%	-23%
Phokwane	6418	18%	4976	14%	-22%
Frances Baard	24411	10%	17301	7%	-29%
Northern Cape	76861	11%	58818	8%	-23%

Dikgatlong Local Municipality had a large number of people with some secondary school followed by those with some primary levels from 2011. Currently 10% of the Dikgatlong Municipality population that is older than 20 years in 2016 have 'no

schooling', a steep decline of 37% in actual numbers from 18% in 2011. Only 23% of the 2016 population that is older than 20 years of age have Gr.12, up from 20% in 2011, these low levels of education place certain limitations on employment creation. Tertiary education is decidedly low in Dikgatlong LM, with only 1,1% of the population older than 34 having some type of tertiary education, a 1,81% increase from 2011.

Table 15. Population older than 20 years with Grade 12 (Source: StatsSA: Census 2011 (2016 Municipal Demarcations), Community Survey 2016)

	2011		2016		% Change 2011 to 2016
	Pop. 20+ with Gr.12	% Pop. 20+ with Gr.12	Pop. 20+ with Gr.12	% Pop. 20+ with Gr.12	
Sol Plaatjies	44506	29%	53303	33%	+20%
Dikgatlong	5567	20%	6628	23%	+19%
Magareng	3419	24%	4055	28%	+19%
Phokwane	7963	22%	8741	24%	+10%
Frances Baard	61456	26%	72728	30%	+18%
Northern Cape	154008	22%	200860	27%	+30%

Table 16. Population older than 34 with Higher Education (Source: StatsSA: Census 2011 (2016 Municipal Demarcations), Community Survey 2016).

	2011		2016		% Change 2011 to 2016
	Pop. older than 34 with Higher Education	% of pop. older than 34	Pop. older than 34 with Higher Education	% of pop. older than 34	
Sol Plaatjies	1053	1,2%	1494	1,5	+0,13%
Dikgatlong	107	0,7%	208	1,1	+1,81%
Magareng	84	1,0%	149	1,6	+2,12%
Phokwane	189	0,9%	394	1,7	+1,10%
Frances Baard	1307	0,3%	1736	1,1	+0,10%

Of the population, living in the Sol Plaatje Municipality, over 20 years, 30% have matric and higher education, while 10% indicate no schooling. The remaining 60% have some primary schooling and some secondary schooling. This will pose a serious problem for the future economic trajectory as skills will have to be built to suit the economic path and in the short-term skills will have to be brought in from skilled areas.

Unemployment

The unemployment rate of the district has also not been stagnant for the past five years. Based on the graph below (figure 49), since 2010, unemployment levels in the district have been increasing instead of deteriorating. According to STATSSA: 2016, FBDM has an unemployment rate of 39.4%, whilst Phokwane (47.8%), Magareng (53.9%), Dikgatlong (44%) and Sol Plaatje (36.2%) are also characterized by such unemployment levels. FBDM, through its local economic

development initiatives seek to address such issues and improve the state of unemployment levels in the district.

The number of those who are not economically active, within the Dikgatlong Municipality, is very high, which means a large portion of the population is highly dependent on social grants or on those that work. The number of employed people has increased from 5924 people (2001) to 7841 (2011) (Figure 50). Thus, the unemployment rate has decreased from 45.3% (2001) to 39.7% (2011).

The Stats SA 2011 indicates that more men are employed than their female counterparts. Furthermore women are the most discouraged work seekers. Additionally, the economical not active female population is also higher than their male counterparts. There is a need to have initiatives that make it easy for women to find employment

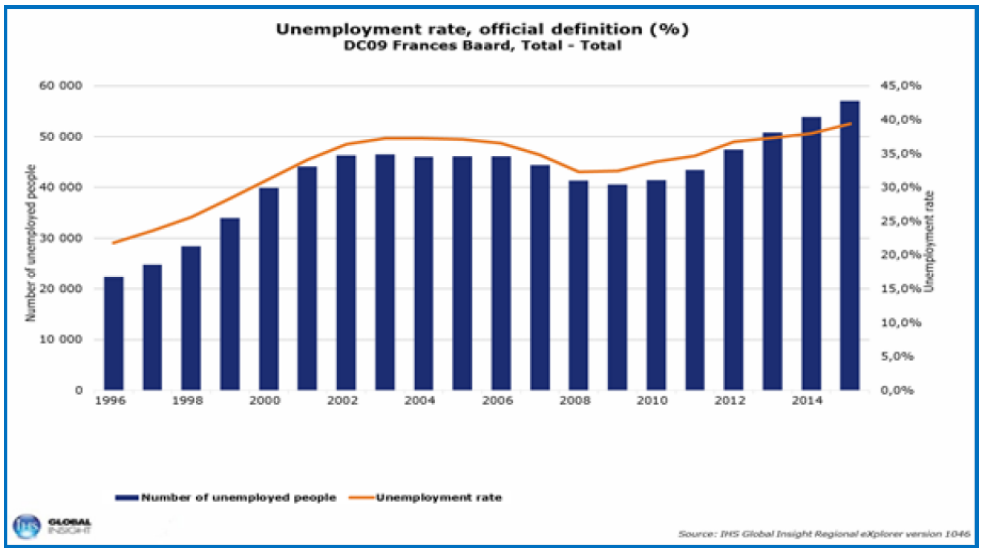


Figure 49. Unemployment rate of the Frances Baard District Municipality. (Source: Global Insight, 2016)

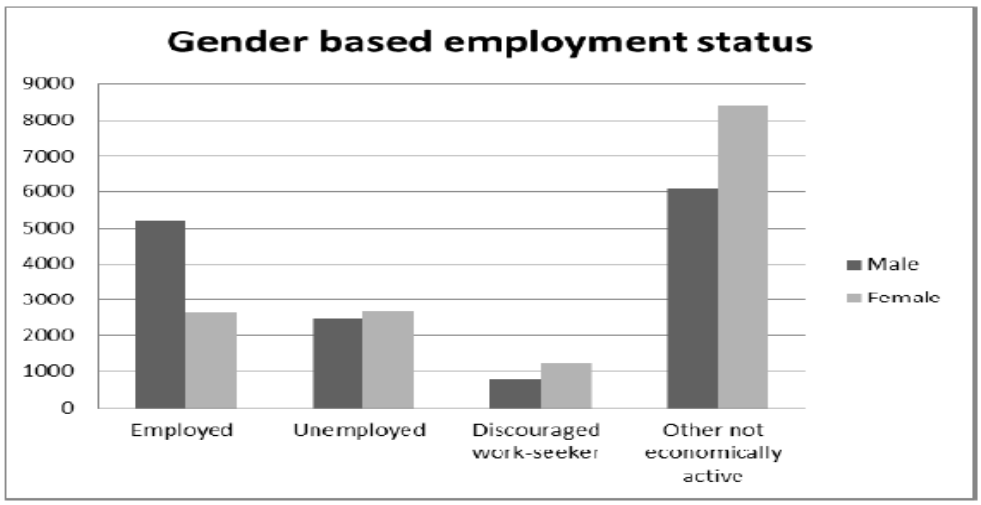


Figure 50. Employment status according to gender for the Dikgatlong Municipality.

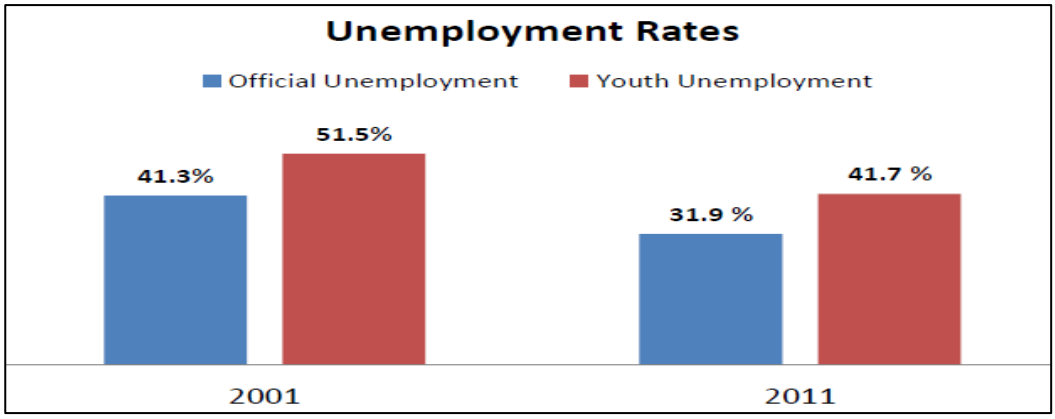


Figure 51. Unemployment Rates for the Sol Plaatje Municipality.

Of the economically active people in the Sol Plaatje Municipality, 31.9% are unemployed (narrow definition of unemployment) and 41.7% of the economically active youth (15 – 34 years) in the area are unemployed. Although the unemployment rates is high, it has decreased from 2001 to 2011.

Economic Analysis

FBDM has the strongest economic potential in the Northern Cape, accounting for 36% of the provincial GDP. The graph in figure 52 stipulates that the economy of the district consists of the primary sector (14%) (agriculture and mining), secondary sector (9%) (Manufacturing, electricity and construction) and tertiary sector (77%) (Trade, transport, financial and social services).

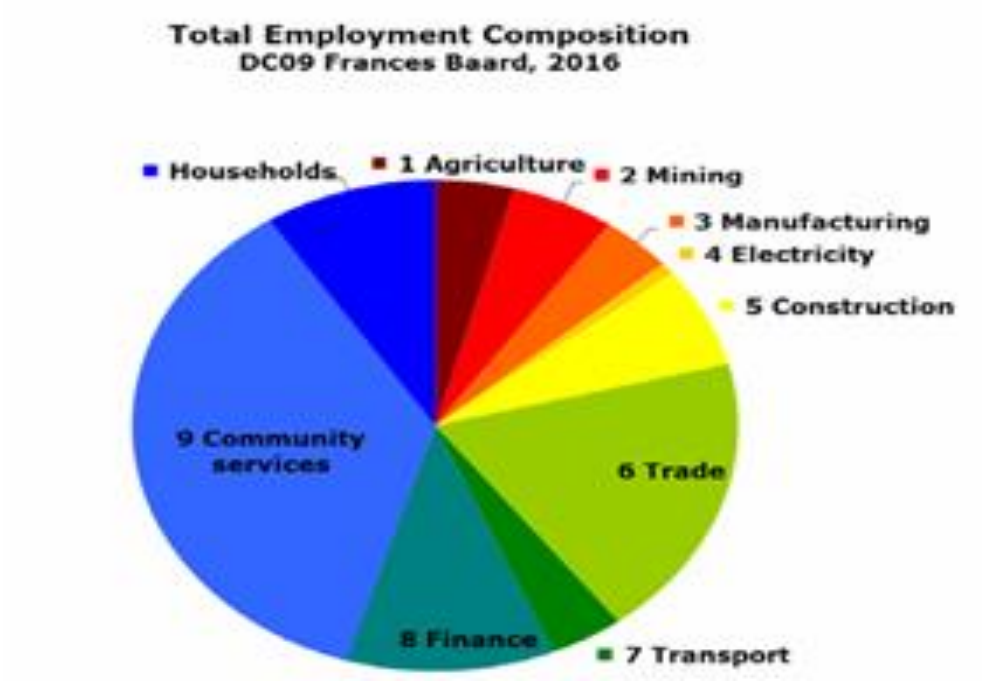


Figure 52. Total employment Composition of the Frances Baard District Municipality.

Local government has a responsibility to create an enabling environment for economic growth and job creation. The Dikgatlong Local Municipality, has adopted a LED Strategy, to assist it in creating those necessary conditions. As the municipality acknowledges the role that the informal economy is playing in its local area, it is in the process of drafting an Informal trading policy to regulate, in a developmental way, the operation of the informal economy.

The formal sector employs 17.73% of employment people while the informal economy has employed 4.29%. The role of the informal economy cannot be underestimated, as it provides those who are unskilled an opportunity to create livelihood for themselves. Dikgatlong Local Municipality acknowledges and appreciated the positive contribution that the informal economy plays in its municipal area and local economic growth. People who work in private households as domestic workers, gardeners, drivers and child minders for individual homes accounts for 3.32% of employable people.

Tourism is one of the key area that drives growth in the Province this is also true for the Dikgatlong Municipality. There is currently a proposed alluvial diamond hiking trail. There is also a need for SAHRA to work with the municipality to see how best to utilise the heritage sites, so that they can make a contribution to the economy of the municipality.

The Sol Plaatje area has a relatively small and somewhat insignificant contribution to the national gross domestic product but has a special place in the provincial economy (54). Sol Plaatje municipality makes up 24% of the share of the provincial economy. The share of Sol Plaatje is estimated at R16.5 billion. This makes up 76% of the contribution of the Frances Baard District to the national economy. Growth rates have been low estimated at 0.6% over the period 1995 to 2013. With the downward turn in the national economy it is likely that this figure would have dropped to between 0.5% and 0.4%.

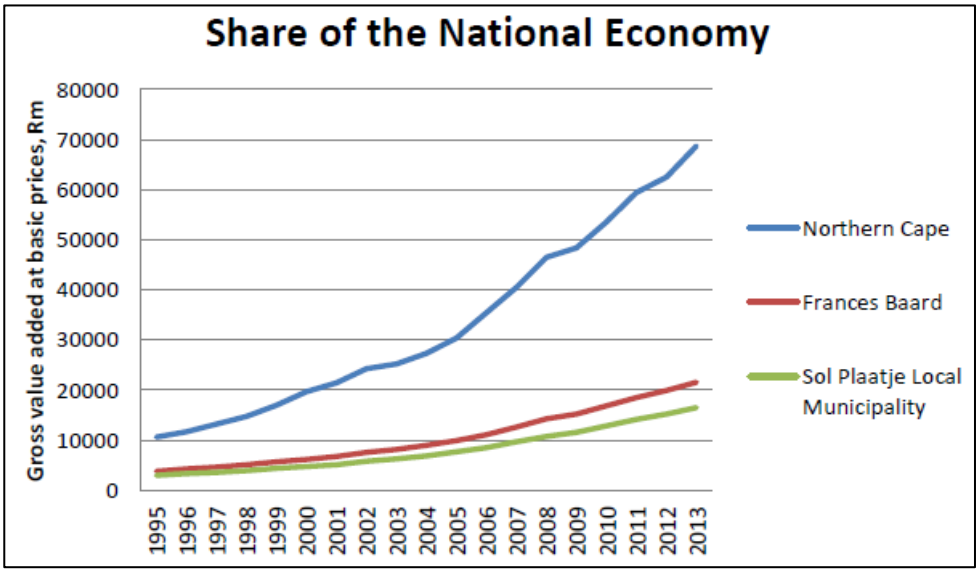


Figure 53. Contribution of Sol Plaatje to National Economy (Source: Quantec)

There has not been a strong replacement and anchor for the dwindling mining sector, which through its diamond trading over 100 years ago, led to the establishment of a stock exchange in Kimberley. Manufacturing which is spurned from mining has a small presence in the area.

The local economy has strong competition from smaller centres such as Upington, which despite its smaller size, may also take the place of Kimberley as a regional service provider. Sol Plaatje's role as primary service provider for the broader region is also challenged by Bloemfontein (located 170km to the east), which offers a more diverse range of functions and services. This overlap is due largely to Kimberley's location related to the discovery of diamonds in the area rather than its role as a regional service centre (which may have seen it situated in a more "logically'). Its position in a less than central location within the province means that areas within the Northern Cape might in fact bear a stronger relationship to Cape Town as a place for high order services.
Tourism has potential to become the anchor however a massive programme to uplift the area, to modernise and globalise the city to attract and retain tourists' interests will be required to reap benefits. Another trigger to the economy could be the Integrated Human Settlements programme of national government and the province. The Northern Cape does not have local distribution points for building materials, bricks and cement. The city is well placed to be become the regional service provider.

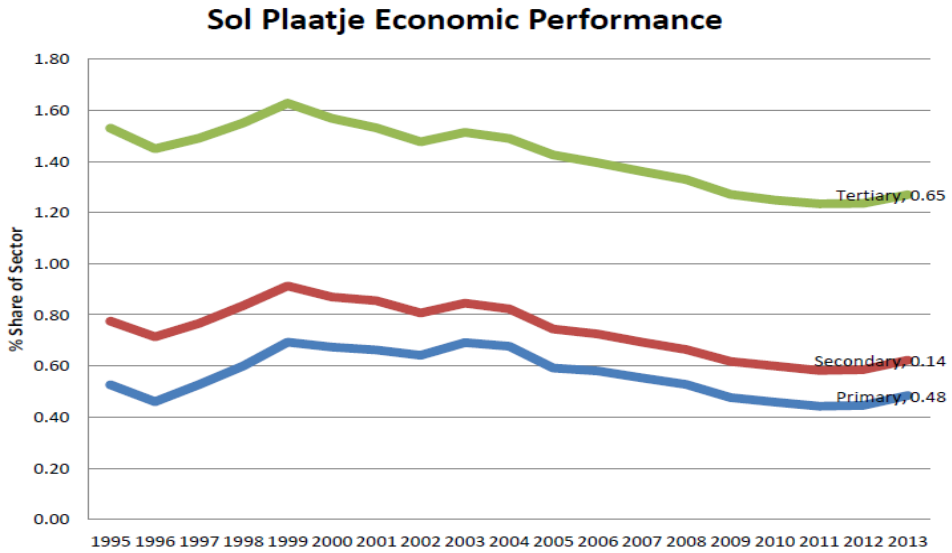


Figure 54. Economic performance of the three economic sectors in the local economy (Source: Quantec)

A closer view of the performance of the local economy, reveals that the tertiary sector, wherein tourism and trade are counted, has a higher performance rate.

All three sectors of the economy show a downward path of decline. Kimberley fulfils the role of provincial capital and thus forms a hub for a range of government services. The provincial government and district municipal offices are both located in the Kimberley and form an important employer and contributor to the need for services. This explains the higher share in the tertiary sector of the economy.

A large part of the employment opportunities in the area were created by the manufacturing sector, especially through the manufacturing of herb beer, jewellery, sheep and leather clothing and dried fruit. Manufacturing could still be stimulated particularly on agro-processing activities, mineral beneficiation including clay, brick and jewellery.

Agricultural production covers: Ground Nut, Cotton, Wheat, Soybeans, Grapes and Lucerne. Many of the products, which are currently produced in the Sol Plaatje municipality, are not processed locally. Linked to the possible development of the agricultural sector, there is the potential to develop the agro-processing sector including meat, fruits and vegetables, oil extraction, leather, muesli and muesli by-products. This sector could be stimulated with a focus on new technological practices (which incorporate labour intensive practices) including organic farming, biotechnology and hydroponics. The focus is both on intensive agriculture (crops) as well as livestock and game farming (meat). Spatially, farming will occur within the rural areas of the municipality. A key imperative is to encourage new start-ups although barriers to entry may include land ownership issues.

Key economic activities

The Northern Cape economy is anchored by the primary sector specifically the mining industry with the primary sector contributing 32.6%, secondary 6.2% and the tertiary sector 49.8% (Statistics SA: GP p0441: 2010). Although the tertiary sector contributes almost 50%, the mining industry alone contributes 24.6% to the provincial value addition. Northern Cape recorded an average real annual economic growth rate of 2.5% between 1996 and 2007. Average real annual economic growth rate of South Africa for the same period (1996 to 2007) was 3.6%.

(14) ***SENSITIVE LANDSCAPES:***

Dr. Betsie Milne from Boscia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application areas, sensitive landscapes was included in this report.

Site sensitivity

The sensitivity map for the De Bad and At Last mining sites is illustrated in Figure 55. The Vaal River, ephemeral pans, and all drainage lines are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. These freshwater systems are also protected in terms of the National Water Act (Act No 36 of 1998) and regarded as important features for the conservation of biodiversity and broad-scale ecological processes. These units are essentially no-go areas.

The woodland on red sand is considered to be of high sensitivity, primarily because of the widespread and dense occurrence of nationally protected Vachellia erioloba. Although these units are not regarded as no-go areas, activities should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

The remaining pristine plains and ridges on De Bad and At Last are considered to be of medium sensitivity. Some land use disturbances are visible, but the natural vegetation remains intact. Species of conservation concern also occur in these habitats, but impacts are likely to be largely local. Activities within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

Those areas already transformed by agriculture are of low sensitivity. There is likely to be a negligible impact on ecological processes and biodiversity in these areas and most types of activities can proceed within these areas with little ecological risk.

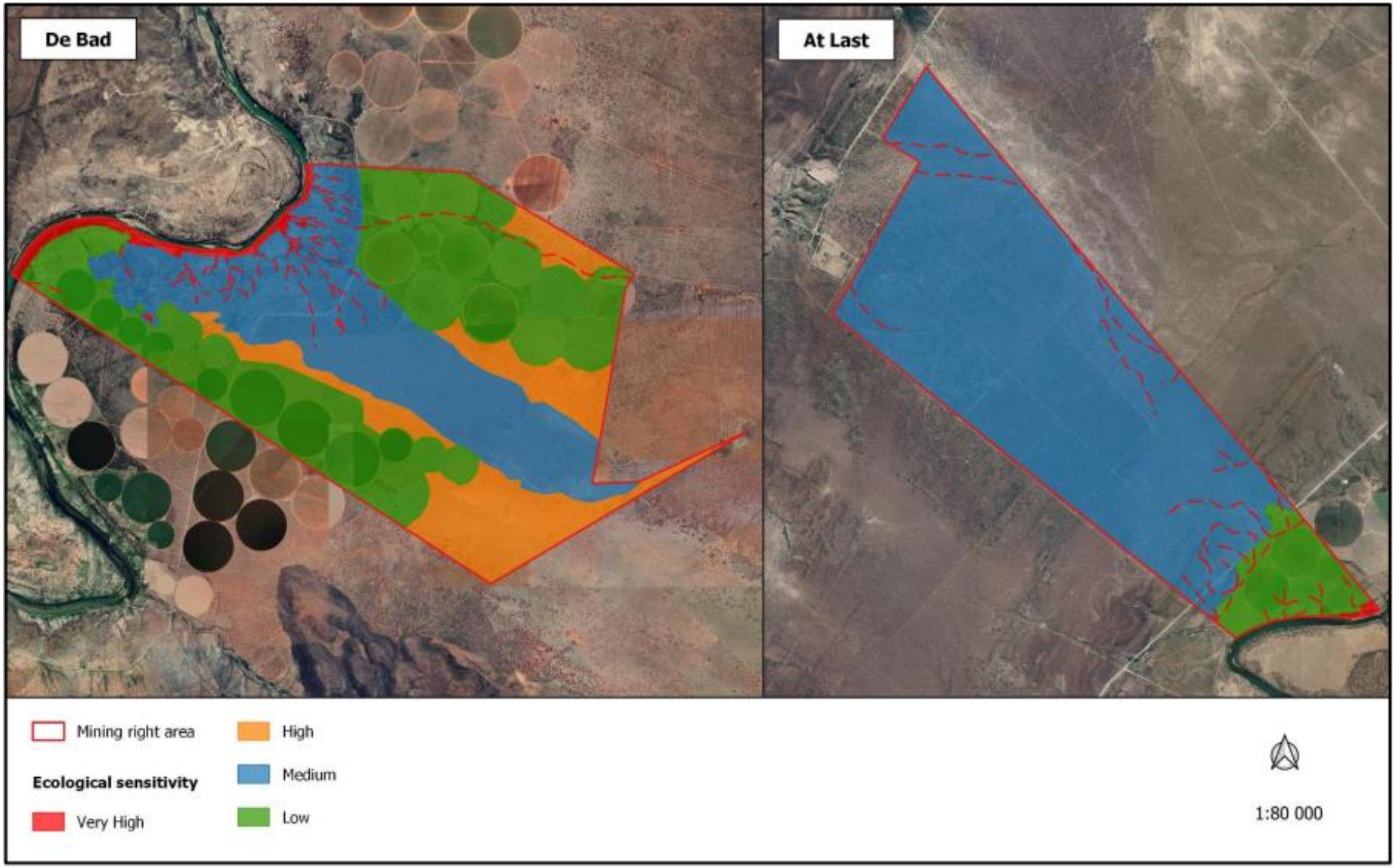


Figure 55. A sensitivity map for the Saxendrift mining area

(b) Description of the current land uses

Dr. Betsie Milne from Bocia Ecological Consulting Pty Ltd has been appointed by Renaissance Resources to provide an Ecological Assessment Report for alluvial diamond mining on Portion 2 (At Last) of the Farm No 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley, and to determine the possible impact of mining on the application area Land capability and land use was described and included in this report., and to determine the possible impact of mining on the application area Land capability and Land Use was described and included in this report.

Pre-mining Land Capability

De Bad and At Last are situated in a rural area, with major land uses in the region including mining and agriculture. According to AGIS, both sites are highly suitable for irrigation. De Bad falls within the Douglas East Potential Agricultural Area (PAA), with a B rating, while At Last falls within the Delportshoop PAA, with a D rating. The agricultural region is demarcated for cattle farming, with the grazing capacity estimated at 13 - 15 Ha/LSU.

Land Use Prior to Mining

Currently, the property is used for agricultural activities, with extensive crop irrigation, especially along the river, while the remaining natural pastures are utilised by domestic stock.

Historical Agricultural Activities and evidence of Abuse

Large areas have been transformed for agriculture and evidence of historic mining activities are also visible.

Existing Structures

Existing infrastructure include homesteads, farm tracks, power lines and grazing camps, while large areas have been transformed for agriculture and evidence of historic mining activities are also visible.

(c) Description of specific environmental features and infrastructure on the site

The infrastructure on site is comprehensively discussed in section d(ii) as part of the mining methodology discussion, as well as in section g as part of the mine footprint description. Furthermore, a comprehensive description of the environment was presented in section g (iv) (A) as part of the baseline report.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

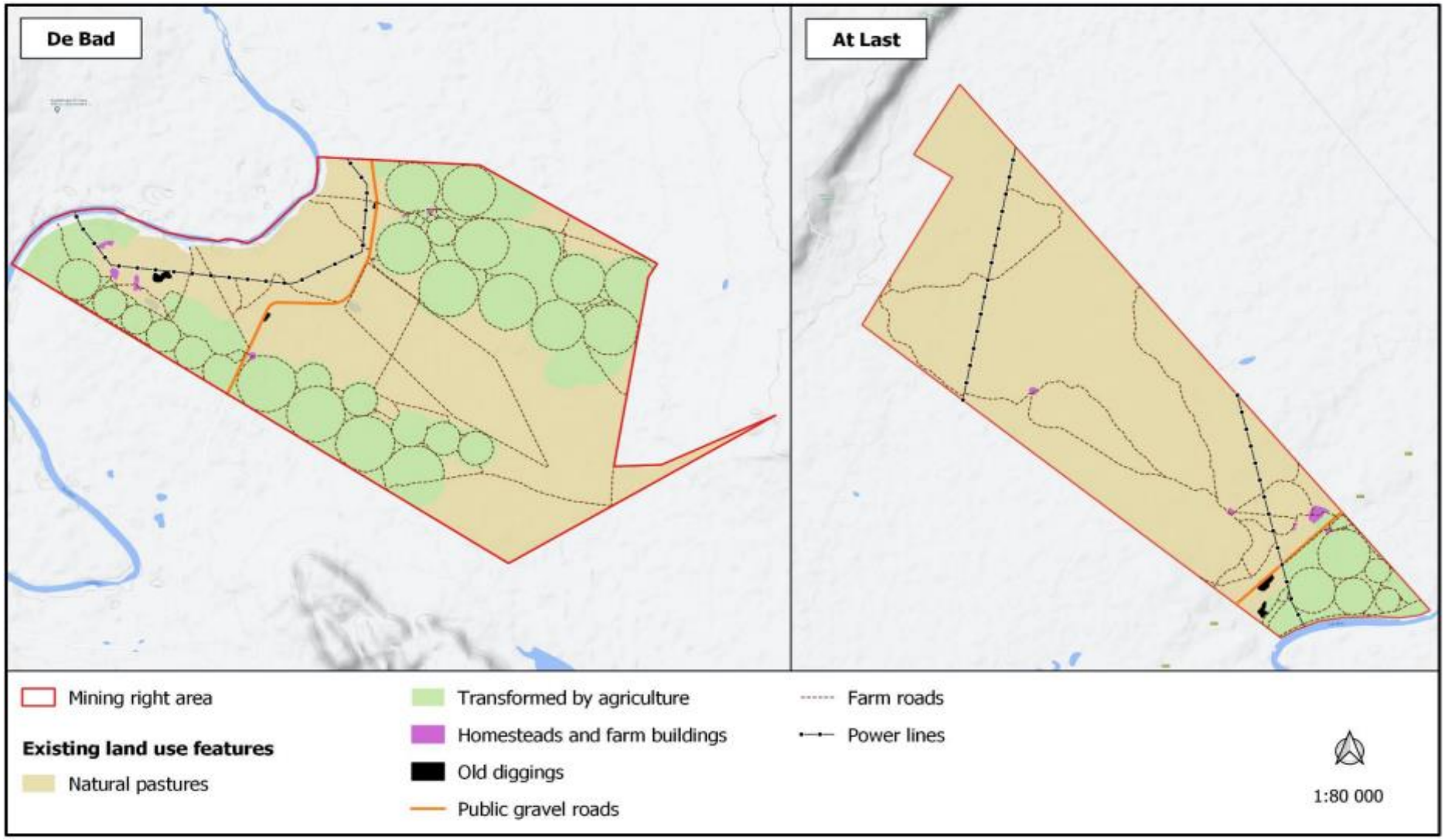


Figure 56. Environmental and current land use map with previous distubances evident

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

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	Sterilisation of mineral resources	Very low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Medium	High	Construction and Operational	Low Local	• Mining of all alluvial gravels continuously, if possible and does not influence mining and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of excavations, dumps and plant site. • Stabilise the mine residue deposits. • All temporary infrastructures should be demolished during closure.
Soils	**Soil Erosion** During clearing of an area for the excavation of minerals, construction of infrastructure and	Low-Medium	Possible, frequently	Decommissioning	Low Local	• Bare ground exposure should be minimised at all times in terms of the surface area and duration. • Re-establishment of plant cover on disturbed areas must take place as soon as possible,

	roads, stockpiling, natural events. Vegetation will be stripped for construction of new roads and mining areas and these areas will be bare and highly susceptible to erosion. Any topsoil-, overburden- and ore stockpiles can be eroded by wind, rain and flooding. Exposed sediments in the watercourses can be carried away during runoff causing downstream sediment deposition. Any leaking pipes can also cause additional water erosion.					once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses, including drainage lines. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of topsoil and soil fertility During clearing of an area for the excavation of minerals,	Medium - High	Certain for life of operation	Residual	Low-medium On-Site	• Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas. • These topsoil stockpiles must be kept as small as possible in

	construction of infrastructure and roads, stockpiling. Topsoil contains living organisms that naturally regulate the ecological functioning of a habitat. Therefore, any disturbances to the intact soil profile can result in soil sterilisation which will directly affect vegetation communities. Apart from the direct disturbances caused by the mining activities, loss of soil fertility can also occur through soil compaction by dump loads as well as heavy machinery and vehicles.					order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment. • To restore areas where compacted soil occur, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.

						• Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Alteration of soil character and quality During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, oil and petrochemical spills. Topsoil contains living organisms and seed banks that provide ecological resilience against disturbances, and any disturbances to the intact soil profile will change its ability to sustain natural ecological functioning. Vehicles and mining	Medium - High	Certain for life of operation	Residual	Low-Medium On-site	• Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure, and stockpile areas. • These topsoil stockpiles must be kept as small as possible to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired. • Topsoil must not be handled when the moisture content exceeds 12 %. • Topsoil stockpiles must by no means be mixed with sub-soils. • The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained

	equipment may potentially leak hazardous fluids on the soil surface, which will cause soil pollution. Apart from the direct disturbances caused by the mining activities, soil compaction by dump loads as well as heavy machinery and vehicles will causes a decrease in large pores, and subsequently the water infiltration rate into soil.					within the topsoil. for the re-growth of the seed bank contained within the topsoil. • For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment. • To restore areas where compacted soil occurs, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction. • Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings and succulent cuttings. • Vehicles and machinery should be regularly serviced and maintained. • Refuelling and vehicle maintenance must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. • Drip trays must be available on site and installed under all stationary vehicles.

						• Spill kits to clean up accidental spills must be well-marked and available on site. • Workers must undergo induction to ensure they are prepared for rapid clean-up procedures. • Any soil or area that is contaminated must be cleaned immediately by removing the soil and disposing it as hazardous waste in the correct manner.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Very Low	Possible	Short term	Minimal Local	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Very low	Possible	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the	Medium	Possible	Construction	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be

	groundwater resource locally					equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
Surface Water **Alteration / destruction of watercourses**	During excavation of minerals, construction of infrastructure and roads, stockpiling. During mining activities there is a possibility that the watercourses on site (i.e. pans and drainage lines) might be altered or indirectly affected. This includes direct mining within the watercourses as well as development of roads, infrastructure or stockpiles within their active zones, catchment areas, or buffer zones. Such activities can completely change the	Medium to High	Possible, Life of operation	Permanent	Medium -high Regional	• All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones. • No new roads should be created across a watercourse and no mining should take place in them. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected watercourses.

	hydrologic regime or habitat conditions of the watercourses, which will not only compromise their ecological functioning, but also have downstream effects.					
Siltation of surface water	During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, natural events. Vegetation will be stripped in preparation for the mining areas and associated infrastructure. These bare areas will be susceptible to water erosion without plants to stabilise the soil, creating potential sediment source zones. High runoff	Low-Medium	Possible, infrequent	Decommissioning	Low Regional	• Bare ground exposure should always be minimised in terms of the surface area and duration. • Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased. • No new roads, infrastructure or mining areas should be developed over watercourses. • Disturbances during the rainy season should be monitored and controlled. • Any potential run-off from exposed ground should be controlled with flow retarding barriers. • Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring;

	events could potentially cause the drainage lines, pans and Vaal River to be filled with silt from mining areas if the sediment source zones lie along the drainage paths towards these watercourses. This may lead to changes in hydrologic regime or character of the watercourses on site, and downstream.					followed by appropriate remedial actions.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling.	Medium-High	Certain for life of operation	Residual	Low to Medium On site	• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible. • Implement effective avoidance measures to limit any activities in the highly sensitive areas, by applying the no-go principles. • Ensure measures for the adherence to a maximum

	The Renaissance mining activities are expected to destroy a large area of natural habitat, especially on De Bad. It is expected that the ecological functioning and biodiversity will take many years to fully recover. Furthermore, vehicle traffic and mining activities generate lots of dust which can reduce the growth success and seed dispersal of many small plant species in the adjacent areas.					speed limit of 40 km/h to minimise dust fallout and associated effects on plants in the adjacent pristine areas. • Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings. • The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas. • Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.
	Loss of Red data and / or protected flora species Removal of listed or protected plant species during clearing of an area for the excavation of minerals, construction of	Medium High	Possible for life of operation	Residual	Low to Medium On site	• The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to any destructive activities by means of a search-and-rescue operation. • It is recommended that these plants are identified and marked prior to intended activity. These plants should

	infrastructure and roads, stockpiling. Intentional removal of listed or protected plant species for non-mine related purposes, e.g., firewood collection or illegal succulent trade. There are a number of plant species of conservation concern present in the Mining Right area, including the nationally protected Vachellia erioloba and provincially protected Aloe claviflora, A. grandidentata, Trachyandra bulbinifolia, Gymnosporia buxifolia, Lessertia annularis, Ornithogalum flexuosum, Moraea pallida, Olea europaea subsp. africana, Oxalis					ideally be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely all be removed or relocated if possible. The relevant permits from DAFF and/or DENC should be applied for at least three months before such activities will commence. • The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of all the rescued plants. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and

	lawsonii, Jamesbrittenia tysonii and Nemesia fruticans. Therefore, it is likely that the mining operation could potentially have an impact on these species if their local populations are destroyed. Furthermore, any illegal harvesting of firewood from V. erioloba or succulents and bulbs for ornamental purposes or trade, by staff, contractors or secondary land users could have devastating effects on the population of these species.					workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Environmental induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • Employ regulatory measures to ensure that no illegal harvesting takes place.
	Introduction or spread of alien species During clearing of an area for the excavation of	Low Medium-	Possible, frequently	Residual	Low Local	• Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.

	minerals, construction of infrastructure and roads, stockpiling, improper rehabilitation practises. Existing populations. Several invasive species (Argemone ochroleuca, Eucalyptus camaldulensis, Lythrum hyssopifolia and Prosopis spp.) and a high density of naturalised exotics (Bidens spp.,) occur within and around the study area. Anthropogenic disturbances to natural vegetation, especially the clearance of large areas of land, provide the opportunity for alien plants to increase. This is due to their opportunistic nature of dispersal					• Mechanical methods of control should be implemented pro-actively as soon as invasive species start to emerge. • Regular follow-up monitoring of invasive control areas need to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

	and establishing in disturbed areas. If alien plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity as well as reduction in the ecological value and land use potential of the area. Therefore, if alien species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.					

	Encouragement of bush encroachment During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling, improper rehabilitation practises. Existing populations. Bush encroachment is a natural phenomenon characterised by the excessive expansion of certain shrub species at the expense of other plant species. While general clearing of the area and mining activities destroy natural vegetation, bush encroaching plants can increase due to their aggressive nature in	Low	Possible, infrequently	Residual	Low On site	• Mechanical methods of control should be implemented pro-actively when encroaching species form dense stands. • Regular follow-up monitoring of encroached control areas need to be implemented to ensure effective eradication. • Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

	disturbed areas. If encroaching plants establish in disturbed areas, it may lower the potential for future land use and decrease biodiversity. Senegalia mellifera, Grewia flava, Rhigozum trichotomum, Tarchonanthus camphoratus and Vachellia karroo already indicate high levels of encroachment on site. However, the removal of these species during mining activities may potentially reduce their abundance and therefore mining could have a positive effect on bush encroachment.					
Fauna	**Loss, damage and fragmentation of natural habitats**	Medium-High	Certain for life of operation	Residual	Low - Medium Regional	• All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise

	During clearing of an area for the excavation of minerals, construction of infrastructure and roads, stockpiling. Fragmentation of habitats typically leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This can be in the form of small-scale fragmentation for reptiles, amphibians, and invertebrates, to more large-scale fragmentation that hinder dispersal of birds and plants. It also includes the degradation of aquatic habitats, like pans and the ephemeral drainage channels. Fragmentation of					dissection or fragmentation of any important faunal habitat type. • The footprint areas of the mining activities must be scanned for any nests and dens prior to any destructive activities by means of a search-and-rescue operation. • It is recommended that nests and dens are identified and marked prior to intended activity and should be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely be destroyed. The relevant permits from DENC should be applied for at least three months before such activities will commence. • The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so. • Those pristine areas surrounding the earmarked area that are not part of the

	habitats typically leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This can be in the form of small-scale fragmentation for reptiles, amphibians, and invertebrates, to more large-scale fragmentation that hinders dispersal of birds and plants. It also includes the destruction of burrows, tunnels, and chambers as well as the degradation of ephemeral aquatic habitats. Small-scale fragmentation disconnects breeding and foraging links, increasing stress and energy budget deficits, which is especially taxing on					demarcated area should be considered as a no-go zone for employees, machinery or even visitors. • No new roads should be created across any of the watercourses. • No mining should take place in the drainage lines, ephemeral pans or within the river buffer. If this is unavoidable, a water use license to alter the beds and banks of the watercourses should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected terrestrial and aquatic habitats.

	animals living in arid environments. Larger scale fragmentation results in a subsequent loss of genetic variability between meta populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations. The mining activities is expected to result in the loss of connectivity and fragmentation of natural micro-habitats primarily on a local scale, but if the ephemeral pans are destroyed then this will have a regional effect on the branchiopod population as well as					

	the migratory birds that feed on them.					
	Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from mining activities; excavations. The site provides suitable habitat for several species of conservation concern, as discussed in the various faunal taxon groups in this report. The proposed mining activities could lead to the death and displacement of some of these species. The transformation of natural	Low-Medium	Certain for life of operation	Decommissioning	Low - Medium Local	• Careful planning of the operation is needed to avoid the destruction of pristine habitats and minimise the overall disturbance footprint. • The extent of the mining activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site should be managed as a no-go zone. • The footprint areas of the mining activities must be scanned for any protected faunal species prior to any destructive activities by means of a search-and-rescue operation. • If any of the protected wildlife species are directly threatened by habitat destruction or displacement during the mining operation, then the relevant permits from DENC should be obtained followed by the relevant mitigation

	habitats will result in the loss of micro-habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g., birds that nest in trees or animals residing in holes in the ground, among rocks or underneath plants. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians, and many invertebrates. Intentional killing of snakes, reptiles, and owls will negatively affect their local populations.					procedures stipulated in the permits. • It is recommended that these individuals be rescued and relocated by a registered professional prior to intended activities. • No mining should take place in the drainage lines, pans or near the river and no new roads should be created across these water resources. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Everyone on site must undergo environmental induction for awareness on not capturing or harming species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site. • All reptiles, amphibians, bird nests and small mammal litters that are exposed during the clearing operations should be captured for later release or

						translocation by a qualified expert. • Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.
Cumulative Compromise of Broadscale Ecological Processes	Clearing of vegetation and disturbance during the construction of roads and mining activities; alterations to watercourse habitat characteristics. Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental	Medium-high	Certain for life of operation	Residual	Low - Medium Regional	• Implement best practise principles to minimise the footprint of transformation. • No new roads should be created across the watercourses and no mining should take place in the watercourses or their buffers. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities. • Employ sound rehabilitation measures to restore characteristics of all affected habitats.

	fluctuations. The vast extent of mining and agricultural activities in the region have already transformed large natural landscapes and the proposed mining activities will add to the fragmentation of habitats on a landscape level. Habitat alterations will also destroy connectivity of vital ecological corridors of aquatic food webs in the ephemeral pans, which could have cascading effects on a regional level.					
Air Quality	Sources of atmospheric emission associated with the mining operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and	Low	Certain	Decommissioning	Low Local	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels.

	vehicle entrainment of road dust.					
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Construction of internal Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Construction of internal roads should be limited to daytime only.
	Construction of the Mine Residue dump, soil stock pile and material stock pile.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Clearing of new open cast mining areas, stripping and stockpiling of topsoil.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.

						Topsoil stripping should be limited to daytime only.
	Diesel generators	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.
	Mining activities	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Back fill of mine footprint area	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.

						Backfill of mine footprint area activities should be limited to daytime only.
Visual impacts	Potential visual impact	Medium	Certain	Construction, Operation and Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact. As the visual impact would be low, Correct design will ensure that the development will fit into the surrounding area.
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Low likelihood	Decommissioning	Low Local	Utilise existing access roads, where applicable; implement measures that ensure adherence to traffic rules.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	**Population Impacts** Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• A community skills audit should be undertaken by Renaissance Resources. Alternatively, the existing Labour Desk could be used to determine which skills are locally available and which employees could come into consideration for employment. • Training of potential future employees, contract workers and/or community members should focus on mining related skills which would furthermore equip

						trainees/beneficiaries with the necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training courses should be accredited and certificates obtained should be acceptable by other related industries. • Guidance concerning legal requirements to which locals should adhere to, to make them employable, such as the standard construction industry requirements should also be attended to.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting

						• The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis

Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the mining company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

Methodology used in determining and ranking the nature, severity, consequences, extent, duration and probability of potential environmental impacts and risks

The Different environmental components on which the project (can) have an impact are:

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **Surface Water**
9. **Ground Water**
10. **Air Quality**
11. **Noise and vibration**
12. **Archaeological and Cultural Sites**
13. **Sensitive Landscapes**
14. **Visual Aspects**
15. **Socio-Economic Structures**
16. **Interested and Affected Parties**

Impact Assessment

Before the impact assessment could be done the different project Activities/infrastructure components were identified.

1	**Processing Plant: 2 - 4 X 16 feet** pans with conveyers and recovery
2	**Ablution Facilities:** In terms of sewage the decision was made to use chemical toilets which can be serviced regularly by the service provider.
3	**Clean & Dirty water system: Berms** It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
4	**Fuel Storage facility (Concrete Bund walls and Diesel tanks):** It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
5	**Mining Area:** Opencast mining to mine for alluvial diamonds.
6	**Salvage yard (Storage and laydown area).**
7	**Product Stockpile area.**
8	**Waste disposal site** The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: o Small amounts of low-level hazardous waste in suitable receptacles; o Domestic waste; o Industrial waste.
9	**Roads (both access and haulage road on the mine site):** Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 - 4 km of roads, with a width of 6 meters.
10	**Temporary Workshop Facilities and Wash bay.**
11	**Water distribution Pipeline.**
12	**Water tank:** It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

The criteria used to assess the consequence of the impacts are shown in the **table 17** below. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The Consequence of the impacts was calculated by using the following formula:

(Severity + Extent + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts.

Table 17. Consequence of impacts is defined as follows.

CONSEQUENCE				
Colour Code	**Consequence rating**	**Rating**	**Negative Impact**	**Positive Impact**
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Low- Medium	23 -33	Acceptable/Not desirable	Moderately Positive
	Medium	34 - 48	Generally undesirable	Beneficial
	Medium-High	49 - 56	Generally unacceptable	Important
	High	57 - 70	Not Acceptable	Important
	Very High	90 - 102	Totally unacceptable	Critically Important

Consequence of impacts is defined as follows:

Very Low - Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low - Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Low Medium Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium - Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible and possible.

Medium High- Impact would be real but could be substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and possible but may be difficult and or costly.

High - Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Before any assessment can made the following evaluation, criteria need to be described.

Table 18. Criteria used to assess the **SIGNIFICANCE** of impacts

Weight	Severity	Spatial scope (Extent)	Duration
5	Disastrous	Trans boundary effects	Permanent
4	Catastrophic / Major	National / Severe environmental damage	Residual
3	High / Critical / Serious	Regional effect	Decommissioning

2	Medium / slightly harmful	Immediate surroundings / local / outside mine fence	Life of Operation
1	Minimal/potentially harmful	Slight permit deviation / on-site	Short term / construction (6 months – 1 year)
0	Insignificant/ non harmful	Activity specific / No effect / Controlled	Immediate (0 – 6 months)

Table 19. Explanation of **PROBABILITY** of impact occurrence

Weight number		1	2	3	4	5
Frequency						
Probability	Frequency of impact	Highly unlikely	Rare	Low likelihood	Probable / Possible	Certain
		Practically impossible	Conceivable but very unlikely	Only remotely possible	Unusual but possible	Definite
	Frequency of activity	Annually or less	6 months/ temporarily	Infrequent	Frequently	Life of Operation

Table 20. Explanation of EXTENT of impact

Weight	Extent of Impact	Explanation of Extent
1	Footprint	Direct and Indirect impacts limited to the activity, such as footprint occurring within the total site area of impact only.
2	Surrounding Area **Site**	Direct and Indirect impacts affecting environmental elements **within 2 km of site**
3	Local Municipality **Local**	Direct and Indirect impacts affecting environmental elements within the **Dikgatlong and Sol Plaatjie area**
4	Regional/District **Regional**	Direct and Indirect impacts affecting environmental elements within **Frances Baard District**
5	**Provincial**	Direct and Indirect impacts affecting environmental elements in the **Northern Cape Province**

Table 21. Explanation of DURATION of impact

Weight	Duration of Impact	Explanation of Duration
1	Temporary (Very Short)	Less than 1 year
2	Short term	1 to 5 years
3	Medium term	6 to 15 years
4	Long term (Life of project)	16 to 50 years
5	Very Long term	Longer than 50 years
6	Permanent	Permanent

Table 22. Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
1	No Impact	There will be no impact at all – not even a very low impact on the system or any of its parts.
2	Very Low	Impact would be negligible. In the cast of negative impacts, almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple. In the case of positive impacts alternative

		means would almost all likely to be better, if one or a number of ways, then this means of achieving the benefit.
3	Low	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved or little would be required or both. In the case of positive impacts alternative means for achieving this benefit would be easier, cheaper, more effective, less time-consuming, or some combination of these.
4	Moderately Severe	Impact would be real but not substantial within the bounds of those which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily possible. In the case of positive impacts other means other means of covering these benefits would be about equal in cost and effort.
5	High Severance	Impacts of substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
6	Very High Severity	Of the highest order possible within the bounds of impacts which could occur, in the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted. In the case of positive impacts there is no real alternative to achieving the benefit.

vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

During construction and operation of the mine, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and slimes dam will alter the topography by adding features to the landscape. Topsoil removal and alluvial mining will unearth the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation where present will be stripped in preparation for placement of infrastructure and loading, and therefore the areas will be bare and susceptible to erosion. The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The declared areas will be rehabilitated, but full restoration of soil might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

During the construction and operation of the mine, there is a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil unusable unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly

monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. The site has a land capability for agriculture and grazing, but grazing activities can still be performed in areas not earmarked for mining, and with proper rehabilitation the land capabilities and land use potential can be restored.

If oil and fuel spillages occur, then it will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow.

Construction and mining activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species. It is expected that protected species if present will be destroyed during the mining operation, the necessary permits will be obtained after the specialist studies have been completed to confirm the presence of the protected species.

While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to mining activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. The construction of the mine and associated infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected

population's genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the site. Pockets of fragmental natural habitats hinder the growth and development of populations.

During the mining operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The mine will add a certain amount of noise to the existing noise in the area. However, levels of noise generated by mining activities are low.

The impact of site generated trips on the traffic of the existing roads is experienced to be low. Nevertheless, if road safety is not administered it can have a high impact on the safety of fellow road users.

The mining operation, especially during construction, will create a number of new employment opportunities. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area will possibly impact on safety and security of local residents. During the decommissioning and at closure of the mine, staff will most likely be retrenched. This can potentially flood the job market, resulting in people being unable to find new employment for a long period of time. It is normally more difficult for people with highly specialised skills to find employment immediately. Those with fewer skills have more flexibility in the job market.

Economic slump of the local towns after mine closure is an associated potential impact, although small due to the small scale of the operation. Income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and mine-related businesses. People who have derived income directly or indirectly from the project may be inclined to leave the region in search of employment or business opportunities. This could result in further decline of the economy of the region as well as the abandonment of infrastructure. The loss of the mine workforce income will also impact upon non-mine related industries within the local and regional areas, particularly the rental property market and retail and service industries who would have received income during the life of mine from the salaried workforce.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the mine, and that the economy will not decline to its original level prior to the development of this project. This is because the mine will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

It is difficult to predict the actual impact of the mine closure in advance, but it is acceptable to assume that the mine closure will have a negative impact on the local and regional economy with a high probability of occurrence, a Low severity and a Low

significance. Positive impacts include employment and training opportunities for people in the local community and local contractors; social upliftment and community development programmes; economic benefits.

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

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered)

Geology and mineral resource

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The mining of alluvial gravels should be well planned and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.

Topography

Level of risk: Low

Mitigation measures

- Mining of alluvial gravels continuously, if possible, otherwise when they become available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled backfilling at excavations and plant site;
- Stabilise the mine residue deposit;
- All temporary infrastructures should be demolished during closure.

Soil erosion

Level of risk: Low Medium

Mitigation measures

- Bare ground exposure should always be minimised in terms of the surface area and duration.
- Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased.
- No new roads, infrastructure or mining areas should be developed over the drainage lines.
- Disturbances during the rainy season should be monitored and controlled.
- Any potential run-off from exposed ground should be controlled with flow retarding barriers.
- Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

Loss of Topsoil and soil fertility

Level of risk: Medium High

Mitigation measures

- Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure and stockpile areas.
- These topsoil stockpiles must be kept as small as possible to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
- For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occurs, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings and succulent cuttings.

Soil character and quality

Level of risk: Medium High

Mitigation measures

- Topsoil needs to be removed and stored separately during mining and the construction of roads, infrastructure, and stockpile areas.
- These topsoil stockpiles must be kept as small as possible to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must by no means be mixed with sub-soils.
- The topsoil should be replaced as soon as possible on to the disturbed areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
- For restoration of the affected areas without topsoil, soils can be sourced from other sustainable areas and chemically changed to match with the surrounding environment.
- To restore areas where compacted soil occurs, a ripper blade or deep plow can be pulled across the affected area to alleviate compaction.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings and succulent cuttings.
- Vehicles and machinery should be regularly serviced and maintained.
- Refuelling and vehicle maintenance must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Drip trays must be available on site and installed under all stationary vehicles.
- Spill kits to clean up accidental spills must be well-marked and available on site.

- Workers must undergo induction to ensure they are prepared for rapid clean-up procedures.
- Any soil or area that is contaminated must be cleaned immediately by removing the soil and disposing it as hazardous waste in the correct manner.

Land capability and land use

Level of risk: Medium

Mitigation measures

- Ensure that optimal use is made of the available land through consultation with land owner and proper planning of mining activities.
- Surface agreement to be signed with land owners.
- Employ effective rehabilitation strategies to restore land capability and land use potential of the area.
- All activities to be restricted within the demarcated areas.
- Ensure that land which is not used during construction is made available for grazing.

Ground water

Level of risk: Low

Mitigation measures

- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Spill kits to clean up accidental spills from earthmoving machinery must be well marked and available on site.
- Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.
- All facilities where dangerous materials are stored must be contained in a bund wall.
- Vehicles and machinery should be regularly serviced and maintained.

Surface water

ALTERATION DESTRUCTION OF WATERCOURSES

Level of risk: Medium High

Mitigation measures

- All activities associated with the mining operation must be planned to avoid any disturbances to the watercourses and their buffer zones.
- No new roads should be created across the watercourses and no mining should take place in these systems. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected watercourses.

Surface water

Siltation of surface Water

Level of risk: Low Medium

Mitigation measures

- Bare ground exposure should always be minimised in terms of the surface area and duration.
- Re-establishment of plant cover on disturbed areas must take place as soon as possible once activities in the area have ceased.
- No new roads, infrastructure or mining areas should be developed over watercourses.
- Disturbances during the rainy season should be monitored and controlled.
- Any potential run-off from exposed ground should be controlled with flow retarding barriers.
- Regular monitoring during the mining operation should be carried out to identify areas where erosion is occurring; followed by appropriate remedial actions.

Indigenous flora

Loss of indigenous vegetation

Level of risk: Medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Implement effective avoidance measures to limit any activities in the highly sensitive areas, by applying the no-go principles.
- Ensure measures for the adherence to a maximum speed limit of 40 km/h to minimise dust fallout and associated effects on plants in the adjacent pristine areas.
- Encourage the growth of natural plant species in all affected areas by sowing indigenous seeds or by planting seedlings.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of affected areas.
- Apply for permits to authorise the clearance of indigenous plants from DENC at least three months before such activities will commence.

Indigenous flora

Loss of Red data and/or protected floral species

Level of risk: Medium

Mitigation measures

- The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to any destructive activities by means of a search-and-rescue operation.
- It is recommended that these plants are identified and marked prior to intended activity. These plants should ideally be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely all be removed or relocated (if possible). The relevant permits from DENC/DAFF should be applied for at least three months before such activities will commence.
- The setup of a small nursery is advisable to maximise translocation and re-establishment efforts of all the rescued plants.

- A management plan should be implemented to ensure proper establishment of ex situ individuals and should include a monitoring programme for at least two years after re-establishment to ensure successful translocation.
- The designation of an environmental officer is recommended to render guidance to the staff and contractors with respect to suitable areas for all related disturbance and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.
- All those working on site must be educated about the conservation importance of the flora occurring on site as well as the legislation relating to protected species.
- Employ regulatory measures to ensure that no illegal harvesting takes place.

Alien invasive plants

Level of risk: Low to medium

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation, by keeping to existing roads and earmarked areas where possible.
- Mechanical methods of control should be implemented pro-actively as soon as alien species start to emerge.
- Regular follow-up monitoring of invasive control areas needs to be implemented to ensure effective eradication.
- Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

Encouraging bush encroachment

Level of risk: Low to medium

Mitigation measures

- Mechanical methods of control should be implemented pro-actively when encroaching species form dense stands.
- Regular follow-up monitoring of encroached control areas needs to be implemented to ensure effective eradication.
- Encourage proper rehabilitation of disturbed areas through soil restoration and reseeding of indigenous plant species.

Fauna

Disturbance displacement and killing of fauna

Level of risk: Medium

Mitigation measures

- Careful planning of the operation is needed to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.
- The extent of the mining activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site should be managed as a no-go zone.
- The footprint areas of the mining activities must be scanned for any protected faunal species prior to any destructive activities by means of a search-and-rescue operation.

- If any of the protected wildlife species are directly threatened by habitat destruction or displacement during the mining operation, then the relevant permits from DENC should be obtained followed by the relevant mitigation procedures stipulated in the permits.
- It is recommended that these individuals be rescued and relocated by a registered professional prior to intended activities.
- No mining should take place in the drainage lines, pans or near the river and no new roads should be created across these water resources. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Everyone on site must undergo environmental induction for awareness on not capturing or harming species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site.
- All reptiles, amphibians, bird nests and small mammal litters that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Employ measures that ensure adherence to a maximum speed limit of 40 km/h as well as driving mindfully on site to lower the risk of animals being killed on the roads or elsewhere in the mining area.

Habitat fragmentation

Level of risk: Medium

Mitigation measures

All activities associated with the mining operation must be planned, where possible to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.

- The footprint areas of the mining activities must be scanned for any nests and dens prior to any destructive activities by means of a search-and-rescue operation.
- It is recommended that nests and dens are identified and marked prior to intended activity and should be incorporated into the design layout and left in situ. However, due to the nature of the proposed mining activities they will most likely be destroyed. The relevant permits from DENC should be applied for at least three months before such activities will commence.
- The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so.
- Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors.
- No new roads should be created across any of the watercourses.
- No mining should take place in the drainage lines, ephemeral pans or within the river buffer. If this is unavoidable, a water use license to alter the beds and banks of the watercourses should be obtained from DWS prior to such activities.

- Employ sound rehabilitation measures to restore characteristics of all affected terrestrial and aquatic habitats.

Broad-scale ecological processes

Level of risk: Low

Mitigation measures

- Implement best practise principles to minimise the footprint of transformation.
- No new roads should be created across the watercourses and no mining should take place in the watercourses or their buffers. If this is unavoidable, a water use license to alter the beds and banks of each earmarked watercourse should be obtained from DWS prior to such activities.
- Employ sound rehabilitation measures to restore characteristics of all affected habitats.

Air quality

Level of risk: Low

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for mining only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.
- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.
- The length of time where open areas are exposed should be restricted. Mining should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all mining activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
    - Speed limits;
    - Spraying of surfaces with water;
    - Mining of alluvial gravels and rehabilitation of disturbed areas; and

Noise and vibration

Level of risk: Low

Mitigation measures

- Machinery with low noise levels which complies with the manufacturer's specifications to be used.
- Restrict construction and mining activities to take place during daytime period only unless agreements obtained to do 24hr operations.

- Vehicles to comply with manufacturers' specifications and any activity which will exceed 90.0dBA to be done during daytime only.
- Systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- Generators to be placed in such a manner that it is not a nuisance for any other parties.
- Noise monitoring to be done along the mine footprint and noise sources within the mine boundary on a monthly basis after which the frequency can change to a quarterly basis.
- Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.
- Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data-base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.

Visual impacts

Level of risk: Low -Medium

Mitigation measures

Mitigation measures may be considered in two categories:

Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered; and

Secondary measures designed to specifically address the remaining negative effects of the final development proposals:

- Primary measures that will be implemented should mainly be measures that minimise the visual impact by softening the visibility of the mining activities, by "blending" with the surrounding areas. Such measures will include rehabilitation of the disturbed area, such as the excavations by re-vegetation of the area and using an aesthetically pleasing design for the proposed development.

During the construction phase the following mitigation measures should be implemented to minimise the visual impact.

- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.

- Reduce the construction period through careful planning and productive implementation of resources.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.
- Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting or restrict lighting to certain areas.
- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way;
- Rehabilitation of disturbed areas and re-establishment of vegetation;

Traffic and road safety

Level of risk: Low

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources

Level of risk: Low

Mitigation measures

- The heritage and cultural resources (e.g. stone age sites and Mining Heritage etc.) must be protected and preserved by the delineation of a no go zone.
- Intact bedrock strata should be avoided during mining of terrace gravels where possible.
- Stone tools should be avoided where possible and fresh exposure should be recorded before destruction. All stone tool artefacts should be recorded, mapped and collected before destruction.
- Should any further heritage or cultural resources be disturbed, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist.

Socio-economic

Level of risk: Low

Mitigation measures

- The mine must ensure that false expectations are not created regarding job creation.

- Jobs must be allocated as advertised and in so far as is possible to local inhabitants.
- Contractors and employees should not be permitted to wander outside the mining area.
- Uncontrolled settlement of contractors and workers outside of the site will be prevented.
- The expectations of what benefits can accrue to the community must be managed from the initiation of the project.
- Commitments as set out in the SLP must be attained.

Interested and affected parties

Level of risk: Low

Mitigation measures

- Maintain active communication with IAPs.
- Ensure transparent communication with IAPs at all times.
- IAPs must be kept up to date on any changes in the mining operation.
- A complaints management system should be maintained by the mine to ensure that all issues raised by community members are followed up and addressed appropriately.

ix) Motivation where no alternative sites were considered

No alternative location for the proposed mining operation was considered, as the alluvial gravels have been deposited in this area. There is therefore no other alternative with regard to the overall operation footprint. The applicant is the holder of a existing Prospecting Right on the same area.

x) Statement motivating the alternative development location within the overall site (Provide a statement motivating the final site layout that is proposed)

Not applicable. There is no alternative development location for the site as this is the area with the mineable resource.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity (Including (i) a description of all environmental issues and risks that are identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

Not applicable. There is no alternative development location for the site and therefore the initial site locality is considered to be the final site locality. The impact assessment provided in section g(v) is therefore sufficient and the process undertaken to identify impacts is the same as in section g(vi).

i) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties)

ACTIVITY Whether listed or not listed.	**POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**ASPECTS AFFECTED**	**PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)**	**SIGNIFICANCE IF NOT MITIGATED**	**MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity**	**SIGNIFICANCE IF MITIGATION**
Processing Plant: 2 - 4 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	Medium

Ablution Facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Low
Clean & Dirty water systems:	Surface disturbance Soil contamination Surface water contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	It will be necessary to divert storm water around excavations and dumps areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage areas. Excavations for Alluvial gravel, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipes will be inspected at least	Low

					monthly to check that the associated water management infrastructure is effective in controlling erosion. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site.	Low

					Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	
Mining Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Medium	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays MRD stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland.	Low

	Surface disturbance Surface water contamination				Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo environmental induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.	

					The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining Snares & traps removed and destroyed Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities; Prevention of exotic vegetation encroachment;	

					Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and instream habitat should always be avoided during operations.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take	Low

					advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Storage of waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low
Roads (both access and haulage road on the mine site):	Dust Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at	Low

					least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Temporary Workshop Facilities and Wash bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

j) Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS HTAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Appendix 4 **Heritage Impact Assessment (including Palaeontological Desktop Assessment) for a Mining Right Application on Portion 2 (At Last) of Farm No 232 near Delportshoop, and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155 near Schmidtsdrif, Northern Cape Province** **Prepared by Edward Matenga (PhD Archaeology & Heritage, MPhil, Archaeology; Uppsala/Sweden)** **September 2022**	**CONCLUSION AND RECOMMENDATIONS** In light of the findings in this report, the Mining Right Application must be approved. The buildings recorded on the Farm At Last must be protected. The graves reported on the Farm De Bad must be protected. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified for an investigation and evaluation of the finds to take place.	X	
Appendix 5 A & B **Palaeontological Impact Assessment for the proposed Mining Right Application on At Last, Barkly-Wes and De Bad, Kimbrley** **Northern Cape Province** **September 2022**	**Executive Summary** A Palaeontological Impact Assessment was requested by Renaissance Resources (Pty) Ltd) for a Mining Right Application on the Farm **At Last 232,** west of Delportshoop in the Dikgatlong Local Municipality, Northern Cape Province. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the	X	

Prof Marion Bamford **Palaeobotanist** **P Bag 652, WITS 2050** **Johannesburg, South Africa** **Marion.bamford@wits.ac.za**	National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development. The proposed site lies on the moderately sensitive aeolian and fluvial Kalahari Sands but any fossils would be out of context because the sands have been transported by wind and water. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations, drilling and mining activities have commenced. Since the impact would be low, as far as the palaeontology is concerned, the project should be authorised. **Recommendation** Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised. **Executive Summary** A Palaeontological Impact Assessment was requested by Renaissance Resources (Pty) Ltd) for a Mining Right		

	Application on the Farm **De Bad 155**, on the Vaal River west of Kimberly an north of Olie River, Northern Cape Province. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development. The proposed site lies on the moderately sensitive aeolian and fluvial Kalahari Sands but any fossils would be out of context because the sands have been transported by wind and water. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations, drilling and mining activities have commenced. Since the impact would be low, as far as the palaeontology is concerned, the project should be authorised. **Recommendation** Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised.		

Appendix 6 ECOLOGICAL ASSESSMENT REPORT Renaissance Resources **September 2022** **Dr. Betsie Milne from Boscia Ecological Consulting Services**	**CONCLUSION, RECOMMENDATIONS AND OPINION REGARDING AUTHORISATION** Seven plant communities occur in the study area, including terrestrial and aquatic habitats. The Vaal River, ephemeral pans and drainage lines are all considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance, which is portrayed in the various sections of this report. The ephemeral pans and Vaal River, including their buffer zones, should ideally be marked as no-go areas. The woodland on red sand hosts a dense population of Vachellia erioloba and is therefore of high sensitivity. The remaining pristine terrestrial habitats are of medium sensitivity, while the sensitivity of those areas already transformed by agriculture, is low. The most profound impacts related to the proposed activities is expected to be in the form of cumulative habitat destruction, given the extensive history of mining and crop irrigation in the region. Direct and secondary impacts to water resources are also considered to be significant. Therefore, activities near these systems should be carefully planned to avoid disastrous implications. If any of the protected plant species will be damaged or removed, permit applications regarding protected flora and/or nationally protected trees need to be lodged with the Northern Cape Department of Environment and Nature Conservation and/or Department of Agriculture, Forestry and Fisheries, three months prior to any removal of affected species. To conclude, in my opinion, authorisation for the mining operation can be granted if the applicant commits to the	X	

	adherence of effective avoidance, management, mitigation and rehabilitation measures.		

Attach copies of the Specialist Reports as appendices (All studies attached as Appendix 4 – 6)

k) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

The site proposed for mining operations has been rated as being acceptable for the development. However, this is subject to the Vaal River and associated floodplains being excluded from mining activities and that comprehensive rehabilitation is implemented.

Topsoil contains living organisms and seed banks that provide ecological resilience against disturbances, and any disturbances to the intact soil profile will change its ability to sustain natural ecological functioning. Vehicles and mining equipment may potentially leak hazardous fluids on the soil surface, which will cause soil pollution. Apart from the direct disturbances caused by the mining activities, soil compaction by dump loads as well as heavy machinery and vehicles will causes a decrease in large pores, and subsequently the water infiltration rate into soil.

Topsoil contains living organisms that naturally regulate the ecological functioning of a habitat. Therefore, any disturbances to the intact soil profile can result in soil sterilisation which will directly affect vegetation communities. Apart from the direct disturbances caused by the mining activities, loss of soil fertility can also occur through soil compaction by dump loads as well as heavy machinery and vehicles.

Vegetation will be stripped for construction of new roads and mining areas and these areas will be bare and highly susceptible to erosion. Any topsoil-, overburden- and ore stockpiles can be eroded by wind, rain and flooding. Exposed sediments in the watercourses can be carried away during runoff causing downstream sediment deposition. Any leaking pipes can also cause additional water erosion.

The At Last and De Bad mining activities is expected to destroy some natural vegetation. It is expected that the ecological functioning and biodiversity will take many years to fully recover. Vehicle traffic and mining activities generate lots of dust which can reduce the growth success and seed dispersal of many small plant species in the adjacent pristine areas.

Seven plant communities occur in the study area, including terrestrial and aquatic habitats. The Vaal River, ephemeral pans and drainage lines are all considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance, which is portrayed in the various sections of this report. The ephemeral pans and Vaal River, including their buffer zones, should ideally be marked as no-go areas.

The woodland on red sand hosts a dense population of Vachellia erioloba and is therefore of high sensitivity. The remaining pristine terrestrial habitats are of medium sensitivity, while the sensitivity of those areas already transformed by agriculture, is low.

The most profound impacts related to the proposed activities is expected to be in the form of cumulative habitat destruction, given the extensive history of mining and crop irrigation in the region. Direct and secondary impacts to water resources are also considered to be significant. Therefore, activities near these systems should be carefully planned to avoid disastrous implications. If any of the protected plant species will be damaged or removed, permit applications regarding protected flora and/or nationally protected trees need to be lodged with the Northern Cape Department of Environment and Nature Conservation and/or Department of Agriculture, Forestry and Fisheries, three months prior to any removal of affected species.

To conclude, in my opinion, authorisation for the mining operation can be granted if the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures (Taken out of the Ecological Study by Boscia).

Fragmentation of habitats typically leads to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This can be in the form of small-scale fragmentation for reptiles, amphibians, and invertebrates, to more large-scale fragmentation that hinder dispersal of birds and plants. It also includes the degradation of aquatic habitats, like pans and the ephemeral drainage channels. Fragmentation of habitats usually results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations. However, the mining activities is expected to result in the loss of connectivity and fragmentation of natural habitats on a local scale.

The transformation of natural habitats will result in the loss of micro habitats, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g. birds that nest in trees or animals residing in holes in the ground or among rocks. Increased noise and vibration will disturb and possibly displace wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Intentional killing of snakes, reptiles, vultures and owls will negatively affect their local populations.

During mining activities there is a possibility that the watercourses on site (i.e. pans and drainage lines) might be altered or indirectly affected. This includes direct mining within the watercourses as well as development of roads, infrastructure or stockpiles within their active zones, catchment areas, or buffer zones. Such activities can completely change the hydrologic regime or habitat conditions of the watercourses, which will not only compromise their ecological functioning, but also have downstream effects.

Vegetation will be stripped in preparation for the mining areas and associated infrastructure. These bare areas will be very susceptible to water erosion without plants to stabilise the soil, creating potential sediment source zones. High runoff events could potentially cause the drainage lines and pans to be filled with silt from mining areas if

the sediment source zones lie along the drainage paths towards these watercourses. This may lead to a change in hydrologic regime or character of the watercourses.

(ii) Final Site Map;

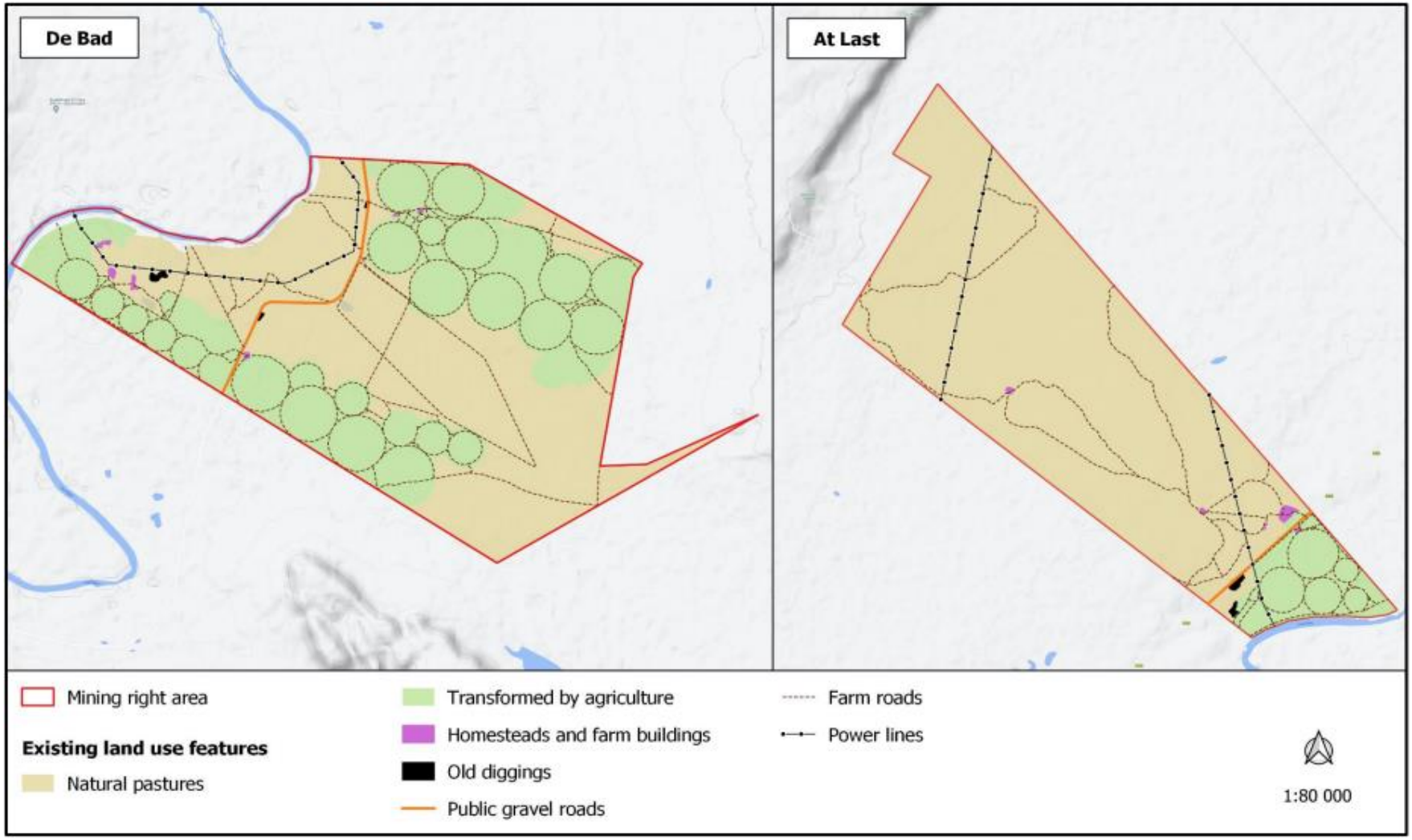
Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicated any areas that should be avoided, including buffers. Attach as **Appendix (Figure 13)**

The final site map below indicates the mining right application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site is also indicated.

No mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with;

No construction or excavation work shall be executed within 11 metres from any Eskom power line structure, and/or within 11 metres from any stay wire.

Please see Final Site Map below.


De Bad
At Last
Mining right area
Existing land use features
Natural pastures
Transformed by agriculture
Homesteads and farm buildings
Old diggings
Public gravel roads
Farm roads
Power lines
1:80 000

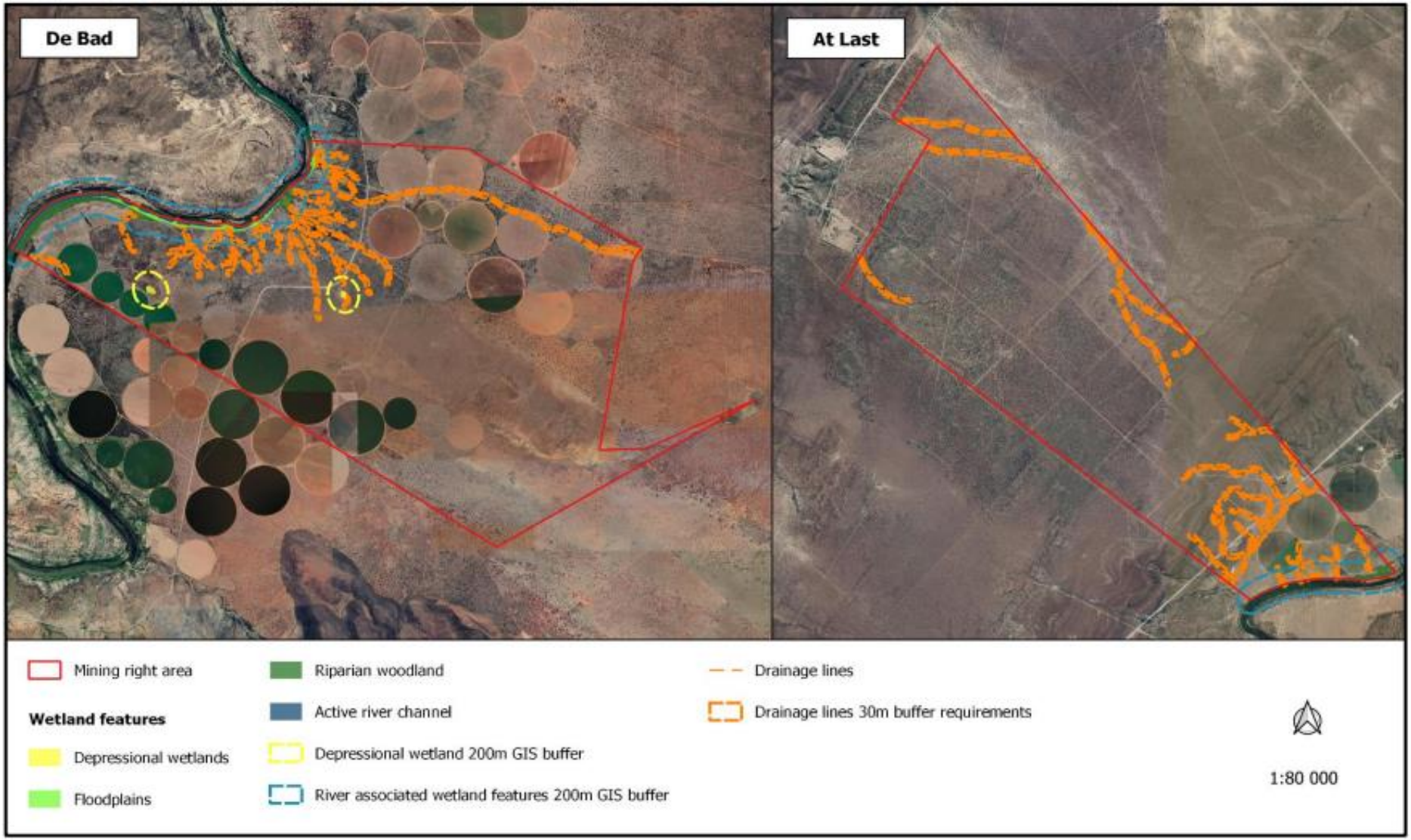


Figure 57. A sensitivity map for the proposed mining area, indicating the SITE SENSITIVITY in red taken out

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

As mentioned before, the specific occurrence of diamonds in the area dictates the selection of the specific mining site and there are no alternatives in terms of project location.

In terms of alternative land use, the proposed mining operation will be done in such a way that grazing will still be possible as the site will be rehabilitated in such a way that it allows the establishment of grass cover again.

The mining operation will provide 12 to 25 jobs and will also add to the increased economic activity and the area surrounding the application area.

Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration.

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. However, the site layout plan has been developed not to place any infrastructure where resource materials could be located. The infrastructure and excavations /dumps will alter the topography by adding features to the landscape. Topsoil removal and Mine Residue Dumps will change the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and mining of alluvial gravels, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper

placement of infrastructure. Most of the sites has a land capability for agriculture and grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly affected if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Any dumping within the drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary road and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project outweigh the potential social risks and/or threats to the local communities. However, as indicated earlier in the report, the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality, but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the mining activities on the residents should be limited.
The mining activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing mining activities.

On a more detailed level, the following **positive** impacts are anticipated:

- The creation of job opportunities in the area, and associated local economic development;
- Economic and revenue contribution to the local municipal area, as well as the adjacent municipalities;
- The involvement of Renaissance Resources with regards to training and capacity building of his employees and subsequent improvement of the livelihoods of the employees' families, as well as its efforts in sustaining the socio-economic development of the communities in close proximity to the operation;
- The involvement of Renaissance Resources with regards to social development projects and support through the Integrated Development Plans (IDPs);
- The positive impact of mining activity on the regional and local economy; and
- Positive impact of extensive local procurement focus.

Negative impacts as a result of the mining activity refer to:

- Inconvenience and intrusion impacts during the start-up and construction phases of the project such as the inflow of an additional workforce to the area, the possible influx of jobseekers, possible increase in the criminal activities (safety and security issues), disruption of social networks, as well as possible health risks;
- Disruptions in the daily living and movement patterns (increased traffic and possible dust pollution);
- Additional pressure on infrastructure development and maintenance;
- General intrusion impacts such as visual and noise pollution

From a social perspective it can be concluded that the proposed Renaissance Resources Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered to e.g. ongoing environmental management and rehabilitation once the mine reaches its end of life.

l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and where applicable the 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 conditions of authorisation.

Air Quality

- To limit the creation of nuisance, dust the following management guidelines must be followed:
- Avoidance of unnecessary removal of vegetation.
- Routine spraying of unpaved site areas and roads utilized by the mining operation with water.
- Speed limits of vehicles inside the mining area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
- Continuous dumping and rehabilitation of disturbed areas.
- All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.

Archaeology:

- All operators of equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
    - All construction in the immediate vicinity (50m radius of the site) should cease.
    - The heritage practitioner should be informed as soon as possible.
    - In the event of obvious human remains the SAPS should be notified.
    - Mitigation measures (such as refilling) should not be attempted.
    - The area in a 50m radius of the find should be cordoned off with hazard tape.
    - Public access should be limited.
    - No media statement should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.

Fauna

- To ensure a minimum of impact to animals the following management guidelines will be followed:
    - Speed limits of vehicles inside the application area must be strictly controlled to avoid road kills.
    - Continuous controlled dumping.
    - Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
    - No hunting (snares) must be allowed at the application area or in the surrounding area.
    - All mining and access roads must be fenced.

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.

- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - 'The plants will be uprooted, felled or cut off and can be destroyed completely.'
    - The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.
- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

- Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
- The following procedure must be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area.
    - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
    - All efforts must be made to move the broken-down vehicle or piece of equipment to the maintenance area.
    - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
- No repairs may be allowed outside the maintenance area except for emergencies.
- Equipment used as part of the proposed operation must be adequately maintained so as to ensure that the oil, diesel, grease or hydraulic fluid does not leak during the operation.
- Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).
- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine.
- Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.

- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

- Working hours must be kept between sunrise and sunset as far as possible.
- As a minimum, ambient noise levels emanating from the mining activities may not exceed 82dBA at the site boundary.
- The Company must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The company must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABS 083 as amended, in any place at or in any mine or works where persons may travel or work exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
- Hearing protection must be provided to all employees where attenuation cannot be implemented.
- If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Mechanical equipment

- All mechanical equipment must be in good working order and vehicles must adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation must be equipped with a silencer on its exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, must be appropriately calibrated / adjusted.

Screening / Migration Control:

- Appropriate measures must be specifically installed and / or employed at the plant to act as screen and to reflect/reduce the noise.
- Appropriate non-metallic washers/insulation must be used with any joining of apparatus made from materials such as corrugated iron. Such apparatus must be maintained in a fixed position.

Safety

- No employees may reside on the mine site without permission from the surface owner.
- Access and haul roads must be maintained.
- Security access point to ensure monitoring of access to the site.

Soil

- In all places of development, the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed where possible, from all areas where physical disturbance of the surface will occur.
- In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
- The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the life of the mining area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
- Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
- The stored topsoil must be adequately protected from being blown away or being eroded.
- Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
- Vehicle movement must be confined to establish roads for as far as practical in order to prevent the compaction of soils.

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.
- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.
- An application for an integrated Water Use Licence must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.
- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.

- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
- Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities;
- Prevention of exotic vegetation encroachment;
- Prevent further siltation within the river segment as well as downstream of activities;
- Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.

Topography

- All alluvial gravel excavations must be rehabilitated if and when possible and made safe so as to reflect as far as possible the pre-mining topography of the area.
- All temporary features e.g. plant, containers and stockpiling must be removed and handled in the prescribed manner during rehabilitation.

Visual

- Security Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night
- Alluvial Excavations must be subject to progressive backfilling and made safe (including the re-establishment of vegetation).
- Permanent structures or features that are part of the proposed mining operation must be kept neat and well presented.
- Waste material of any description must be removed from the mining area on a regular basis and be disposed of at a recognized landfill facility.

The impact management objectives for the Renaissance Resources planned mining operation should include:

- To ensure efficient extraction of the diamonds and to prevent the sterilization of any diamond reserves.
- To limit the alteration of the surrounding topography
- To manage and preserve soil types
- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.
- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of natural streams.

- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.
- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
- To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
- To minimise noise and vibration to a level that disturbances felt by the communities are limited.
- To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
- To ensure that all traffic generated by the proposed mining development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.
- To preserve the historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
- To ensure that the current socio-economic status quo is improved.
- To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

The location of the central mining site and associated infrastructure is primarily based on proximity to the access roads, proximity to the areas earmarked for mining and limited additional impact on the environment and heritage resource.

It will therefore cause additional impacts if this infrastructure is moved and render the consideration of alternative mining sites useless.

The mining activities and methodologies associated with mining of alluvial diamonds is the only economic viable method currently being used by the diamond's fraternity. There is no alternative mining method for the mining of alluvial diamonds.

n) Aspects for inclusion as conditions of Authorisation

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

The site proposed for mining operations has been rated as being acceptable for the development. However, this is subject to the Vaal River and associated floodplains being excluded from mining activities and that comprehensive rehabilitation is implemented.

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

o) Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measure proposed)

The study took place during late winter, which is not an optimal time of the year. Although the area received good summer rainfall, most grasses and annuals were dormant during the time of the field survey. The vegetation was therefore not in a favourable state for the assessment at the time of the site visit. Furthermore, due to the brief duration of the surveys and the lack of seasonal coverage, the species list and wetland characterisation reflected in this report cannot be regarded as fully representative. Ideally, a site should be visited several times during different seasons to ensure that the variation in species presence and habitat conditions are captured. However, this is rarely possible due to time and cost constraints related to mining and prospecting right application processes, and due to the nature of ephemeral wetlands systems. The survey was nevertheless conducted in such a manner to ensure all representative communities were traversed and therefore is likely to have included most of the common and important species present.

The official guideline documents and tools currently available to assess wetlands in South Africa were mainly developed for- and best applied to the more temperate wetlands of South Africa. The suite of methodologies available to date do not provide for a comprehensive and accurate assessment of the ephemeral wetlands in South Africa. This is mainly because they are rarely wet and do not display those indicators typically used for wetland assessments in other parts of South Africa. These systems have also received little attention in terms of scientific research. Therefore, the nature of the wetland on site and the lack of fully applicable methodologies are regarded as a limiting factor to justify the impacts to- and sensitivity of these systems on site. Nevertheless, the methodology used for this assessment was adapted from those available in the official guidelines, based on specialist knowledge and experience to provide a comprehensive understanding of the wetland and associated impacts related to the mining activities. In addition to these standard assessment protocols, the invertebrate cultures that were run in the lab provided valuable insight into the biodiversity of the ephemeral pans, which enhanced the wetland assessment outcome.

De Bad was accessible during the time of the field survey, but no access was granted to visit At Last during this time. Therefore, information relating to the ecology of At Last was extrapolated from nearby sites that have been surveyed in the past. The core area earmarked for mining on At Last has however already been completely transformed by agricultural activities and therefore the lack of access is not considered a significant limitation to this ecological assessment. (Dr. Betsie Milne out of the Ecological Study, 2022).

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, granites, sandstones, shales and sands are typical for the country and might contain fossil plant or vertebrate material that has been transported from another site, and fragmented. The sands of the Quaternary period would not preserve fossils. (Taken out of the PIA assessment by Prof Marion Bamford).

The above mitigation measures are tried and tested over many years in the diamond mining industry. The Company must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is therefore assumed that the above assumptions are adequate, and that the information provided is correct.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorized or not.

There are no significant reasons why the activity should not be authorised, given that the applicant also has a Prospecting Right on the application areas. However, if the proposed management and mitigation measures are not properly applied or if the mining operation intentionally disregards any of these measures, it will negatively affect the environment and have more long-term consequences. Therefore, the competent authority should take all the necessary steps to ensure that the mining operation complies with the conditions set out in the approval of the EMPR.

ii) Conditions that must be included in the authorisation.

(1) Specific conditions to be included into the compilation and approval of EMPr

The site proposed for mining operations has been rated as being acceptable for the development. However, this is subject to the Vaal River and associated floodplains being excluded as far as possible from mining activities and that comprehensive rehabilitation is implemented.

Mining operations within 100 meters or within the floodplain of the river and within 100 meters of wetland areas will require authorisation from DWS.

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment

Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

(2) Rehabilitation requirements

A Detailed rehabilitation plan will be appended to the EMPR. The Mine had to provide to the DMR, a financial rehabilitation guarantees to the amount as calculated in terms of the financial quantum Guideline and approved by the DMR.

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the office area, storage areas and the plant site, will finally be rehabilitated as follows: All other material on the surface will be removed to the original topsoil level where possible. This material will then be backfilled into any open pits. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.

All infrastructures, equipment, plant, and other items used during the operational period will be removed from the site.

On completion of operations, all buildings, structures or objects on the office site will be dealt with in accordance with regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

Topsoil and Stockpile Deposits:

Disposal Facilities: Waste material of all description inclusive of receptacles, scrap, rubble and tyres should be removed entirely from the mining area and disposed of at a recognized landfill facility. It should not be permitted to be buried or burned on the site.

Ongoing Seepage, Control of Rain Water:

Water Quality Management in accordance with the South African Water Quality Guidelines must be adhered to in order to provide timely and accurate water data to the Department of Water and Sanitation (DWS) as well as to manage impacts caused by the activity. Specific objectives of such a program are to:

- Determine whether water quality comply with water quality standards.
- Provide timely data for intervention as and when required.
- Assess the status of water quality in the surrounding areas.
- Provide analytical water quality information describing trends (present conditions and changes).

The objectives are to limit the adverse effect of pollutants in the water resource. The setting of in-stream Resource Water Quality Objectives (RWQO) is based on the South African Water Quality Guidelines.

Water Monitoring Points

Surface water: The Vaal River which may be impacted by the mining activity are perennial. Monitoring takes place by collecting surface water samples every quarter.

Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities (taken out of the aquatic assessment report);

Long Term Stability and Safety: It should be the objective of mine management to ensure the long-term stability of all rehabilitated areas including the backfilled excavations. This should be done by the monitoring of all areas until a closure certificate has been issued.

Final rehabilitation in respect of erosion and dust control: Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is deemed necessary, unless vegetation growth is not returned to a desirable state by the time of mine closure.

Final Rehabilitation Roads:

- After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of Information:

- Reports on rehabilitation and monitoring should be submitted annually to the Department of Mineral Resources – Kimberley, as described in Regulation 55 and amended with new legislation promulgated in the new NEMA regulations NO. R. 1147 20 NOVEMBER 2015 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, (ACT NO. 107 OF 1998) REGULATIONS PERTAINING TO THE FINANCIAL PROVISION FOR PROSPECTING, EXPLORATION, MINING OR PRODUCTION OPERATIONS.

Maintenance (Aftercare):

- Maintenance after closure should include the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the mine should be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments should be implemented by Mine Management.

After-effects Following Closure:

Acid Mine Drainage: No potential for bad quality leachate or acid mine drainage development is associated with diamond mine closure.
Long Term Impact on Ground Water: No after effect on the groundwater yield or quality is expected.

Long-term Stability of Rehabilitated Land: One of the main aims of any rehabilitated ground should be to obtain a self-sustaining and stable end result. The concurrent monitoring of all material and replacement of topsoil where available should be ensured.

q) Period for which the Environmental Authorisation is required

10 years. Thus, the period required is for the Life of Mine of the Mining Right.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Renaissance Resources Mine site as it stands currently (risking premature rehabilitation) is estimated to be R1,116,668 according to the DMR calculations.

Table 23. Financial quantum

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Remark:							
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	900	18,42	1	1,1	18235,8
					1	1,1	
2 (A)	Demolition of steel buildings and structures	m2	0	256,63	1	1,1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	250	378,15	1	1,1	103991,25
3	Rehabilitation of access roads	m2	10000	2,1	1	1,1	23100
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	445,73	1	1,1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	243,13	1	1,1	0
5	Demolition of housing and/or administration facilities	m2	200	513,26	1	1,1	112917,2
6	Opencast rehabilitation including final voids and ramps	ha	3,5	261224,38	0,04	1,1	40228,55452
7	Sealing of shafts adits and inclines	m3	0	137,77	1	1,1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,55	179372,28	1	1,1	108520,2294
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0,3	223404,93	1	1,1	73723,6269
					1	1,1	
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	648873,81	1	1,1	0
					1	1,1	
9	Rehabilitation of subsided areas	ha	0	150197,24	1	1,1	0
10	General surface rehabilitation	ha	2	142093,10	1	1,1	312604,82
11	River diversions	ha	0	142093,1	1	1,1	0
12	Fencing	m	0	162,08	1	1,1	0
13	Water management	ha	0	54027,79	1	1,1	0
14	2 to 3 years of maintenance and aftercare	ha	2	18909,73	1	1,1	41601,406
15 (A)	Specialist study	Sum	0			1,1	0
15 (B)	Specialist study	Sum	0			1,1	0
					Sub Total 1		834922,8868
1	Preliminary and General		50095,37321		weighting factor 2 1,05		52600,14187
2	Contingencies				83492,28868		83492,28868
					Subtotal 2		971015,32
					VAT (15%)		145652,30
					Grand Total		1116668

ii) Confirm that this amount can be provided from operating expenditure

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining Work Programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

t) Deviations from the approved scoping report and plan of study

i) Deviations from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)

Not applicable – No deviations from the methodology proposed in the Scoping Report.

ii) Motivation for the deviation

Not applicable – No deviations from the methodology proposed in the Scoping Report.

u) Other information required by the competent Authority

i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998), the EIA Report must include the:-

(1) Impact on the socio-economic conditions of any directly affected person

(Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as **Appendix 2.19.1** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 therein)

From a social perspective the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMP).

It should be noted that the responsibility of the mitigation lies with the owner, operator, and/or with the local municipality. The mitigation measures would have to form part of the respective stakeholder's expenditure predictions or operations and management within the area; therefore, the monitoring activities cannot be expressed in financial terms.

From a social perspective it can be concluded that the proposed Renaissance Resources Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

(Provide the results of investigation, assessment, evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(*i)*(vi) and (vii) of that Act, attach the investigation report as **Appendix 2.19.2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 herein)

Dr. Edward Matenga from (AHSA) Archaeological and Heritage Services Africa (Pty) Ltd has been appointed by Renaissance Resources to provide an Heritage Impact Assessment Report for alluvial diamond mining on Portion 2 (AT LAST) of the Farm no. 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley and to determine the possible impact of mining on the application area.

<u>On the farm At Last</u>

Stone Age

For thousands of years before modern times, the area was occupied by hunter-gatherers who subsisted on stone tool technologies. However, the ground survey on At Last yielded far fewer stone tools when compared to other studies in the locality.

Iron Age

No sites or relics dating to the Iron Age were found.

Burial Buildings

The principal dwelling house at the farmstead is a remarkable monument. It has a hipped roof and veranda on two sides. There are two chimneys. The façade represented by the two veranda sides has ornate finishes. The date of construction inscribed on the cornerstone is 1936. The building will not be affected by mining operations. There are other buildings at the farmstead which are not architecturally important.

On the Farm De Bad

General Observations

It has been observed more than 60% of the farm De Bad is under cultivation, or has been cultivated in the recent past. No ancient relics such as stone tools can be expected to be found in an undisturbed context. Stone tools were found outside the fields along the edge of the Vaal River.

Stone Age

The Stone Age finds include hand axes found in two instances and a cleaver. These tools suggest occupation by Early Stone Age communities more than 250 000 years BP.

Iron Age

A single potsherd was found a short distance from the edge of the Vaal River. Pottery in the Lower Vaal and Middle Orange Rivers has been associated with a possible transition to the Iron Age.

Burial grounds

The Farmer reported two places with graves on the property. The graves were not located during the survey. If the graves will be located in a mining area, a 100 m servitude must be reserved.

Conclusion and recommendations

In light of the findings in this report, the Mining Right Application must be approved. The buildings recorded on the Farm At Last must be protected. The graves reported on the Farm De Bad must be protected. The study is mindful that some important discoveries during the excavations. If this happens operations should be halted, and the provincial heritage resources authority or SAHRA notified for an investigation and evaluation of the finds to take place.

Palaeontology

Prof Marion Bamford, of the University of the Witwatersrand, sub-contracted by Archaeological and Heritage Services Africa (Pty) Ltd, Pretoria, South Africa has

been appointed by Renaissance Resources to provide an Palaeontological Impact Assessment Report for alluvial diamond mining on Portion 2 (AT LAST) of the Farm no. 232, Barkly-Wes and Portion 2, 3, 4, 5 and 6 of the Farm De Bad 155, Kimberley and to determine the possible impact of mining on the application area.

At Last 232, Barkly-Wes

A Palaeontological Impact Assessment was requested for the **Farm At Last 232** application. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

The project lies on the margin of the Griqualand West Basin that is one of three Palaeoproterozoic basins filled with sediments and volcanic tuffs of the Transvaal Supergroup. The latter overlies the Ventersdorp Supergroup. Much of the area has been covered by aeolian and fluvial sands of the much younger Kalahari Group.

The Quaternary Kalahari sands form an extensive cover of much younger deposits over much of the Northern Cape Province and Botswana. Haddon and McCarthy (2005) proposed that the Kalahari basin formed as a response to down-warp of the interior of the southern Africa, probably in the Late Cretaceous. This, along with possible uplift along epeirogenic axes, back-tilted rivers into the newly formed Kalahari basin and deposition of the Kalahari Group sediments began. Sediments included basal gravels in river channels, sand and finer sediments. A period of relative tectonic stability during the mid-Miocene saw the silcretisation and calcretisation of older Kalahari Group lithologies, and this was followed in the Late Miocene by relatively minor uplift of the eastern side of southern Africa and along certain epeirogenic axes in the interior. More uplift during the Pliocene caused erosion of the sand that was then reworked and redeposited by aeolian processes during drier periods, resulting in the extensive dune fields that are preserved today.

There are numerous pans in the Kalahari, generally 3–4 km in diameter (Haddon and McCarthy, 2005). Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape.

Tertiary calcretes cover large parts of the Northern Cape but they are difficult to date and there are several schools of thought (see Partridge et al., 2006). Nonetheless, it is accepted that calcretes form under alternating cycles humid and arid climatic conditions in strata that have calcium carbonate (Netterberg,

1969). More recent research using geophysical techniques to measure uplift of the continent during the Cretaceous and tertiary, combined with the fossil record (Braun et al., 2014) suggest that there were two predominant humid periods during the Tertiary. The whole of the Eocene (56-33 Ma) and a short period during the early Miocene (ca 20-19 Ma) were humid according to their estimation. It is possible that the Northern Cape calcretes formed during one of these periods.

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

New cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments (Matmon et al., 2015), South Africa, indicate that in the southern Kalahari, the majority of deposition occurred rapidly at 1.0–1.2 Ma. All earlier sediments in this region were eroded during previous sedimentary cycles. In summary, they showed that the stratigraphy, sedimentology, and cosmogenic nuclide data indicate:
1) the existence of a stable, shallow and low-energy water body over the southern Kalahari for at least 450 ka prior to 1–1.2 Ma;
2) rapid sediment accumulation that filled up the basin at 1–1.2 Ma; and
3) the establishment of the Kalahari sand cover shortly thereafter.

The authors acknowledge that this timeframe is far younger than expected from the conventional estimates for the Kalahari Group sediments (Haddon and McCarthy, 2005). The significant hiatus between the Pleistocene sequence and the underlying Archaean basement implies that evidence of earlier cycles of deposition and erosion are no longer preserved in the sedimentary record.

Palaeontological context
The site for mining is in the Quaternary alluvium and sands (orange) and the Vryburg Formation (green). The latter is quartzitic and unlikely to be mined.

The Tertiary calcretes can trap fossils and artefacts when associated with palaeo-pans or palaeo-springs (Partridge et al., 2006). Where deflation has occurred, for example along the west coast of South Africa, any trapped materials in the different levels can be concentrated in the depo-centre of the pan or dune and thus it can be challenging to interpret the deposit (Felix-Henningsen et al., 2003).

The Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked. Conditions required for the preservation of organic material and formation of fossils are burial in a low energy, anoxic environment such as overbank deposits, lake muds or clays (Briggs and McMahon, 2016). Aeolian sands are high energy, well-oxygenated

environments. In some regions the sands may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually, these geomorphological features can be detected using satellite imagery. No such features are visible.

Exploration and research along the palaeo-rivers of Southern Africa, now only present as abandoned palaeochannels, or captured by the present-day rivers, the Vaal and Orange Rivers in this case, the gravels and sands might include transported robust and fragmentary fossils. Examples of these are heavy bone fragments and silicified wood fragments, as well as diamonds (de Wit, 1999; de Wit et al., 2000).

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or the materials have been transported. Furthermore, the material to be mined or sifted through is transported, high energy and well oxygenated sand and this does not preserve fossils. Since there is a small chance that fossils from the Quaternary may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assumptions and uncertainties
Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, granites, sandstones, shales and sands are typical for the country and might contain fossil plant or vertebrate material that has been transported from another site, and fragmented. The sands of the Quaternary period would not preserve fossils.

Recommendation
Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised.

De Bad 155, Kimberley
A Palaeontological Impact Assessment was requested for the **Farm De Bad 155** Mining Right Application. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

The project lies on the margin of the Griqualand West Basin that is one of three Palaeoproterozoic basins filled with sediments and volcanic tuffs of the lower

Transvaal Supergroup. Much of the area has been covered by aeolian and fluvial sands of the much younger Kalahari Group.

The Quaternary Kalahari sands form an extensive cover of much younger deposits over much of the Northern Cape Province and Botswana. Haddon and McCarthy (2005) proposed that the Kalahari basin formed as a response to down-warp of the interior of the southern Africa, probably in the Late Cretaceous. This, along with possible uplift along epeirogenic axes, back-tilted rivers into the newly formed Kalahari basin and deposition of the Kalahari Group sediments began. Sediments included basal gravels in river channels, sand and finer sediments. A period of relative tectonic stability during the mid-Miocene saw the silcretisation and calcretisation of older Kalahari Group lithologies, and this was followed in the Late Miocene by relatively minor uplift of the eastern side of southern Africa and along certain epeirogenic axes in the interior. More uplift during the Pliocene caused erosion of the sand that was then reworked and redeposited by aeolian processes during drier periods, resulting in the extensive dune fields that are preserved today.

There are numerous pans in the Kalahari, generally 3–4 km in diameter (Haddon and McCarthy, 2005). Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape.

Tertiary calcretes cover large parts of the Northern Cape but they are difficult to date and there are several schools of thought (see Partridge et al., 2006). Nonetheless, it is accepted that calcretes form under alternating cycles humid and arid climatic conditions in strata that have calcium carbonate (Netterberg, 1969). More recent research using geophysical techniques to measure uplift of the continent during the Cretaceous and tertiary, combined with the fossil record (Braun et al., 2014) suggest that there were two predominant humid periods during the Tertiary. The whole of the Eocene (56-33 Ma) and a short period during the early Miocene (ca 20-19 Ma) were humid according to their estimation. It is possible that the Northern Cape calcretes formed during one of these periods.

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

New cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments (Matmon et al., 2015), South Africa, indicate that in the southern Kalahari, the majority of deposition occurred rapidly at 1.0–1.2 Ma. All earlier sediments in this region were eroded during previous sedimentary cycles. In summary, they showed that the stratigraphy, sedimentology, and cosmogenic nuclide data indicate:
1) the existence of a stable, shallow and low-energy water body over the southern Kalahari for at least 450 ka prior to 1–1.2 Ma;
2) rapid sediment accumulation that filled up the basin at 1–1.2 Ma; and
3) the establishment of the Kalahari sand cover shortly thereafter.
The authors acknowledge that this timeframe is far younger than expected from the conventional estimates for the Kalahari Group sediments (Haddon and McCarthy, 2005). The significant hiatus between the Pleistocene sequence and the underlying Archaean basement implies that evidence of earlier cycles of deposition and erosion are no longer preserved in the sedimentary record.

Palaeontological context
The site for mining is in the Quaternary alluvium and sands (orange and green respectively).

The Tertiary calcretes can trap fossils and artefacts when associated with palaeo-pans or palaeo-springs (Partridge et al., 2006). Where deflation has occurred, for example along the west coast of South Africa, any trapped materials in the different levels can be concentrated in the depo-centre of the pan or dune and thus it can be challenging to interpret the deposit (Felix-Henningsen et al., 2003).

The Aeolian sands of the Gordonia Formation do not preserve fossils because they have been transported and reworked. Conditions required for the preservation of organic material and formation of fossils are burial in a low energy, anoxic environment such as overbank deposits, lake muds or clays (Briggs and McMahon, 2016). Aeolian sands are high energy, well-oxygenated environments. In some regions the sands may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually these geomorphological features can be detected using satellite imagery. No such features are visible.

Exploration and research along the palaeo-rivers of Southern Africa, now only present as abandoned palaeochannels, or captured by the present day rivers, the Vaal and Orange Rivers in this case, the gravels and sands might include transported robust and fragmentary fossils. Examples of these are heavy bone fragments and silicified wood fragments, as well as diamonds (de Wit, 1999; de Wit et al., 2000).

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or the materials have been transported. Furthermore, the material to be mined or sifted through is transported, high energy and well oxygenated sand and this does not preserve fossils. Since there is a small chance that fossils from the Quaternary may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking

account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, granites, sandstones, shales and sands are typical for the country and might contain fossil plant or vertebrate material that has been transported from another site, and fragmented. The sands of the Quaternary period would not preserve fossils.

Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the ands and alluvium of the Quaternary. There is a small chance that fossils may have been transported with the sands so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, miners or other responsible person once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. Since the impact on the palaeontological heritage would be low, it is recommended that the project be authorised.

Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, invertebrates) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist

must be sent to SAHRA once the project has been completed and only if there are fossils.

8. If no fossils are found and the excavations have finished then no further monitoring is required.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act

(the EAP managing the application, must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 4**)

There are no alternatives, as the application area applied for is the area where the applicant has proven diamonds and has found potential for a diamond mining operation. The applicant is the holder of an existing Prospecting Right on the property.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

a) Details of the EAP (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required)

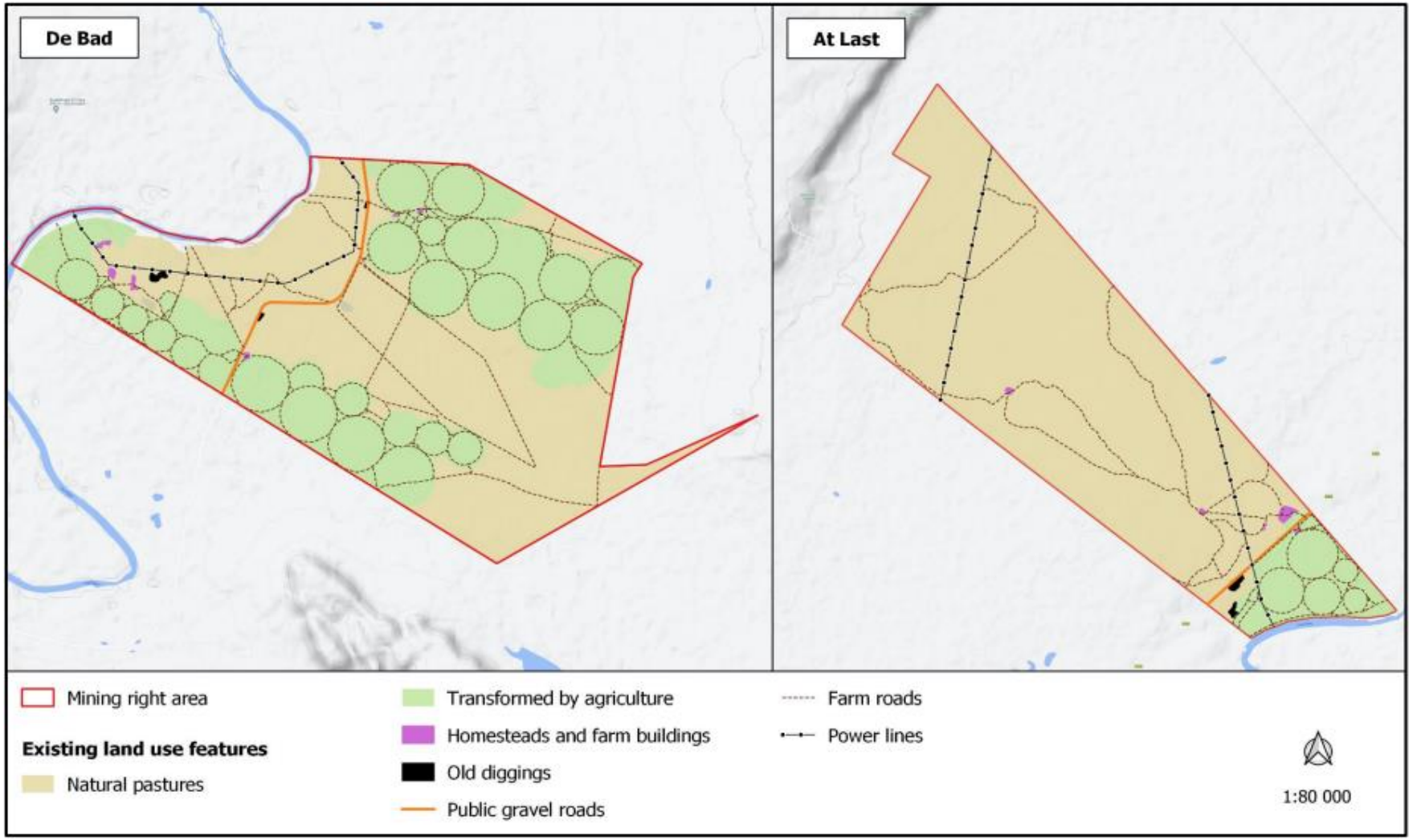
I hereby confirm that the requirement for the provision of the details and expertise of the EAP is already included in Part A as required.

b) Description of the Aspects of the Activity (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required)

I hereby confirm that the requirement for the aspects of the activity is already included in Part A as required.

c) Composite Map

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



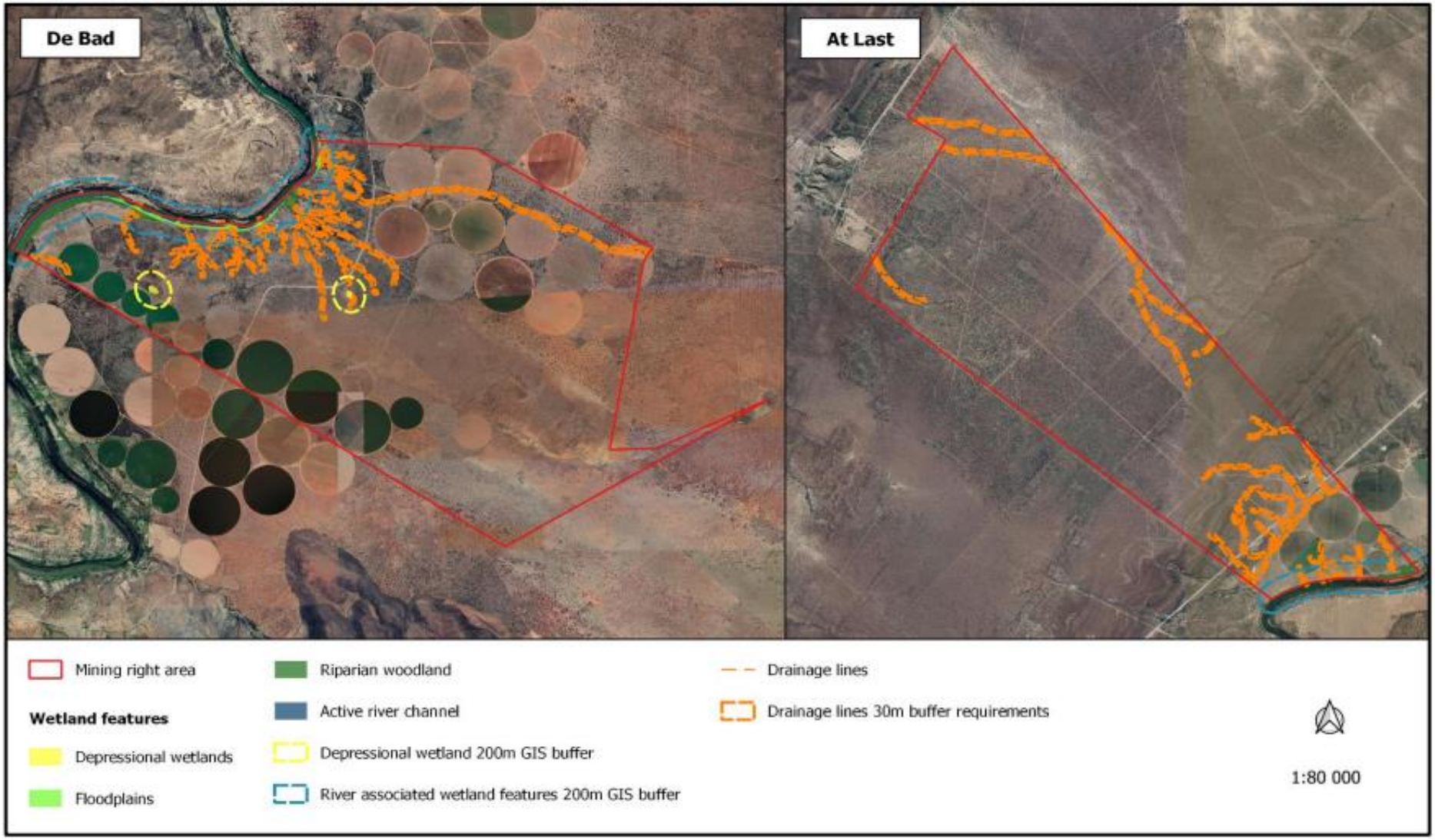


Figure 58. A sensitivity map for the proposed mining area, indicating the SITE SENSITIVITY in red taken out of the ecological study by Boscia Ecological Services.

d) Description of impact management objectives including management statements

i) Determination of closure objectives (ensure that the closure objectives are informed by the type of environment described in 2.4 herein)

The main closure objectives of the planned mining operation are:

- To restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any diamond reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained when a closure certificate is issued.
- To establish a stable and self-sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the mining activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the mining operation efficiently, cost effectively and in accordance with Government Policy.

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:

Rehabilitation of infrastructure areas

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure that infrastructure identified for removal is successfully demolished and removed.
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate.
- The removal, decommissioning and disposal of all mining infrastructure, will comply with all conditions contained in the MPRDA. To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:
- The plant and associated disused infrastructure will be dismantled or demolished. Any building foundations will be removed and land exposed to the demolition and dismantling of infrastructure and all other disturbed land will be rehabilitated.
- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.

- Any surface water management infrastructure will be maintained to ensure they are stable and functional.
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Mine Residue Dump (Porrel Dam)

The objectives pertaining to the effective management and rehabilitation of the Mine Residue Dump include:

- To ensure that the Mine Residue Dump deposit are stable and that there is an acceptably low risk of failure of these deposits during the decommissioning phase and following mine closure;
- To establish self-sustainable vegetation cover on the Mine Residue dump so that the visual impact of the Mine Residue dump is improved and in order to prevent erosion.

Management principles pertaining to Mine Residue dump include:

- The Mine Residue dump will continuously be inspected by a suitable qualified professional engineer to ensure their stability. If they are unstable, the appropriate remedial measures will be implemented.
- Inspection and monitoring should continue until a suitable qualified profession engineer has confirmed the long-term stability of the Mine Residue dump.
- Any infrastructure or facilities that serve the Mine Residue dump will be maintained to ensure that they are both stable and functional.

Maintenance

The necessary agreements and arrangement will be made by Renaissance Resources to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of the Mine Residue dump, rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance assessments

As per the MPRDA and associated Regulations, as well as NEMA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Renaissance Resources will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of this EMPR;
- Conduct performance assessments of this EMPR; and
- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will be annually. An independent and competent person will undertake all performance assessments.

Decommissioning and closure objectives

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding land owners and land users. This should be done during the operational phase of the mine;
- Rehabilitate disturbed land to a state suitable for its post-closure uses;
- Rehabilitate disturbed land and mine residue deposits to a state that facilitates compliance with applicable environmental quality objectives;
- Limit the impact on staff whose positions become redundant at the time of mine closure, as addressed in the SLP;
- Keep relevant authorities informed of the progress of the decommissioning phase;
- Submit monitoring data to the relevant authorities;
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative economic impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Renaissance Resources will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.
- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic

benefits of the project through development of alternative forms of income generation.

- Renaissance Resources will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.
- The mine will fulfil the requirements for closure.

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

There won't be a need for this, as based on the specialist reports (Ecological study by Boscia Ecological Services).

The National Water Act (36 of 1998) (NWA) provides a framework to protect water resources.
According to this Act, a water resource includes a watercourse, surface water, estuary, or aquifer; whereas a water course includes:
a) a river or spring,
b) a natural channel in which water flows regularly or intermittently,
c) a wetland, lake or dam into which, or from which, water flows, and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.

Any reference to a watercourse includes its bed and banks and a water resource does not only include the water within the system, but also the entire water cycle; i.e. evaporation, precipitation, the habitats and processes.
The purpose of this Act (Section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors - (g) protecting aquatic and associated ecosystems and their biological diversity and (h) reducing and preventing pollution and degradation of water resources.

No activity may take place within a watercourse unless authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

De Bad and At Last fall within the Vaal D/S Bloemhof quaternary catchments C92A and C92B of the Lower Vaal Water Management Area. These quaternary catchments have been allocated a Present Ecological State (PES) of 'Moderately Modified' (C) by Delport and Mallory (2002).

According to The South African Inventory of Inland Aquatic Ecosystems (SAIIAE), De Bad and At Last fall within the Eastern Kalahari Bushveld Bioregion, where 1.3 % of the land area is covered by inland wetlands, including depressions, floodplains, seeps and valley-bottom wetland types (Van Deventer et al. 2019).

Two depressional wetlands, one river (Vaal River), and several drainage lines were identified on site. The wetland features associated with the Vaal River includes an active channel, floodplains, and riparian woodland. A minimum GIS buffer of 200 m is indicated here for the depressional wetlands and river features and the post-mitigation buffer requirements for the drainage lines are 20m. However, it is recommended that a conservative approach be opted for and that the pre-mitigation buffer width of 30m be adopted where possible.

The depressional wetlands covers a total area of ± 2.4 ha, with their entire surface areas falling within the boundaries of the mining right area. Their catchments cover a total area of ± 350 ha of which all fall within the study area. The active channel of the Vaal River lines the boundaries of At Last, but ± 29 ha falls within the boundaries of De Bad. No floodplains are found on At Last, while the floodplains on De Bad cover ± 13 ha. Riparian woodland occupies a total of ± 37 ha within the study area.
The drainage lines flow from the plains and ridges, downwards towards the river of which a total combined length of ± 50 km occurs within the study area.

The two depressional wetlands are the main assessment units considered for this mining right area due to the fact that both fall within the areas earmarked for core mining activities. They are found on plains terrain and their Hydrogeomorphic Unit (HGMU) classification is described below, up to Level 6. The river and ephemeral drainage lines will not be further defined, but their buffer requirements should be honoured during the mining operation to minimise impacts to these systems.

Seven plant communities occur in the study area, including terrestrial and aquatic habitats. The Vaal River, ephemeral pans and drainage lines are all considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance, which is portrayed in the various sections of this report. The ephemeral pans and Vaal River, including their buffer zones, should ideally be marked as no-go areas.

The woodland on red sand hosts a dense population of Vachellia erioloba and is therefore of high sensitivity. The remaining pristine terrestrial habitats are of medium sensitivity, while the sensitivity of those areas already transformed by agriculture, is low.

The most profound impacts related to the proposed activities is expected to be in the form of cumulative habitat destruction, given the extensive history of

mining and crop irrigation in the region. Direct and secondary impacts to water resources are also considered to be significant. Therefore, activities near these systems should be carefully planned to avoid disastrous implications. If any of the protected plant species will be damaged or removed, permit applications regarding protected flora and/or nationally protected trees need to be lodged with the Northern Cape Department of Environment and Nature Conservation and/or Department of Agriculture, Forestry and Fisheries, three months prior to any removal of affected species.

To conclude, in my opinion, authorisation for the mining operation can be granted if the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures. (Taken out of the Ecological study done by Dr. Betsie Milne 2022).

iii) Potential risk of Acid Mine Drainage (Indicate whether or not the mining can result in acid mine drainage)

No potential risk for Acid Mine Drainage exists.

iv) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

v) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Not applicable, there is no potential risk of acid mine drainage.

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

There is no residual or cumulative impact that may result from acid mine drainage.

vii) Volumes and rate of water use required for the mining, trenching or bulk sampling operation

The only activity relating to the cost of water in the mining operations relates to dust suppression in the mining area and on the roads when hauling and transporting material to the processing plant and doing continuous backfilling as part of the rehabilitation process.

It must however be noted that the water supply to the activities will be sourced from the nearby Vaal River. There will be an industrial rate applied for water used and the cost will be the pumping cost.

The processing plant (diamond pan), scrubbers and final recovery will have an impact on the cost of water used. The cost of water will have an upward trend over time as a result of the national capacity and demand situation. Water are however recycled as far as possible and redirected to the processing plants. It must however be noted that the water supply to the activities will be sourced from the Vaal River.

viii) Has a water use licence been applied for?

A WULA application has been prepared and are in the final stages to be submitted. The EIA EMP is a minimum requirement for the application and therefor the application will be submitted shortly after the EIA EMP had been submitted to the competent authority. The Proof of submission will be sent onto the competent authority as soon as it is received.

ix) Impact to be mitigated in their respective phases

Measure to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITY Whether listed or not listed. (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).	**PHASE** of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.	**SIZE AND SCALE** of disturbance (volumes, tonnages and hectares or m²)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when Required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-.. Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Processing Plant 2 - 4 X 16 feet pan	Construction Commissioning Operational Decommissioning Closure	0.5 ha Steel, concrete, electric wires	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills		Removal of processing plant upon closure of mining right.

			Rip disturbed areas to allow re-growth of vegetation cover		
Ablution facilities Chemical toilets	Construction Commissioning Operational Decommissioning Closure	25m² or 0.0025ha	Maintenance of container Plants Removal of container plants upon closure		Removal of container plant upon closure of the Mining Right.
Clean & Dirty water systems: Berms	Construction Commissioning Operational Decommissioning Closure	This area also includes the re-fuel and lubrication station, wash bay and office area.	Maintenance of berms and trenches Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.		Upon cessation of the individual activity (continuous rehabilitation)
Fuel Storage facility (Diesel tanks)	Construction Commissioning Operational Decommissioning Closure	250m² Concrete, bricks, and steel	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point Immediately clean hydrocarbon spill.		Removal of diesel tanks upon closure of Mining Right.
Mining Area	Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of ±436 hectares of alluvial diamond target areas for excavations.	Proper planning of excavations Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation		Upon cessation of the individual activity (continuous rehabilitation)

			Stormwater run-off control Immediately clean hydrocarbon spill Drip trays Dump control and monitoring Erosion control		
Salvage yard (Storage and laydown area)	Construction Commissioning Operational Decommissioning Closure	1000m² or 0.1 ha No construction material, area to be levelled with a grader and fenced with a gate and access control	Access control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill		Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.
Waste disposal site (domestic and industrial waste):	Construction Commissioning Operational Decommissioning Closure	15m x 30m = 450m²	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.
Roads (both access and haulage road on the mine site):	Construction Commissioning Operational Decommissioning Closure	Additional mine haul road = 10 000m²	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control		Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.

			Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover		
Workshop and Wash bay	Construction Commissioning Operational Decommissioning Closure	300m² Concrete and Steel	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills		Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right
Water distribution Pipeline	Construction Commissioning Operational Decommissioning Closure	HDPE Pipes	Maintain water pipeline and structures		Removal of pipeline upon closure of the mining right.
Water tanks:	Construction Commissioning Operational Decommissioning Closure	3m X 3m = 9m²	Maintain water tanks and structures		Removal of water tank and steel structure upon closure of the mining right.

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**ASPECTS AFFECTED**	**PHASE** **In which impact is anticipated** **(e.g. construction, commissioning, operational, Decommissioning, closure, post closure)**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**STANDARD TO BE ACHIEVED** **(impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.**
Processing Plant 2 - 4 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				distance and natural shielding; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Ablution facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Maintenance of sewage facilities on a regular basis. Removal of container on closure	Minimize the potential for a chemical spill on soil, which could infiltrate to groundwater.

Clean & Dirty water systems:	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	Soil Groundwater Surface Water	Construction Commissioning Operational Decommissioning Closure	The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

				healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site.	Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

				Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	
Mining Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers.	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels;	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance Surface water contamination			Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any	

				important faunal habitat type. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.	

				All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed	

				and protected plant species prior to mining; Snares & traps removed and destroyed; and Maintenance of firebreaks. It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage lines. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Implementation of a suitable management action plan during the operation of the proposed	

				diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities; Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities; Unnecessary destruction of marginal and in-stream habitat should always be avoided during operations.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	Surface water contamination				
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met.
Roads (both access and haulage road on the mine site):	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met. Erosion potential minimized.

				distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	
Workshop and Wash bay	Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning	Monitor pipeline for water leaks Maintenance of pipeline	Rehabilitation standards and closure objectives to be met.

			Closure	Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Erosion potential minimized.
Water tanks:	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Maintain water tanks and structures	Safety ensured. Rehabilitation standards and closure objectives to be met.

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraph (c)

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**TIME PERIOD FOR IMPLEMENTATION** **Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required.** **With regard to Rehabilitation specifically this must take place at the earliest opportunity.** **With regard to Rehabilitation, therefore state either:- Upon cessation of the individual activity or Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.**	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Processing Plant: 2 - 4 X 16 feet pan	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels;	Removal of processing plant upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

		Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		• Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Ablution Facilities Chemical Toilets.	Soil contamination Groundwater contamination	Maintenance of sewage facilities on a regular basis. Removal of container plants on closure	Removal of container plant upon closure of the Mining Right.	The following must be placed at the site and is applicable to all activities:

				• Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

Clean & Dirty water systems: Berms	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the mining area. Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of Mining Right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres

		management infrastructure is effective in controlling erosion. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		to the contents of the EIA and EMPr documents.
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site.	Removal of diesel tanks upon closure of Mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

		Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.		Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Mining Area.	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays	Upon cessation of the individual activity (continuous rehabilitation)	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

	Accelerated erosion of areas adjacent to workings that have been de-vegetated leads to increased suspended sediment loads in nearby streams and rivers. Wind-blown dusts from unprotected tailings and waste rock dumps enter aquatic environment. Soil contamination Surface disturbance Surface water contamination	Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Maintain a buffer zone around the streams. Note that these buffer zones are essential to ensure healthy functioning and maintenance of wetland. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.		Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

		Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance and must ensure that all contractors and workers undergo environmental induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the		

		fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. The footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; Snares & traps removed and destroyed; and Maintenance of firebreaks. Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-		

		vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities; Prevention of exotic vegetation encroachment; Prevent further siltation within the river segment as well as downstream of activities;		
Salvage yard (Storage and laydown area)	Surface Water contamination Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

	Soil contamination Surface disturbance Surface water contamination			Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Product Stockpile area	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination		Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

	Surface disturbance Surface water contamination		Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Surface Water contamination Contamination of soil Surface water contamination	Storage of Waste within receptacles Storm water control Ground water monitoring Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees.

				• The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Roads (both access and haulage road on the mine site):	Dust Surface Water contamination Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding;	Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto.

		Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.		• Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Workshop and Wash bay	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the

				contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Water distribution Pipeline	Surface disturbance	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Removal of pipeline upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

				Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.
Water tanks:	Surface disturbance	Maintain water tanks and structures	Removal of water tank and steel structure upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's

				• SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the EIA and EMPr documents.

i) Financial Provision

(1) Determination of the amount of Financial Provision

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22(2)(d) as described in 2.4 herein.

Closure:

The main closure objective of this mine is to rehabilitate the mined areas in such a way to ensure that the rehabilitated topographical landscape would blend in with the surrounding landscape, would not pose a safety hazard for human and animal, but at the same time allow a certain alternative land use. Establish a self-sustaining and stable vegetation cover in order to mitigate the visual impact, to control erosion and to create some habitat for animals. The rehabilitated environment also needs to be aesthetically acceptable according to the principle of BPEO.

Renaissance Resources will ensure that the mine site is:

- Neither a danger to public health and safety nor to animal health and safety.
- Not a source of any pollution.
- Stable (ecological and geophysical).
- Rehabilitated to the state that is suitable for the predetermined and agreed land use.
- Compatible with the surrounding biophysical environment.
- A sustainable environment.
- Aesthetically acceptable.
- Not an economic, social or environmental liability to the local community or the state now or in the future.

Renaissance Resources will ensure that the physical and chemical stability of the rehabilitated mining site will be such that risk to the environment is not increased by naturally occurring forces to the extent that such increased risk cannot be contended with by the installed measures.

Renaissance Resources will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (diamonds).

Renaissance Resources will ensure that the mining site is closed efficiently and cost effectively.

Renaissance Resources will ensure that the operation is not abandoned but closed in accordance with the relevant requirements.

Renaissance Resources will ensure that the interest of all interested and affected parties will be considered.

Renaissance Resources will ensure that the all-relevant legislation regarding mine closure will be adhered to, and all relevant application procedures followed.

The management of environmental impacts:

With regard to the extension, the mitigation of all environmental impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing mine facilities in a well-planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To contain and prevent any pollution (physical and chemical) from the mining operation within structures, facilities provided therefore.
- To ensure an effective surface run-off control system in order to deal with the separation of clean and dirty water environment.
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof.
- The sustainable rehabilitation of the mining site (excavations, topsoil- & overburden stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

Renaissance Resources is consulting with the landowners of the proposed mine sites and any other comments or concerns that they might have will be addressed after the EIA EMP had been distributed to them for comments and concerns.

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

The rehabilitation of land disturbed by the operation during the life of the mining right will be accompanied by ongoing monitoring of the environment, until a stable state is reached. The main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the area and habitats to a condition acceptable for obtaining a closure certificate.

Final rehabilitation of the site is expected to be within 10 years after the right has been granted and all deposits mined. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.

Dismantling of processing plant and related structures:

- The processing plant in total is expected to cover an area of ± 900 m^2, of which all should be dismantled and removed. This includes related infrastructures, equipment, machinery, screening plant, and other items used during the processing activities, such as conveyor belts, pipelines and power lines.
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of steel buildings and structures:

- All steel buildings and structures are expected to amount to 0 m^2. These include mobile stores, workshops, offices, ablutions, water tanks, etc. Those in disuse and which cannot be sold, donated, or used for future purposes should be dismantled and removed or demolished.
- Any associated foundations associated with dismantled steel buildings and structures should also be demolished to 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of reinforced concrete buildings and structures

- All brick buildings and concrete structures are expected to amount to ± 250 m^2. These include French drains, wash bays, refuelling

depots and concrete floors. Those in disuse and which cannot be donated or used for future purposes should be demolished.
- The foundations of these buildings should also be demolished and to a depth of 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Rehabilitation of access roads
- Mine roads in total, is expected to cover an area of 10 000 m^2. After general site rehabilitation has been completed, all redundant roads should be ripped or ploughed.
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition and rehabilitation of electrified railway lines
- There are no electrified railway lines associated with the mining activities.

Demolition and rehabilitation of non-electrified railway lines
- There are no non-electrified railway lines associated with the mining activities.

Demolition of housing and/or administration facilities
- There are no other housing or administration facilities associated with the mining activities, other than those in the form of mobile containers. These were however included in the section for demolition of steel buildings and structures.

Opencast rehabilitation including final voids and ramps
- Opencasts and ramps associated with the mining activities are expected to cover 3.5ha at any time.
- In-filling of the pits should take place concurrently and by obtaining material from the closest adjacent excess material heaps;
- The topography should then be shaped to the natural contours;
- The prepared surfaces should finally be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Sealing of shafts, adits and inclines

- There are no shafts associated with the mining activities.

Rehabilitation of overburden and spoils

- The total final overburden and spoils are estimated to amount to 2 ha and includes waste dumps as well as earth walls. Pre-planning should be conducted in order decide the fate of these features. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Rehabilitation of processing waste deposits and evaporation ponds with pollution potential

- No processing waste deposits and evaporation ponds with pollution potential are associated with the mining activities.

Rehabilitation of processing waste deposits and evaporation ponds with no pollution potential

- The processing waste deposits on the mining area is estimated to cover an area of ± 0.3 ha. Pre-planning should be conducted in order decide the fate of this feature. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The toe trenches should be backfilled by obtaining material from the closest adjacent heaps deemed appropriate for such purpose;

The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- For backfilled trenches the topography should be shaped to be in line with the natural contours, but where compaction occurred, the areas should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed

bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Storm water management

Storm water runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed to

(1) prevent uncontrolled runoff from the residue deposit, which in turn creates surface erosion and resultant damage to the cover material and could also expose deposited material;
(2) route the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure; and
(3) allow for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

Rehabilitation of subsided areas

The EAP is not currently aware of any areas of subsidence on site. However, any potential for such occurrences should be actively investigated and should be included in the rehabilitation plan, if and when such areas are identified.

General surface rehabilitation

- Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. General surface rehabilitation encompasses the reinstatement of natural topography, the top soiling and the re-vegetation of all those areas where infrastructure have been dismantled and removed or demolished. It also includes any industrial waste or scrap material that need to be removed from site. The total area that will need general surface rehabilitation at the time mine closure is estimated to be ± 2 ha.

River diversions

No river diversions are planned.

Fencing

It is not known at this stage if any fencing is planned.

Water management

No treatment of water will be necessary for the mining activities.

Maintenance and aftercare

Maintenance and aftercare should be planned for two to three years after mine production have ceased and should include the following:

- Annual fertilising of rehabilitated areas.
- Monitoring of surface and subsurface water quality,
- Control of alien plants, and
- General maintenance, including rehabilitation of cracks and subsidence.
- Erosion control and monitoring of the slopes of the slime's dams;

Specialist study

A screening level risk assessment should be completed by a specialist environmental practitioner during mine closure in order to ensure that all of the rehabilitation objectives have been met and that all of the potential risks have been eliminated and/or are controlled. This assessment should specifically emphasise those risks relating to river disturbances, groundwater quality and slope stabilities, but should not neglect progress made in natural vegetation restoration or success in alien invasive eradications. The current average specialist fees are estimated at R 50 000.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation plan was primarily designed with the closure objectives in mind and therefore it relates to all the various objectives as set out above in Section 1) g) 1) a) of this EMPR. In general, the main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the mining area to a condition acceptable for obtaining a closure certificate. Each and every element in the rehabilitation plan was designed in order to meet these closure objectives.

The ultimate rehabilitation of the mining site that involves the sloping, levelling, replacement of topsoil and the seeding of an grass seed mix in areas that does not recover acceptably as agreed to by the land owner will ensure that the site could be regarded as safe for humans and animals and will also ensure that the site is stable from an erosion point of view and also ensuring that the site could be used for grazing again.

The removal of waste material of any description from the mining area and the disposal thereof at a recognised landfill facility.

- ❖ The removal of infrastructure, equipment, plant and other items from the site.

- The ripping of compacted areas to a level of 300mm and the levelling of such areas in order to re-establish a growth medium for plants (such areas will furthermore be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the prospecting operation, if the re-establishment of vegetation is unacceptably slow.

- The mining of alluvial diamonds and the backfilling and covering thereof with previously stored topsoil (where-after this area will also be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to the proposed operation, and seedlings protected for a period of one) if the re-establishment of vegetation is unacceptably slow.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The total cost to rehabilitate and mitigate the Renaissance Resources Mine site as it stands currently (risking premature rehabilitation) is estimated to be R1,116,668 according to the DMR calculations. The detailed calculation DMR quantum is presented in Table 23. The total rehabilitation costing is based on the assumption that the mining operation will do continuous concurrent rehabilitation throughout the project.

(f) Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

g) Monitoring of Impact Management Actions

h) Monitoring and Reporting Frequency

i) Responsible persons

j) Time Period for Implementing Impact Management Actions

k) Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Topography	To minimise the reduction of land capability.	To ensure that rehabilitation post-mining slopes are stable, free draining and no slopes have an angle in excess of 20º.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* to ensure that the levels and the slopes are in order.
Soil	To prevent soil pollution; To limit soil compaction; To curb soil erosion; and To reinstate a growth medium able to sustain plant life.	Soil depth and chemical composition will be tested and possible erosion damage will be assisted and rectified.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* or after a heavy rain event.
Air Quality	To control the incidence of unacceptable levels of dust pollution on site.	To ensure that the mine minimizes dust omissions, so that dust does not become a nuisance for affected parties and a health hazard.	Site Manager/Foreman appointed SHE Consultant	Visual inspections will be done and managed by dust suppression by a water tanker. Quarterly tests will also be conducted by a Safety Health and Environmental Consultant and submitted to Mine Health and Safety for monitoring purposes.
Fauna	To minimise vegetation destruction in mining areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an *annually basis* to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a *twice a year basis* (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Noise and Vibration	To ensure that the legislated noise and ground vibration levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant and that which may migrate outside the plant area.	The manager during the construction phase and the responsible person (Manager / Environmental Department) during the Operational phase of the project.	Quarterly reports on fall-out noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
Surface Water	To conserve water; and To eliminate the contamination of run-off.	The Vaal River are the nearest source in the vicinity of the mine. The Vaal River will be monitored by collecting surface water samples quarterly.	Site Manager/Water Supply	The Vaal River which may be impacted by the mining activity. Monitoring takes place by collecting surface water samples every quarter. Implementation of a suitable management action plan during the operation of the proposed diamond mine, based on analysis of bi-annual water quality and biological monitoring data collected at sites upstream and downstream of all activities

l) Indicate the frequency of the submission of the performance assessment report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted biennially by an independent EAP and an Environmental Audit Report should be compiled in such a way that it meets the requirements in terms of Regulation 34 of the National Environmental Management Act 107 of 1998): Environmental Impact Assessment Regulation, 2014.
The rehabilitation plan should also be reviewed annually in order to fulfil the requirements of Section 41(3) of the MPRDA and should be conducted by an independent EAP. Subsequently, an Annual Rehabilitation Plan should be developed to meet the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).
These reports should be submitted annually to the Northern Cape DMR offices in Kimberley and the performance assessment report biennially.

m) Environmental Awareness Plan

The objective of the environmental awareness plan is to ensure that:

- Training needs are identified and all personnel whose work may create a significant impact upon the environment have received appropriate training;
- All employees are aware of the impact of their activities
- Procedures are established and maintained to make appropriate employees aware of:
    - The significant environmental impacts (actual or potential) of their work activities and environmental benefits of improved personal performance,
    - Their roles and responsibilities in achieving conformance with environmental policies, procedures, and any implementation measures,
    - The potential consequences of departure from specified operating procedures.
- Personnel performing tasks, which can cause significant environmental impacts, are competent in terms of appropriate education, training and / or experience.

Environmental awareness will be part of the existing training and development plan. Key personnel with environmental responsibilities will be identified and the following principles will apply:

- Procedures will be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness will focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;

Top management will build awareness and motivate and reward employees for achieve environmental objectives;

- Environmental policies will be availed to mine employees and contractors;
- Environmental inductions will be conducted for employees, contractors and visitors;
- There will be an ongoing system of identifying training needs.

General environmental awareness training as part of the induction at the Renaissance Resources operation should focus on the following:

- General environmental awareness
- The mine policies and vision concerning environmental management
- Legal requirements
- Mine activities and their potential impacts
- Different management measures to manage identified impacts
- Mine personnel's role in implementing environmental management objectives and targets

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

It is the responsibility of management to ensure that all employees, contractors and visitors are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible. Environmental awareness should be part of the existing training and development plan. Key personnel with environmental responsibilities should be identified and the following principles should be applied:

- Procedures should be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness should focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;
- Top management should build awareness and motivate and reward employees for achieving environmental objectives;
- There should be an ongoing system of identifying training needs.
- An environmental, health and safety induction programme should be provided to all employees, contractors and visitors prior to commencing work or entering the site, and they should sign acknowledgement of the induction. An attendance register and agenda/programme should be filed for each induction.
- A daily "toolbox talk" should be held prior to commencing work, which will include discussions on health, safety and environmental considerations. The toolbox talks should be led by the site manager or the appointed supervisor/s.
- Refresher training should also be given to permanent employees and long-term contractors on an annual basis, to ensure that all are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

General environmental awareness training as part of the induction at the Renaissance Resources project should focus on the following:

- General environmental awareness, which incorporates environmental, ecological and heritage elements;
- The mine policies and vision concerning environmental management;
- Legal requirements;
- Mine activities and their potential impacts;
- Different management measures to manage identified impacts;
- Mine personnel's role in implementing environmental management objectives and targets.

Environmental awareness topics to be covered in training should include:

- Natural resource management and conservation;
- Biodiversity awareness and conservation principles;
- Heritage resource awareness and preservation principles;
- Hazardous substance use and storage;
- Waste management; and
- Incident and emergency actions and reporting;

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

Environmental incident reporting will be a vital part of communication in order to deal with risks and ultimately avoid pollution or the degradation of the environment. Such communication should take place through the management, administrative and worker sectors of the operation, as well as contractors and visitors. Employees should be required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigation actions can be implemented timeously. In the event of an environmental incident, the reporting procedure as indicated in the table below should be followed.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTIONS REQUIRED
Person causing or observing the incident	The first person causing or observing the incident shall report the incident to an immediate supervisor where the environmental incident is observed.
Line management in the relevant area of responsibility where the incident occurred	Line management in the relevant area of responsibility where the incident occurred shall: • Investigate the incident and record the following information: - How the incident happened; - The reasons the incident happened; - How rehabilitation or clean up needs to take place; - The nature of the impact that occurred; - The type of work, process or equipment involved; - Recommendations to avoid future such incidents and/or occurrences; • Inform the environmental manager/ECO and the Operations Manager on a daily basis of all incidents that were reported on site; • Consult with the relevant department/person for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups). • Assist the Environmental Manager and/or Operations Manager with applicable data in order to accurately capture the incident into the reporting database; • Ensure that remediation measures are implemented as soon as possible.

Site managers	The site managers shall: • Forward a copy of the incident form to other line managers; • Forward a copy of the incident form to the Environmental manager/ECO; • Inform the relevant department/person on a weekly basis of the incident by e-mail or by submitting a copy of the incident report. Once a High Risk Incident (any incident which results from a significant aspect and has the potential to cause a significant impact on the environment) occurred it must be reported immediately to the Environmental Manager and the Operations Manager by telephone or email to ensure immediate response/action. • Forward a copy of the completed Incident Reporting Form (and where applicable a copy of the incident investigation) to the relevant department/person.
Environmental manager/ECO	The appointed environmental manager or ECO shall: • Complete an incident assessment form to assess what level of incident occurred; • Make recommendations for clean-up and/or appropriate alternate actions; • Enter actions necessary to remediate environmental impacts into the database in conjunction with the responsible line manager; • Enter the incident onto the database in order to monitor the root causes of incidents; • Include the reported incidents in an appropriate monthly/quarterly report; • Highlight all incidents for discussion at HSEC meetings.

n) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually)

According to Section 41(3) of the MPRDA the holder of a Mining right must annually assess (and revise, if necessary) the total quantum of environmental liability for the operation and ensure that financial provisions are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-operation liability.

An Annual Rehabilitation Plan should be developed to match the various requirements set out in the NEMA regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the site at that time.

It is hereby confirmed that the financial provision shall be reviewed annually.

2) UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports;

b) the inclusion of comments and inputs from stakeholders and I&APs;

c) the inclusion of inputs and recommendations from the specialist reports where relevant; and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

_____

Signature of the Environmental Assessment Practitioner:

Wadala Mining and Consulting (Pty) Ltd

_____

Name of Company:

Date: 29 September 2022

- END –