

NOTICE OF PUBLIC REVIEW:

PROPONENT: WITKOP FLUORSPAR MINE (PTY) LTD

PROJECT: APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR ACTIVITIES ASSOCIATED WITH THE PROSPECTING OF GYPSUM ON THE FARM VERDOORST KOLK 342, KENHARDT RD, NORTHERN CAPE

Ref #: NC 30/5/1/1/2/12069 PR

1 December 2017

Dear Interested & Affected Party (I&AP),

Please find attached the Draft copy of the Basic Assessment Report and Environmental Management Programme compiled in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the National Environmental Management: Waste Act, Act 59 of 2008 (NEM:WA) in respect of activities triggered by the abovementioned prospecting operations.

Please address all comments to:

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Please ensure that all comments reach us on or before the 23rd January 2018.

All comments received will be included in the final report for submission to the Department of Mineral Resources.

Note: Electronic copies of the report are available for download at www.cabangaenvironmental.co.za under the Public Participation tab.

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DATE	VERSION	REASON FOR CHANGE
28/11/2017	1	Draft for Public Review



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC 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 LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: Witkop Fluorspar Mine (Pty) Ltd

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FILE REFERENCE NUMBER SAMRAD: NC 30/5/1/1/2/12069 PR

Important Notice

In terms of the Mineral and Petroleum Resources Development Act (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 (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 furthermore 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.

Objective of the basic assessment process

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

- (a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives,
- (d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on the these aspects to determine:
 - (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - (ii) the degree to which these impacts—
 - a) can be reversed;
 - b) may cause irreplaceable loss of resources; and
 - c) can be managed, avoided or mitigated;
- (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
 - (i) identify and motivate a preferred site, activity and technology alternative;
 - (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
 - (iii) identify residual risks that need to be managed and monitored.

LIST OF ACRONYMS

Acronym	Expanded Name
AEL	Atmospheric Emission License in terms of NEM:AQA
BAR	Basic Assessment Report
BID	Background Information Documents
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
COP	Codes of Practice
DMR	Department of Mineral Resources
DWS	Department of Water Affairs and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989) as amended
EIA	Environmental Impact Assessment (process or report)
EIA Regulation	Environmental Impact Assessment Regulation published under NEMA
EMP	Environmental Management Programme
GDP	Gross Domestic Product
GIS	Geographical Information Systems
GN	General Notice (issued under an Act, providing notice or information)
GNR	General Notice Regulation (issued under an Act, providing instruction)
I&AP	Interested and Affected Parties
IAIA SA	International Association of Impact Assessment South Africa
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MR	Mining Right in terms of the MPRDA
MRA	Mining Right Application in terms of the MPRDA
NAEIS	National Atmospheric Emissions Inventory System
NEM:AQA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEM:WA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended

NFEPA	National Freshwater Ecology Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (Act 35 of 1998) as amended
PPP	Public Participation Process
PRA	Prospecting Right Application in terms of the MPRDA
PR	Prospecting Right in terms of the MPRDA
PWP	Prospecting Work Programme
RoD	Record of Decision (for specific application)
S&LP	Social and Labour Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard (followed by standard number)
SAWIS	South African Waste Information System
SEMA	Specific Environmental Management Acts
SOP	Standard Operating Procedure
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
Stats SA	Statistics South Africa
WMA	Water Management Area
WML	Waste Management Licence in terms of NEM:WA

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PART A:**SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT****1 INTRODUCTION**

Witkop Fluorspar Mine (Pty) Ltd (hereinafter referred to as Witkop) has submitted an application for a Prospecting Right in terms of the Minerals and Petroleum Resources Development Act, Act 28 of 2002 (MPRDA) over Portions 1, 2 and the Remaining Extent of the farm Verdoorst Kolk No. 342, Kenhardt Rd, Northern Cape. The application relates to the search for economically viable reserves of the industrial mineral Gypsum by means of auger drilling.

The proposed prospecting operations will require authorisation in terms of the various environmental legislation and as such an application for Environmental Authorisation ("EA") was submitted as per the requirements of the National Environmental Management Act, Act No. 107 of 1998 ("NEMA") and the NEM: Waste Act, Act No. 59 of 2008 ("NEM:WA"); read together with the MPRDA.

South African Law requires that the environmental and social impacts associated with a proposed development be assessed to identify any potential negative and / or positive consequences as result thereof. Following which, measures must be proposed to avoid or minimise these impacts. As the application relates to listed activities published in terms of Listing Notice 1 a Basic Assessment process is applicable.

This report constitutes the Basic Assessment Report (BAR) and Environmental Management Programme (EMP), and has been compiled for submission to the Component Authority, being the Department of Mineral Resources (DMR).

2 CONTACT DETAILS**2.1 Proponent**

Applicant Name:	Witkop Fluorspar Mine (Pty) Ltd
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Postal Address:	PO Box 688, Stellenbosch, 7599
Physical Address:	2nd Floor, A-Block, Octo Place, Electron Avenue, Technopark, Stellenbosch

2.2 Environmental Assessment Practitioner

Cabanga Environmental has been appointed by Witkop as the independent Environmental Assessment Practitioners (EAP), responsible for the completing the BAR and EMP for the proposed project. The contact particulars of the EAP are indicated below.

EAP:	Cabanga Environmental (t/a Cabanga Concepts cc)
Telephone:	+ 27 11 794 7534
Fax:	+ 27 11 794 6946
E-mail:	jane@cabangaenvironmental.co.za
Postal Address:	Postnet Suite 470, Private Bag x3, Northriding, 2162
Physical Address:	Units 5 & 6 Beyers Office Park, Bosbok Road, Randpark Ridge

2.3 Expertise & Experience of the EAP Project Team

Name:	Role:	Qualification:	Experience:
J.Barrett	EAP (lead author) and project manager	BSc. in Environmental Management & Botany Certificate in Project Management	10 years
M.Venter	EAP (contributing author) and Public Participation Officer	Cert.Sci.Nat BSc. (Hons) Geography	7 years
K.van Rooyen	Reviewing EAP	Pr.Sci.Nat MSc. in Geography, specialising in the environment & coal discard dump	29 years
C.Wallington	Wetland Ecologist	Pr.Sci.Nat BSc. (Hons) in Botany and Environmental & Geographical Sciences	4 years
S.Tsanga	Agricultural Scientist	BSc. Agricultural & Natural Sciences	10 years
M.Swart, KookGIS	GIS Specialist and Public Participation Officer	Pr.Sci.Nat, Pr.GISc MSc Geography	23 years

All of the above have worked on mineral and environmental applications under the MPRDA, NEMA, NEM:WA and NEM:AQA for various mines and industries. Please refer to Appendix B for copies of the relevant Curriculum Vitae.

3 LOCATION OF THE OVERALL ACTIVITY

The proposed Prospecting Right Area encompasses Portions 1, 2 and RE of the farm Verdoorst Kolk, totalling 8,223.3736 hectares.

Table 1: Affected Properties

Farm Name:	Verdoorstkolk 342
Sub-division:	Remaining Extent
Application area (Ha)	5032.8649 Ha
Magisterial district:	Kenhardt
Distance and direction from nearest town	45km NW of the town of Brandvlei
21 digit Surveyor General Code for each farm portion	C03600000000034200000
Surface Rights Holder:	Dot Com Trading 849 cc

Farm Name:	Verdoorstkolk 342
Sub-division:	Portion 1
Application area (Ha)	2519.470 Ha
Magisterial district:	Kenhardt
Distance and direction from nearest town	45km NW of the town of Brandvlei
21 digit Surveyor General Code for each farm portion	C03600000000034200001
Surface Rights Holder:	Dot Com Trading 849 cc

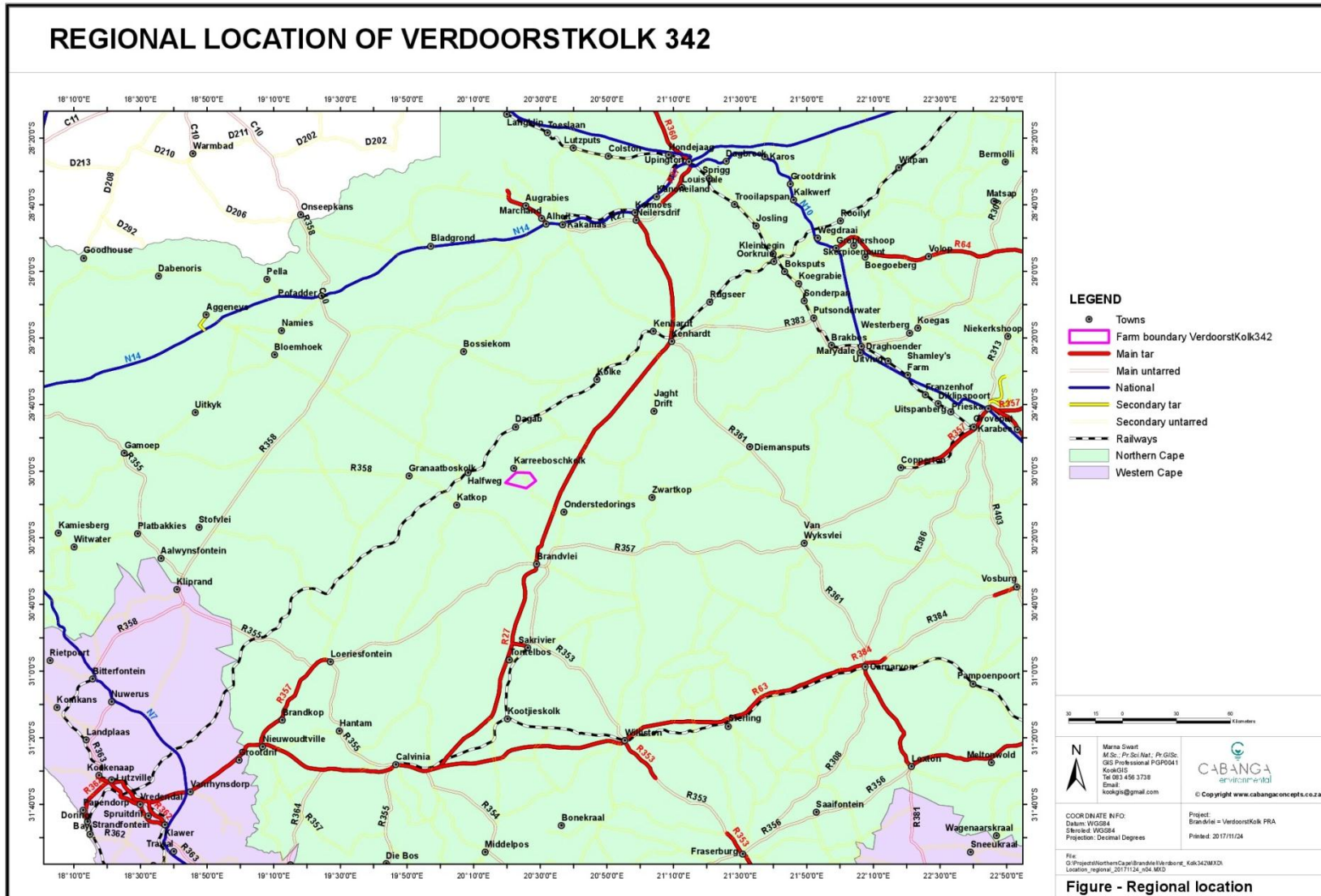
Farm Name:	Verdoorstkolk 342
Sub-division:	Portion 2
Application area (Ha)	671.0380 Ha
Magisterial district:	Kenhardt
Distance and direction from nearest town	45km NW of the town of Brandvlei
21 digit Surveyor General Code for each farm portion	C03600000000034200002
Surface Rights Holder:	PPC Cement SA (Pty) Ltd

4 LOCALITY MAP

The site is situated between the towns of Kenhardt and Brandvlei, within the Hantam Municipality of the Northern Cape Province. The table below summarises the applicable details.

Figures 1 and 2 below indicate the Regional and Local Setting of the project area. Refer also to Appendix A for copies of the relevant figures in A3 format.

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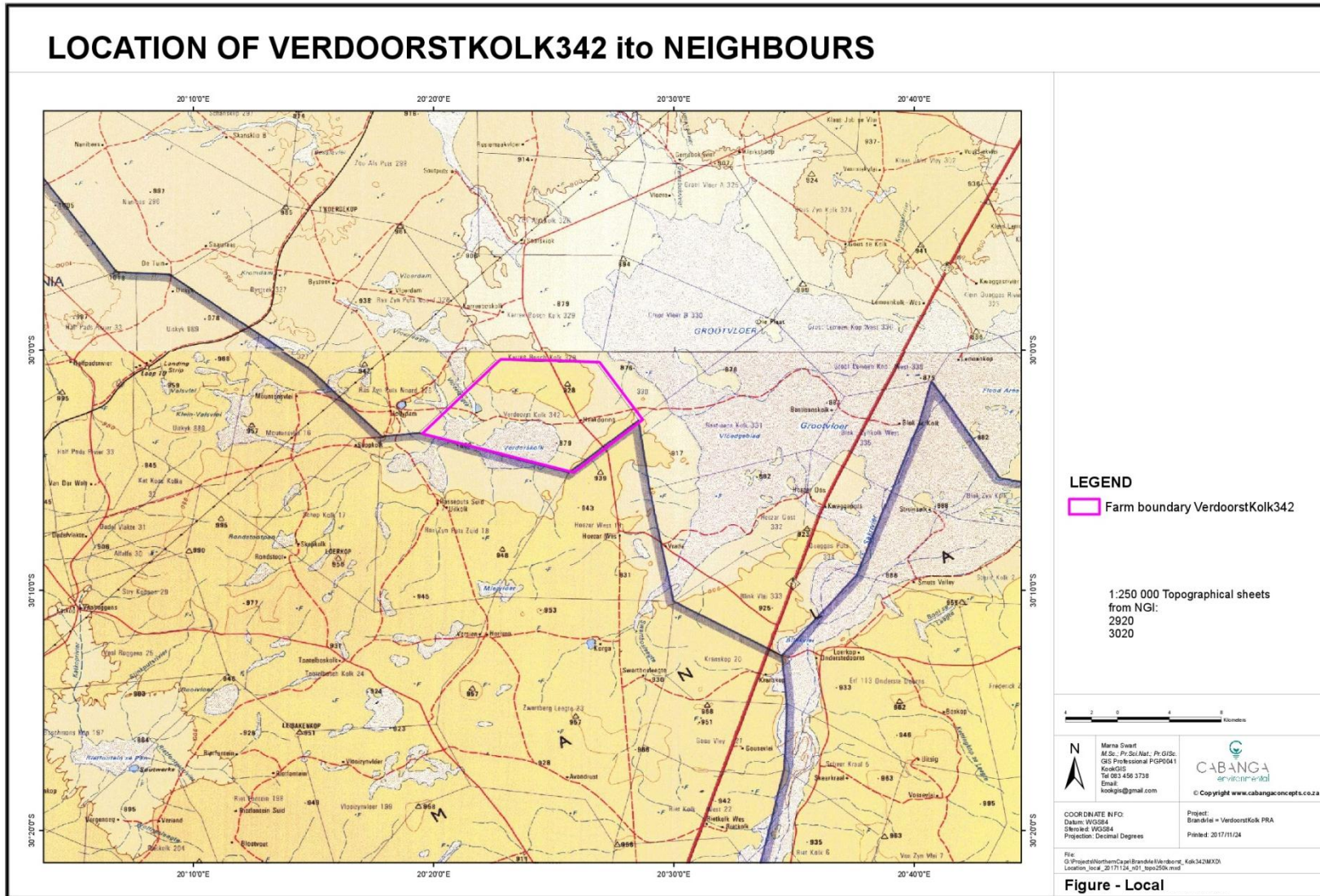


Figure 2: Local Setting

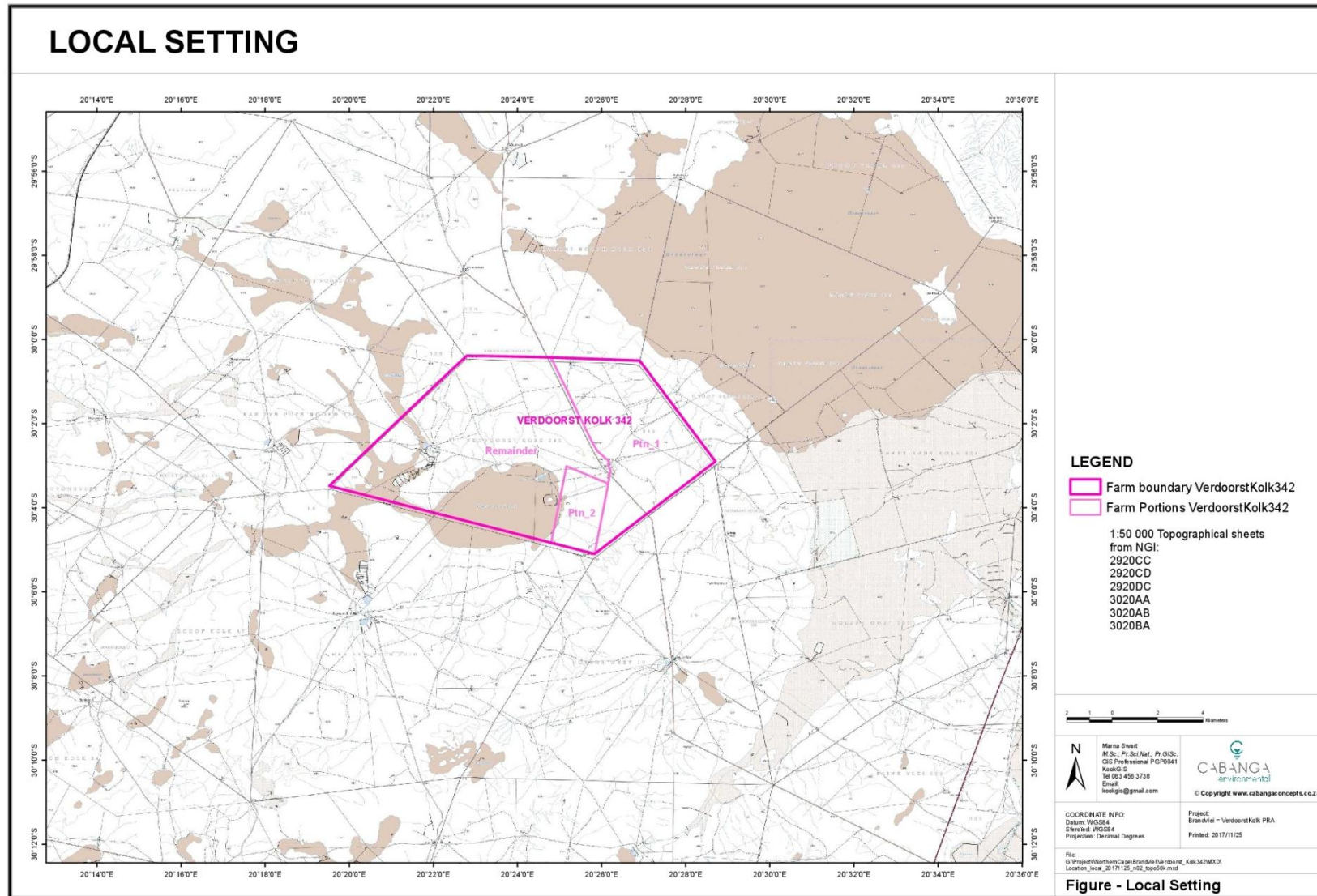


Figure 3: Extent of the Prospecting Area

5 DESCRIPTION OF THE OVERALL ACTIVITY

This section outlines the relevant listed activities applicable to the project (Section 5.1) and gives a detailed project description (Section 5.2) of the activities associated with the proposed prospecting.

5.1 Listed Activities to be undertaken

The Department of Environmental Affairs have published three notices listing activities for which environmental authorisation is required in terms of Section 24(2) and 24D of NEMA prior to commencement.

Furthermore, a list of waste management activities that have or are likely to have, a detrimental effect on the environment were published in terms of section 19(2) of the NEM:WA (GN 921 of 29 November 2013). No person may commence, undertake or conduct a listed waste management activity unless a waste management license (WML) is issued in respect of that activity.

The Department of Mineral Resources (DMR) is the Competent Authority for mineral related activities in terms of both NEMA and NEM:WA. As such an integrated application has been submitted as per the One Environmental System.

Figure 4 outlines the main activities associated with the proposed prospecting programme, whilst Table 2 details the ancillary activities associated with the proposed project, and identifies the applicable listed activities in terms of NEMA and NEM:WA for which authorisation is being sought.

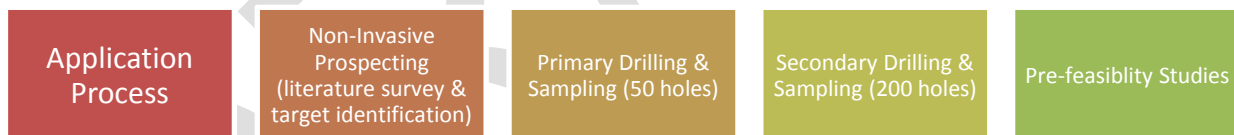


Figure 4: Main activities associated with the prospecting programme

Table 2: Listed and Specified Activities

NAME OF ACTIVITY:	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Access routes	3m wide x 1,008m length = 3,024 m ²	n/a	-	-
Site camp	500m ²	27, 30 12	Listing Notice 1 Listing Notice 3	-
Ablution facility	10m ²	n/a	-	-
Sample storage & laydown area	1,000m ²	n/a	-	-
Auger Drilling	0.625 Ha	9, 20, 22, 27, 30	Listing Notice 1	Category A: Activity 12, 15
Fuel storage	Volumes below 30m ³ – area 125m ²			
Rehabilitation		19, 22	Listing Notice 1	Category A: Activity 14

5.2 Description of the activities to be undertaken

This application relates to prospecting for the industrial mineral, Gypsum. Gypsum is typically used in the agricultural and construction industries (plasterboard, Portland cement, plaster etc.).

Prospecting activities will include non-invasive and invasive techniques; these are further detailed below in Section 5.3 and 5.4. It is currently expected that the prospecting programme will be completed over a 2 year period.

5.3 Prospecting Programme

Phase I: Application Process

Phase I constitutes the application process associated with obtaining the applicable Rights, Permits and Authorisations.

Phase II: Desktop Investigations (non-invasive prospecting)

This phase will focus on research and information gathering to increase knowledge and assist with mapping areas for future drilling. This Phase will include the review and assessment of available aerial photographs, GIS maps, Google Earth imagery, historic reports and studies of the area that might be available in the public domain with regards to the history, geology, geohydrology, topography & drainage systems and will specifically include available historic prospecting reports.

Phase III: Primary Drilling & Sampling

In this phase of the project, high-level lithostratigraphic profiles of the entire deposit will be produced. . This will be achieved by reconnaissance mapping using existing geological data of the area, surface sampling across the overall prospecting right area, as well as wide-spaced drilling of 50 holes (30cm diameter) to a maximum of 5 meters deep, allowing access to both the powdery surface gypsum as well as the secondary and older layer of crystalline gypsum, if any. The preliminary position of these boreholes is indicated in Figure 6 below.

Drilling will be undertaken by means of a TLB-mounted auger drill. This technology is ideal for drilling through unconsolidated alluvial deposits such as sands, silts and clays. This method is considered a 'dry' drilling method, as no additives, such as mud, are used during the drilling process.

The standout feature of this drilling method is that it makes use of three blades that cut into the earth. The blades are attached to a hollow tube. This hollow tube takes up the materials, which are loosened and is able to separate the samples from the materials. In order for the samples to be effectively removed from the created hole, air is compressed into the hole and the materials are blown up the hollow tube. The samples are thus not damaged and can be easily analysed. This is one of the features making this method of exploratory drilling stand out from percussion rotary air blast drilling, which can sometimes cause damage to the samples that are being extracted.

The auger holes will be concurrently rehabilitated by back-filling using waste material from the holes and soil materials and topsoil (if any exists) from the drilling, to maintain a safe environment.

All samples will be subject to extensive analytical evaluation by means of wet chemistry and X-Ray Fluorescence Spectroscopy. Estimated layer thickness information gathered during the aforesaid exercise, will then be used to generate the profiles and to indicate specific areas of high probability to find quality gypsum.



Figure 5: Example of a TLB mounted auger drill
(Source: <http://augertorqueusa.com>)

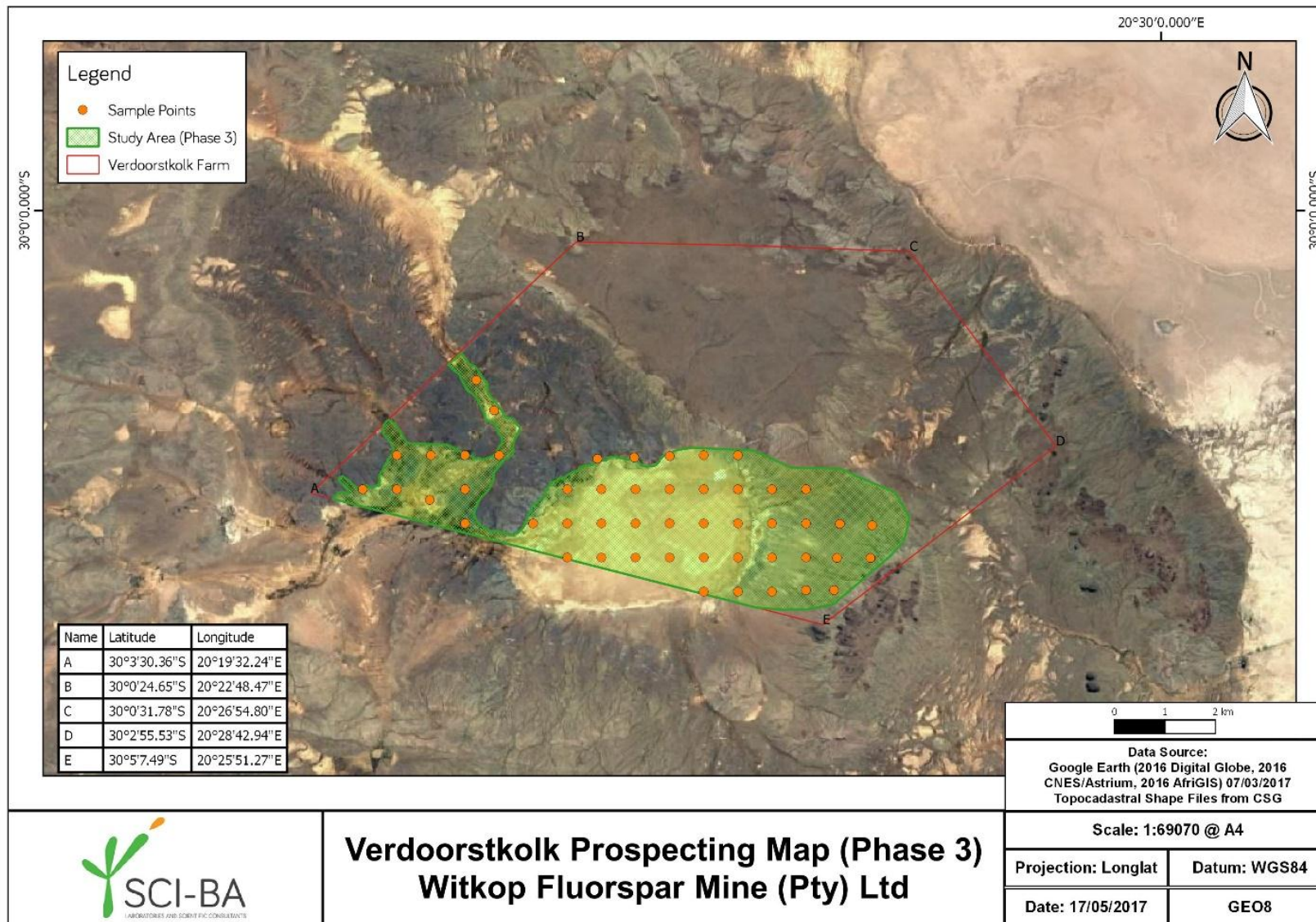


Figure 6: Primary Drilling Programme – Location of Boreholes

Phase IV: Secondary Drilling & Sampling

A secondary drilling programme will be executed on a 300 x 300 metre grid, limited to selected areas based on the outcomes of the primary drilling and sampling programme. It is expected that a maximum of approximately 1,800 hectares will be subject to this detailed programme, calculating to approximately 200 auger-drilled holes with a diameter of 30cm, to a maximum depth of 5 meters. As with Phase III, all auger holes will be immediately rehabilitated.

This preliminary position of these holes is indicated in Figure 7 below, although it must be noted that the geographic location shown is indicative only.

Equipment utilised onsite during Phases III and IV include:

- TLB or backhoe loader;
- Auger-torque drill attachment for TLB/backhoe loader;
- 20 ton excavator (only if required);
- Private vehicles for transport of geologist and operators; and
- Chemical analyses equipment (sample splitters, test sieves, bench top scale, spectrometer etc.)

Phase V: Pre-feasibility Studies

The pre-feasibility study will combine the results of the overall prospecting programme, constructing a geological model of the specific area that shows the highest potential for mining. This model will provide information on the reserve estimate and inform the initial mine plan layout.

The expected outcomes will include but not be limited to (i) analytical report of all samples, (ii) deposit mapping in 3-dimensions with full analytical detail, (iii) reserve calculation, (iv) preliminary trench mining design and future mining plan, (v) list of potential mining and beneficiation equipment required and (vi) economic evaluation and proposal to (or not to) proceed to a mining right.

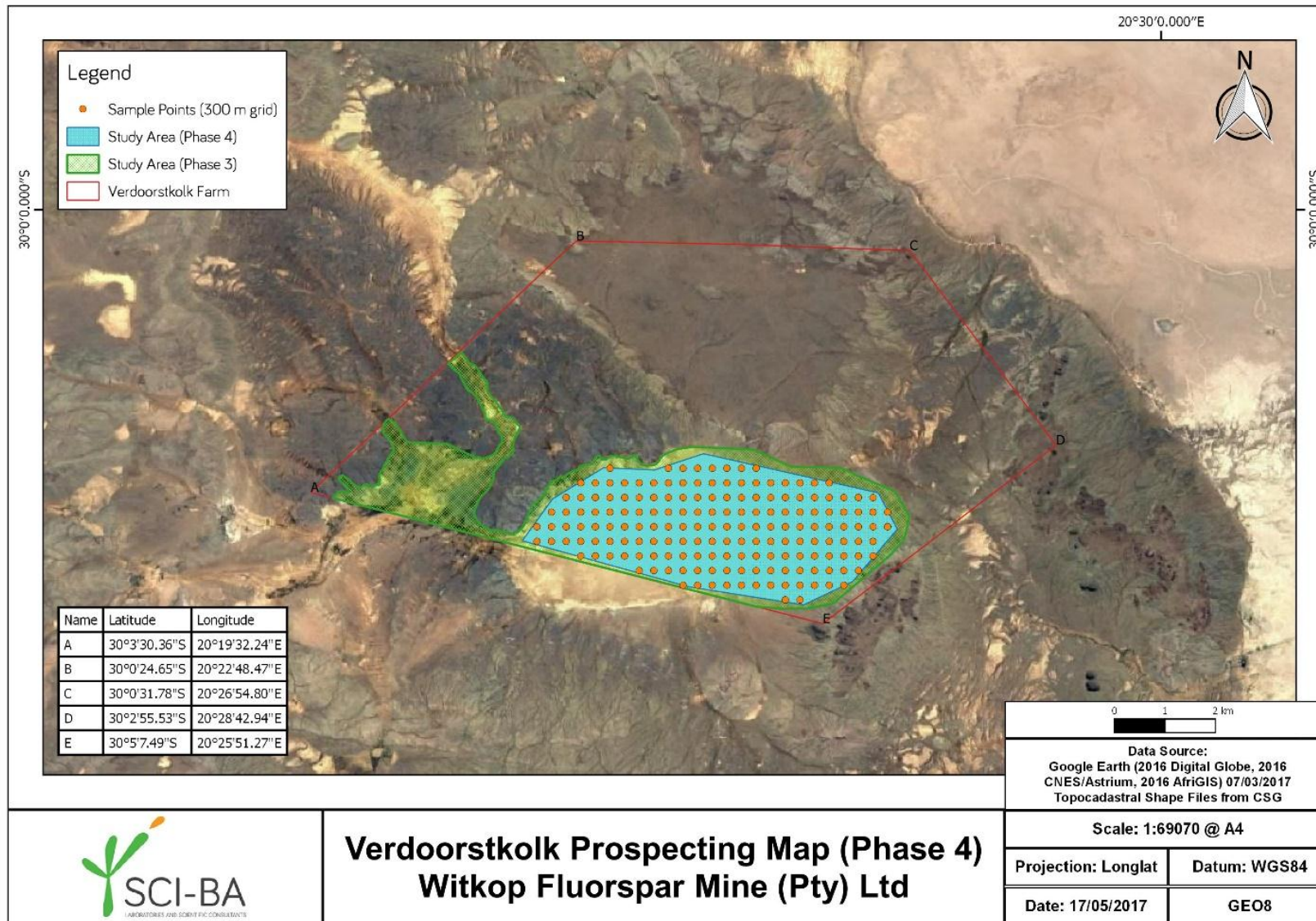


Figure 7: Secondary Drilling Programme – Location of Boreholes

5.4 Associated Activities, Infrastructure and Services

Access Roads:

No formal roads will be constructed, existing farm roads and tracks will be utilised as far as possible.

Site Camp:

A site camp and laydown area will be established on site for the storage of equipment, samples etc. No staff will be housed on site.

Fuel Storage:

Diesel will be stored on site for use by the TLB; this will be erected within the site camp and laydown area. It is currently expected that the storage volumes will remain below 30m³.

Water Supply:

No water is required for the drilling process.

Water for potable use will be trucked and stored within a jojo tank. Alternatively bottled water will be brought to site.

Waste Management

Bins will be provided on site, and waste collected for disposal at the licensed Municipal site.

Chemical toilets (portable) will be erected on site, at the site camp and laydown area.

6 POLICY AND LEGISLATIVE CONTEXT

Table 3 below summarises the Legislation and Guidelines considered to be applicable to the proposed prospecting activities; and were considered at the time of compiling this report.

Table 3: Summary of Applicable Legislation

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
<p>The Constitution of South Africa, 1996 (Act 108 of 1996)</p> <ul style="list-style-type: none"> • Everyone has the right to an environment that is not harmful to their health or well-being; to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development. • Every person has a right to information held by the State and to information held by other people that is required in the exercise or protection of a right. • Everyone has the right to just and procedurally fair administrative action. 	<ul style="list-style-type: none"> • This report. • Section 10 and Appendix D. • Section 10 and Appendix D. 	<ul style="list-style-type: none"> • A BAR process has been followed for the project to determine the impact to the environment. • The BAR and EMP will be made available for public review for a period of 30 days (minimum). • The Appeal Process will be described to I&APs through the RoD notification process.
<p>The Minerals and Petroleum Resources Development Act (MPRDA), Act No. 28 of and its Regulations (GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011).</p>	<p>Acceptance letter included in Appendix C.</p>	<ul style="list-style-type: none"> • An application for a prospecting right was submitted to, and accepted by, the DMR in terms of the MPRDA. • Submission of information has been on the prescribed forms, and submitted via the SAMRAD portal where applicable.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
National Environmental Management Act (NEMA), Act 107 of 1998 as amended and its associated regulations: (GNR982 – EIA Regulations; NEMA Regulation GNR983 – Listing Notice 1; NEMA Regulation GNR984 – Listing Notice 2; and NEMA Regulation GNR985 – Listing Notice 3 as amended in 2017).	Table 2 Identifies the applicable listed activities.	<ul style="list-style-type: none"> Witkop has submitted an application for EA. The application is subject to BAR process.
NEMA: Public Participation Guidelines (GNR807).	Section 10 and Appendix D.	<ul style="list-style-type: none"> Guidelines were followed during the Public Participation Process (PPP).
NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining or production activities (GNR1147 –20 November 2015).	Section 24	<ul style="list-style-type: none"> Financial Provision has been calculated and will be provided for by means of an acceptable guarantee.
National Environmental Management: Waste Act (NEM:WA), Act 59 of 2008 as amended and its associated regulations. The regulations and various addendums pertaining to scheduled waste activities (GNR921, November 2013).	Table 2 identifies the applicable Waste Management Activities.	<ul style="list-style-type: none"> Witkop has submitted an application for EA. The application is subject to BAR process. The definition of mine residue extends to waste from drilling muds etc. As auger drilling is a “dry” drilling method, minimal waste/drilling mud is expected. Any clay/soils material generated will be used to backfill and rehabilitate the auger holes.
Norms and standards for the storage of waste on site as per GNR926, November 2013.	Incorporated into the EMP	<ul style="list-style-type: none"> Waste volumes generated on site will be minimal, and is not expected to trigger Category C. The EMP has considered the norms and standards for storage, where relevant.
National Water Act (NWA), Act 36 of 1998 as amended and its associated regulations.	Incorporated into the EMP	<ul style="list-style-type: none"> The focus area of the prospecting programme is a large salt pan as such authorisation is required in terms of the NWA, either through a GA or

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		<p>water use license.</p> <ul style="list-style-type: none"> To date the DWS has been notified of the acceptance of the Prospecting Right Application as required by the Regulations regarding the procedural requirements for water use license applications. The necessary applications will be submitted to the DWS in the near future.
GNR704 of the NWA, Regulations on the use of water for mining and related activities aimed at the protection of water resources.	Incorporated into the EMP	<ul style="list-style-type: none"> The focus area of the prospecting programme is a large salt pan, as such exemption will be required from Regulation 4(b) of GN704. To date the DWS has been notified of the acceptance of the Prospecting Right Application as required by the Regulations regarding the procedural requirements for water use license applications. The necessary applications will be submitted to the DWS in the near future.
National Environmental Management: Biodiversity Act (NEM:BA), Act 10 OF 2004 as amended and its regulations, including various regulations pertaining to protected species and to alien and invasive species.	Table 2 Identifies the applicable listed activities.	<ul style="list-style-type: none"> Regulations utilised to determine the need for any listed scheduled activities under Listing Notice 3. The majority of the project area is classed as CBA1 and CBA2. The alien invasive management system will consider the listed alien and invasive species published under NEM:BA as well as CARA and preliminary plan included in the EMP.
National Environmental Management: Protected Areas Act (NEMPAA), Act 57 of 2003 as amended and its associated regulations.	Appendix E.	<ul style="list-style-type: none"> Formally protected areas refer to areas protected either by national or provincial legislation whereas informally protected areas refers to privately owned reserves. No formally or

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		informally protected areas are situated in close proximity to the project area. The nearest protected area is Augrabies Falls National Park which is situated approximately 180 km north of the site.
National Heritage Resources Act (NHRA), Act No. 25 of 1999	Section 11.1.10 and Appendix G.	<ul style="list-style-type: none"> • A study was completed to assess the impacts on heritage resources in the area. No sites will be directly impacted by the prospecting activities. • A desktop palaeontological study has been completed for the proposed project. The report indicates that it is unlikely that fossils occur in the prospecting right area because mostly the rocks are of marine original or deltaic turbidites. • SAHRA has been consulted as a Regulatory Authority for the project.
Hazardous Substances Act, Act No. 15 of 1973	Incorporated into the EMP	<ul style="list-style-type: none"> • Hazardous substances on site will be limited to hydrocarbons.
South African National Standard: SANS 10234:2008 - Globally Harmonized System of classification and labelling of chemicals (GHS).	Incorporated into the EMP	<ul style="list-style-type: none"> • Material Safety Data Sheets (MSDS) will be kept on site, where applicable.
South African National Standard: SANS 10228:2006 - The identification and classification of dangerous goods for transport	Incorporated into the EMP	<ul style="list-style-type: none"> • The transportation and storage of dangerous good will be limited to hydrocarbons.
Mine Health and Safety Act, Act 29 of 1996 (MHSA) and associated Regulations	Incorporated into the EMP	<ul style="list-style-type: none"> • Although not directly addressed in the EMP report, protecting the environment contributes to a safe working environment.

7 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

Gypsum is found in many arid regions of Southern Africa, where evaporation in saline pans causes the mineral to crystalize (Cairncross, 2005). A large salt pan is situated within the project area. Available geological data further indicates that area is underlain by quaternary alluvium, comprising calcareous and gypsiferous soils, followed by quaternary gravels, silts and sands.

In order to confirm the above, and determine the nature, location and extent of the reserves, it is necessary to undertake prospecting. The prospecting programme will further determine the economic viability of proceeding with mining in future. So whilst the activity of prospecting will not greatly benefit the surrounding communities or create employment, it will determine the feasibility of future mining prospects in line with the MPRDA.

- Creating employment opportunities and improving social infrastructure are key goals set out in the Municipality's Integrated Development Plan (IDP) and the establishment of any future mine would provide job opportunities for the surrounding areas.
- The Rural Spatial Development Framework/Land Development Plan for the Hantam Municipality dated 2010 has highlighted areas to the west of Brandvlei for possible salt and gypsum mining.

During the prospecting activities, local services (drilling company, laboratory etc.) will be utilised as far as possible.

Minimal services are required for the prospecting activities, these will be limited to water, diesel and chemical toilet all of which will be brought onto site. Vehicles and machinery will be limited to one TLB, one excavator and personal vehicles for transporting the geologist and operators. Thus, no additional capacity will be required from Municipal infrastructure in order to cater for the prospecting project.

The current land use can continue concurrent with the drilling activities.

In terms of environmental sensitivity:

- The site has low agricultural potential.
- The National Biodiversity Assessment, 2011 indicates the threat status of the ecosystem as Least Threatened (LT) and not protected.
- According to the C.A.P.E Fine Scale Biodiversity Planning Project (2009) the pan area was classed as a terrestrial Critical Biodiversity Area (CBA) 2. Subsequently in 2016, the Department of Environment and Nature Conservation reviewed the CBA Map for Northern Cape and revised the status of the pan to a terrestrial CBA1, with the surrounding areas being classed as terrestrial CBA2.
- No aquatic CBA or ESAs were identified on site or within the immediate area.
- The pan and associated wetlands are classed as NFEPA Rank 2 wetlands of National importance.

However, given the nature of the proposed prospecting programme, impacts will largely be limited to the footprint of the drill sites. Drilling will be conducted to a maximum depth of 5m, with a diameter of 30cm using dry auger methods; all drill sites will be rehabilitated concurrently. Thus all impacts associated with the proposed prospecting project can be successfully mitigated if the EMP is correctly implemented.

8 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES, AND TECHNOLOGY ALTERNATIVE

With regard to location, the prospecting activities are delimited by the properties available for prospecting (i.e. not held by another company) and the geology of the area. The preliminary positions of the proposed prospecting boreholes have been sited to give a representative sample for the area of interest.

As mentioned earlier, Gypsum typically forms in the upper region of the weathering profile in salt pans and in shales of the Eccu Group of the Karoo Supergroup. This typically occurs in areas where evaporation rates are high and precipitation rates are low. Thus, the Verdoorst Kolk pan forms the focus area of the prospecting programme as this is where the mineral is most likely to be concentrated.

No activity alternatives are considered. Drilling is still the most effective way and an industry norm to complete resource evaluation as required by the MPRDA.

Alternative drilling technology was considered (i.e. percussion rotary air blast drilling) and dry auger drilling was determined to be the most beneficial.

9 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

9.1 Property/Location Alternatives

Not applicable. Properties are delimited by the properties available for prospecting (i.e. not held by another company); and the geology of the area.

9.2 The Type of Activity to be Undertaken

No activity alternatives are considered. Prospecting is a pre-requisite to mining and is governed by legislative requirements for mining.

9.3 The Design or Layout of the Activity

No formal roads will be constructed; existing farm tracks will be used as far as possible so as to reduce the environmental impacts. Thus no access or route alternatives were considered.

Minimal surface infrastructure will be required this will include a small site camp and laydown area for the storage of equipment and samples. This will be located outside of all environmentally sensitive areas, in an area predetermined with the landowner.

Accommodation will be provided for in one of the surrounding towns.

The preliminary positions of the proposed prospecting boreholes have been sited to give a representative sample for the project area. These will however only be finalised based on the findings of Phase II and III of the prospecting programme. The use of desktop studies and literature reviews are viewed as an initial non-invasive technique to delimit areas for invasive drilling prospecting and is seen as the most responsible method to reduce needless surface disturbance and reduce environmental impact footprint.

9.4 The Technology to be Used in the Activity;

Alternative drilling technology was considered (i.e. percussion rotary air blast drilling) and dry auger drilling was determined to be the most beneficial.

Advantages and disadvantages associated with auger drilling are briefly discussed below:

Advantages of Auger Drilling

- Samples collected are a more accurate representation of what is below the surface and this exploratory process often yields large pieces of samples, which are easier to analyse and to get an accurate representation of the deposit.
- Holes do not need to be cased.
- Drilling muds and water not required for drilling.
- Movement of the machine between areas can be done quickly and easily.
- The impact on the environment is minimal compared to other drilling methods.

Disadvantages of Auger Drilling

- Air core auger drilling can take longer than other methods.
- The process is usually slightly more expensive than other methods.

9.5 The Operational Aspects of the Activity

Drilling is still the most effective way as well as an industry norm to complete resource evaluation as required the MPRDA.

No alternatives were assessed.

9.6 The No-Go Alternative

The no-go option will result in the protection of the environment *in situ*. However, the potential reserves may not be defined and ultimately utilised.

Ultimately, another company will apply for the Mineral Rights.

10 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Table 4 highlights the requirements for a public participation process (PPP) as per NEMA and includes PPP carried out as part of this application process. Please see the PPP report attached as Appendix D for the full details of the PPP carried out to date.

The PPP aims to involve the authorities and I&APs in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and will be followed at all times and will be based on reciprocal dissemination of information.

Table 4: NEMA PPP requirements and PPP conducted to date

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
1	This regulation only applies in instances where adherence to the provisions of this regulation is specifically required
Noted	
2	The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation b:
NEMA PPP Guidelines have been followed.	
a	fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of:
i	the site where the activity to which the application or proposed application relates is or is to be undertaken
ii	An alternative site
Notices were compiled in English & Afrikaans and erected (7 th and 8 th November 2017) on the site boundary fence as well as other public locations. Copies of the Posters and photographic evidence thereof have been included in the relevant Appendix of the PPP Report attached as Appendix D.	
b	giving written notice, in any of the manners provided for in section 47D of the Act, to:
i	the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
ii	owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
iii	the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
iv	the municipality which has jurisdiction in the area;
v	any organ of state having jurisdiction in respect of any aspect of the activity; and
vi	any other party as required by the Competent Authority.
<p>A comprehensive database / I&AP register was compiled, this included various stakeholders, authorities, land owners, land users and associations within the area.</p> <p>Background Information Documents (BIDs), detailing the project, were compiled in English and Afrikaans and circulated to all I&APs.</p> <p>A copy of the BID and proof of delivery thereof is attached in the relevant Appendix of the PPP Report included as Appendix D.</p>	
c	Placing an advertisement in:
i	One local newspaper; or
ii	Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations.
d	placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii)
<p>Advertisements were placed in one (1) local newspapers, in both English and Afrikaans:</p> <ul style="list-style-type: none"> Noordwester, published on 10 November 2017 <p>Copies of the Adverts are attached in the relevant Appendix of the PPP Report included as Appendix D.</p>	
e	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage.
<p>No issues in information dissemination have been noted to date. Any additional requirements made by the authorities will be applied during the PPP process.</p>	
3	A notice, notice board or advertisement referred to in sub regulation (2) must –
a	Give details of the application which is subject to public participation
b	State -
i	whether basic assessment or S&EIR procedures are being applied to the application
ii	Whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
iii	The nature and location of the activity to which the application relates
iv	Where further information on the application or activity can be obtained
v	The manner in which and the person to whom representations in respect of the application may be made
These aspects are addressed in the BIDs, Notices and Adverts. Please see the relevant annexures in the PPP Report included as Appendix D.	
4	A notice board referred to in sub regulation (2) must -
a	be of a size at least 60cm by 42 cm
b	Display the required information in lettering and in a format as may be determined by the Competent Authority
Notices were A2 in size (42 x 60 cm).	
5	Where public participation is conducted in terms of this regulation for an application or proposed application, sub regulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that : -
a	such process has been preceded by a public participation process which included compliance with sub regulation (2)(a), (b), (c) and (d); and
b	written notice is given to registered interested and affected parties regarding where the: -
i	revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
ii	revised environmental impact report or EMPr as contemplated in regulation 23(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due; or
iii	environmental impact report and EMPr as contemplated in regulation 21(2)(d) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
Noted. No deviation required.	
6	When complying with this regulation, the person conducting the public participation process must ensure that:
a	Information containing all the relevant facts in respect of the application is made available to potential interested and affected parties; and
b	Participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process

	reasonable opportunity to comment on the application.
Noted. The BAR and EMP will be made available for public review for a minimum of 30 days.	
7	Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.
The PPP has been combined for all the authorisations required from the DMR in terms of the MPRDA, NEMA and NEM:WA. The notices have also included information on the water uses applicable under the NWA.	

10.1 Details of the PPP followed to Date

Authorities Consultation:

The following Authorities have been identified and notified of the project by means of Background Information Documents (BIDs) sent via fax, e-mail, post or hand delivered:

- DMR
- DWS
- Lower Orange Catchment Management Agency
- Northern Cape Environmental Department
- Northern Cape Agriculture, Land Reform and Rural Development
- Namakwa District Municipality
- Hantam Local Municipality
- Northern Cape Heritage Authority
- South African Heritage Resources Agency

Copies of the BAR and EMP have been delivered to the highlighted Authorities for review and comment. All comments (where received) will be included in the I&AP issues and response table below for submission to the DMR.

Interested and Affected Parties (I&APs) Consultation

The I&APs include a broad database of immediately affected landowners, adjacent land owners/users, communities, local authorities, ward councillors and other interest groups.

Background Information Documents (BIDs) were compiled in English and Afrikaans and were distributed by hand, fax, e-mail and post to all the identified I&APs. In addition the BID was uploaded onto the Cabanga website.

In some cases no one could be located on the property; in such a case the BID was attached to the property gate or left in a post box (when available).

The purpose of the BID was to:

- Introduce the project to the I&APs;
- Inform them of the proposed applications and associated regulatory processes; and
- Initiate a process of public consultation to record perceptions and issues.

No specific public participation meeting was held for the project however, members of the project team were invited to attend and present at the monthly Brandvlei Agricultural Society meeting on the 8th November 2017. At which time a brief summary of the proposed project was presented to the attendees.

Notices

Notices were compiled in English & Afrikaans and erected (7th and 8th November 2017) on the site boundary fence as well as other public locations, namely:

- Voorsorg Vleis, Brandvlei Bethal Public Library;
- Kaap Agri, Brandvlei;
- SASSA, Brandvlei;
- Petrol station beside Windpomp Restaurant, Brandvlei;
- KKK, Brandvlei;
- Hantam Local Municipality, Brandvlei;
- Public Library, Brandvlei;
- Post Office, Brandvlei;
- KKK, Kenhardt;
- Petrol Station, Kenhardt; and
- Bazaar, Kenhardt.

Further to this, advertisements were placed in one local newspaper, The Noordwester, in both English and Afrikaans (Publication Date: 10 November 2017).

Document Review

The Draft Basic Assessment Report will be made available to the public for review and comment for a minimum period of thirty (30) days from the 1st December 2017. In terms of NEMA and its EIA Regulations, the 15th December 2017 to 5th January 2017 is excluded from the reckoning of days for any action for which a timeframe is prescribed thus, the public review period has been extended and will be available until the 23rd January 2018.

All registered I&APs will be informed of the reports' availability through SMS and e-mail.

The Draft Basic Assessment Report will be made available at the following locations :

- Online at www.cabangaconcepts.co.za/public-documents; and
- The Brandvlei Public Library.

10.2 Summary of Issues Raised by I&APs

It must be noted that the consultation process with I&APs is still on-going. All comments (where received) will be included in the I&AP issues and response table below for submission to the DMR.

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Table 5: Issues & Response Table

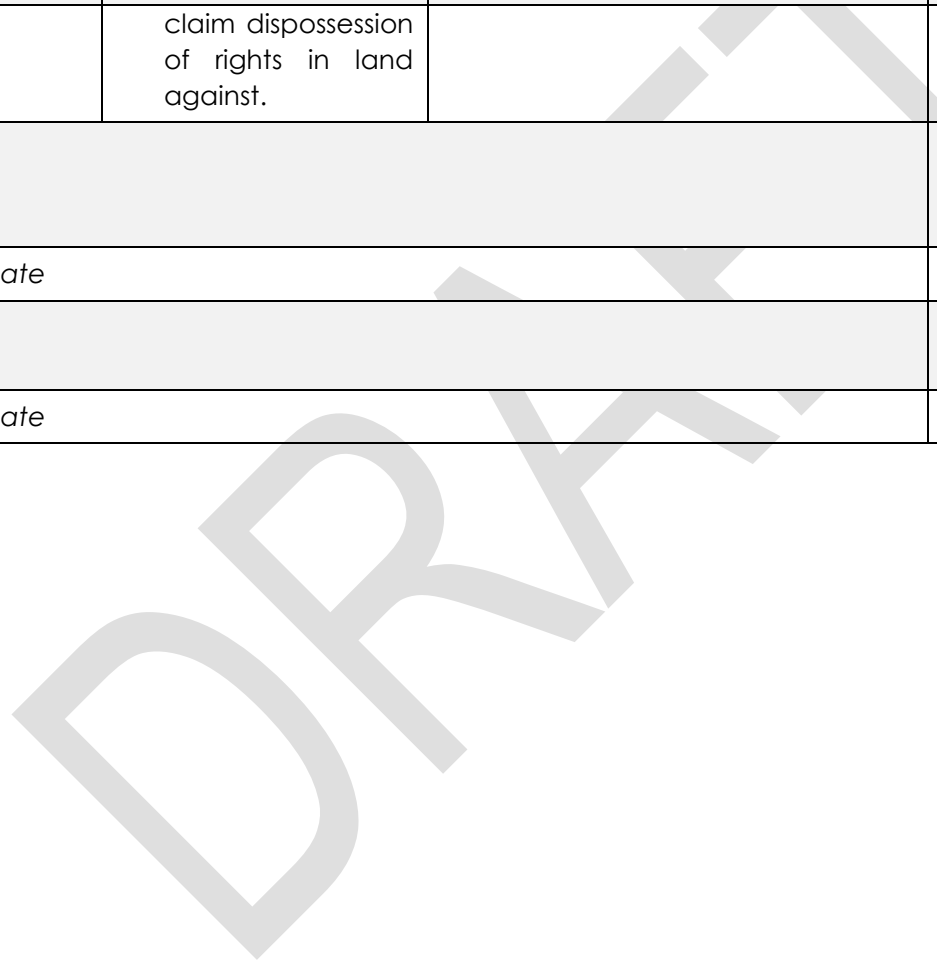
AFFECTED PARTY ¹		Date Comments Received	Issues raised	Initial EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Landowner/s	X				
<i>No comments received to date</i>					
Lawful occupier/s of the land	X				
<i>No comments received to date</i>					
Landowners or lawful occupiers on adjacent properties	X				
<i>No comments received to date</i>					
Municipal Councillor	X				
<i>No comments received to date</i>					
Municipality	X				
<i>No comments received to date</i>					

¹ Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted

AFFECTED PARTY ¹		Date Comments Received	Issues raised	Initial EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.	X				
No comments received to date					
Communities	X				
No comments received to date					
Traditional Leaders	X				
No comments received to date					
Dept. Environmental Affairs	X				
No comments received to date					
Other Competent Authorities affected	X				
Department of	X	16	No land claims on	No response needed. Email	N/A

AFFECTED PARTY ¹	Date Comments Received	Issues raised	Initial EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Rural Development and Land Reform- Nqabisa Mkalipi/Ryan Oliver	November 2017	<p>Verdoorst Kolk Portion Re, 1 and 2.</p> <p>Factors that are beyond the Commission's control:</p> <ul style="list-style-type: none"> • Various factors that some claimants referred to properties that claim dispossession of rights in land against using historical property descriptions which may not match the current property description. • Some claimants provided the geographic descriptions of the land they claim without mentioning the particular actual property description they 	received due to an inquiry emailed to Department of Rural Development and Land Reform.	

AFFECTED PARTY ¹		Date Comments Received	Issues raised	Initial EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			claim dispossession of rights in land against.		
OTHER AFFECTED PARTIES	X				
<i>No comments received to date</i>					
INTERESTED PARTIES	X				
<i>No comments received to date</i>					



11 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

11.1 Baseline Environment

11.1.1 Geology

The area is well known to be underlain by quaternary alluvium, comprising calcareous and gypsiferous soils, followed by quaternary gravels, silts and sands.

These formations are believed to unconformably overlies the Prince Albert Formation and Karoo Dolerite Suite in the study area. The Prince Albert Formation of the Eccca Group, Karoo Supergroup, comprises of green to brown massive mudstone, shale, sandstone and dolomitic limestone. The Karoo Dolerite Suite is approximately ~180 million years old and intruded into the Karoo Supergroup. It is believed that calcareous and gypsiferous soils may have accumulated within the paleochannels and topographic low points within the study area.

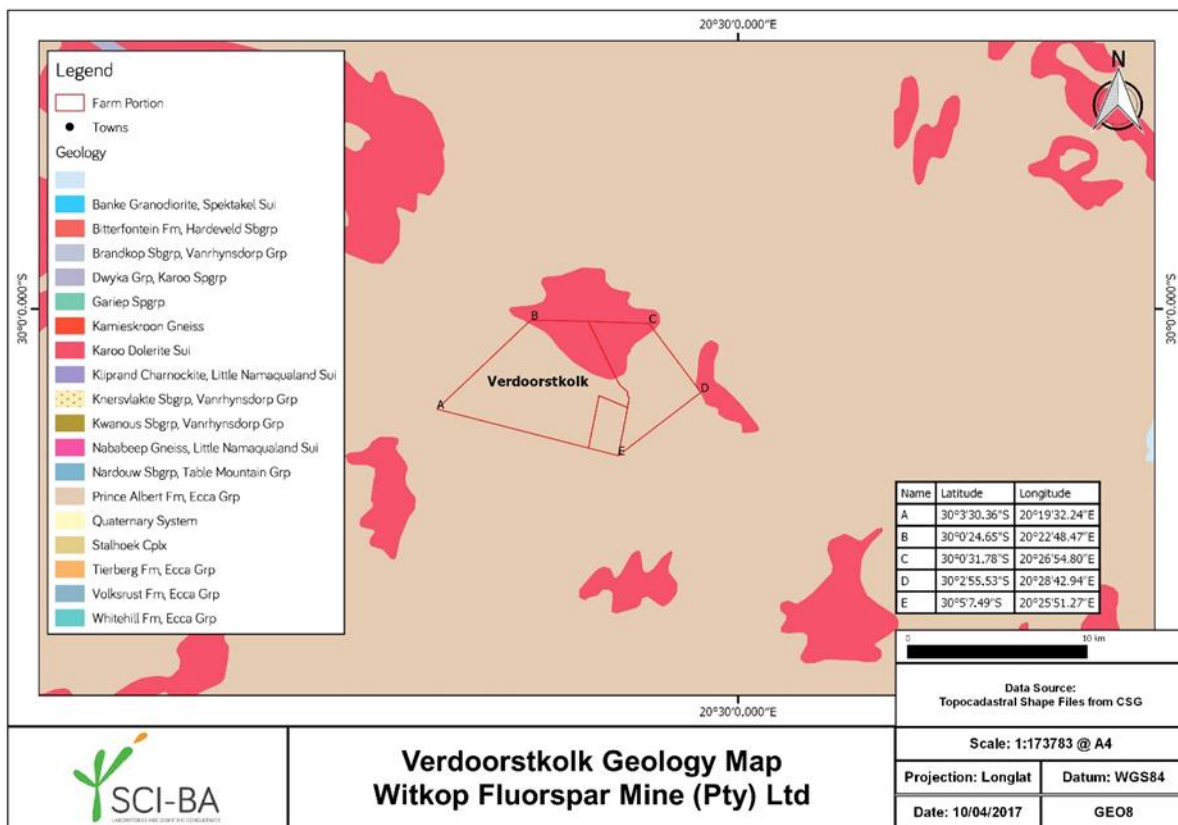


Figure 8: Regional Geology

11.1.2 Landscape Characteristics

The proposed prospecting area is located in the Nama Karoo biome of the Northern Cape Province, and is associated with two nationally defined vegetation types being the Bushmanland Vloere (Azi5) and the Bushmanland Basin Shrubland (NKb6) (Mucina and Rutherford, 2012). According to Mucina and Rutherford the Bushmanland Vloere has an altitude of 850 – 1,450 metres above mean sea level

(mamsl) consistent with Endorheic pans; whilst the Bushmanland Basin Shrubland has an altitude of 8000 – 1,200 mamsl consistent with irregular plains.

The project area can be considered as flat distributed with depressions and intermittent drainage lines.

11.1.3 Climate

The Bushmanland region is characterized by an arid, seasonal climate with a bimodal precipitation regime – i.e. having two rain peaks, one in March and another in November. Overall, the mean annual precipitation (MAP) for the region is around 141 mm, which ranges from 91 mm in western Bushmanland to 306 mm at northern edges of the Roggeveld. Refer to Table 6 below for the average monthly rainfall data as obtained from the weather station 0190868 1 – Brandvlei for the period 1994 -2017.

Mean temperatures range from over 32°C to around zero in January to July where temperatures can have an amplitude (range) of around 25°C in one day. Frost occurrence is frequent in winter months.

The predominant wind direction is from the south west (Figure 9).

Table 6: Monthly Rainfall Data (Source: South African Weather Service)

Month	Ave. rainfall (mm)
January	10.5913
February	16.88182
March	19.22609
April	15.0087
May	5.808696
June	7.582609
July	7.291667
August	4.558333
September	1.891667
October	4.391667
November	6.45
December	17.9913

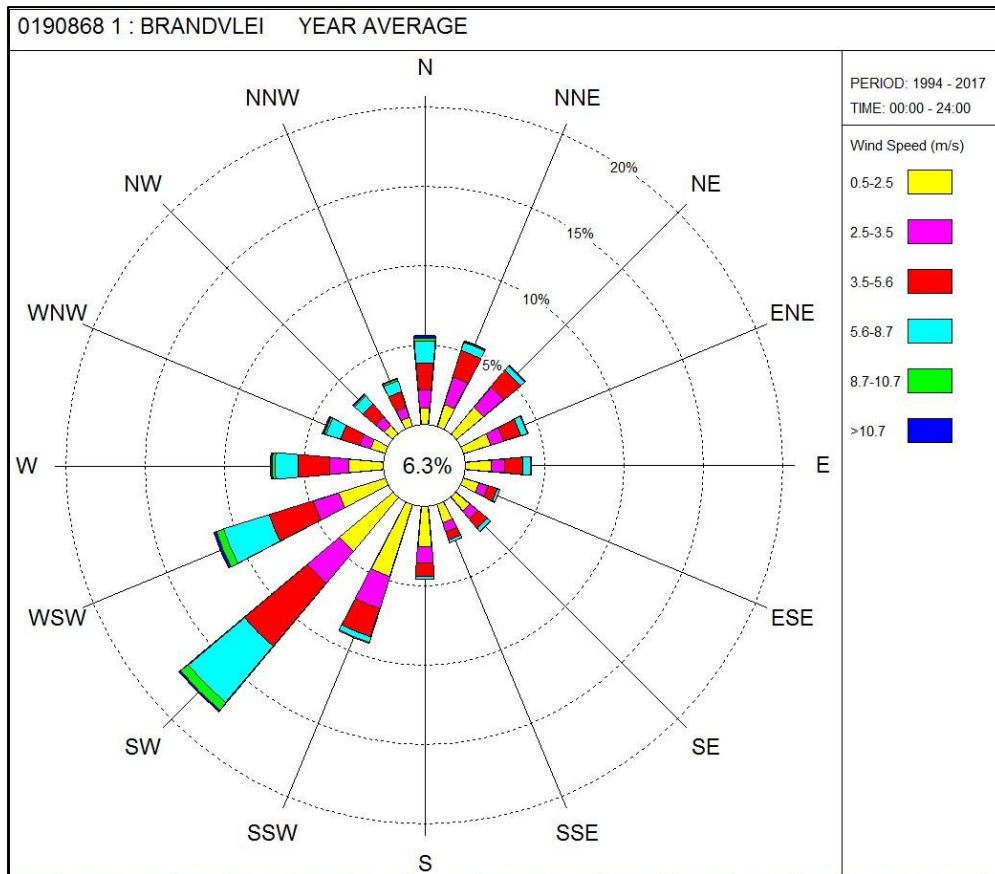


Figure 9: Wind Rose – Brandvlei, Year Average (Source: South African Weather Service)

11.1.4 Hydrology

The project area is located in the Lower Orange Water Management Area (WMA 6) and in the D57D quaternary catchment (Figure 10).

No perennial streams occur within the proposed prospecting area however, a number of drainage lines and a large Endorheic pan have been identified. These Endorheic pans are a common feature in the prospecting area and can be filled in wet summers and in autumn. Given that the pan forms the focus of the prospecting programme, a Water use License Application or General Authorisation will need to be applied for in accordance with Section 21(c) and (i) of the NWA.

11.1.5 Soils

The proposed prospecting right area showed soils with minimal development of the Mispah Soil form. Soil levels ranged from 0 – 300 mm in depth underlying hard or weathering hard rock (Figure 11), with soil deposition evident along the drainage lines. Soil structure varies from Reddish-brown on the Northern section to a yellow-brown on the Southern section of the study area. Dominant Soil Form/ Family are of the Hutton (shallow) and Mispah (80%) soil forms. Gypsum rock outcrops were noted on Western section of the study areas indicating a presence of lime in the area.



Figure 11: Mispah Soil Profile layout



Figure 12: Soil deposition along the drainage channels on the western section of the study area.

Random soil samples were taken with the study area primarily within the footprint of the proposed prospecting programme. One composite sample was sent for analysis at the Agricultural Research Laboratory (ARC) and results are presented in Table 7 below:

Table 7: Soil Chemistry Results

Element	P (mg/kg)	K (mg/kg)	Ca (mg/kg)	Mg (mg/kg)	Na (mg/kg)	pH (water)	Clay%
Value	7.4	900	6800	621	11800	8.54	70

The results showed elevated Potassium, Calcium and Magnesium and Sodium levels within the composite sample. The 70% Clay content is mainly attributed to the pan area as a result of the continued deposition of soil into the pan.

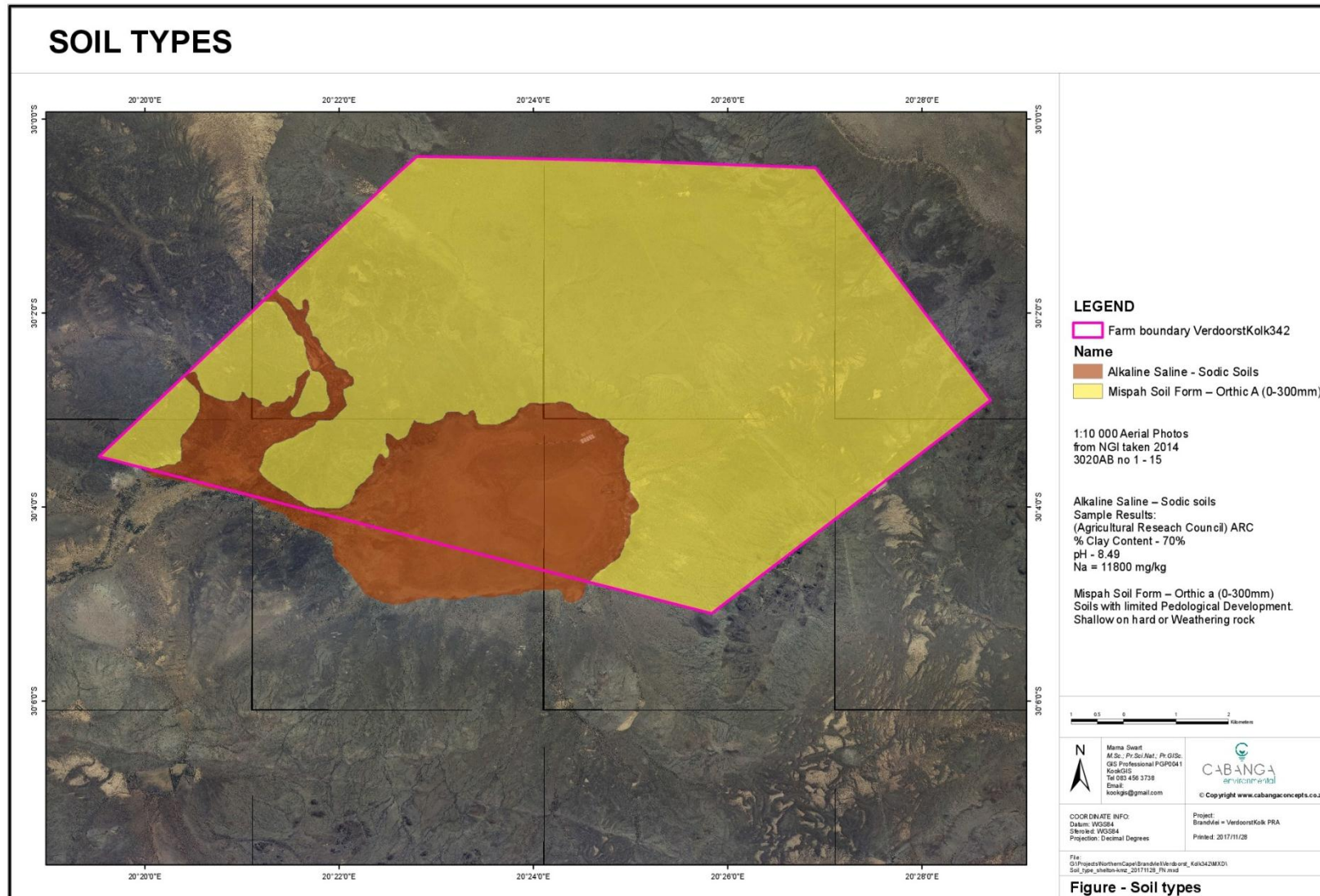


Figure 13: Soil profile layout

11.1.6 Land Capability

The study area falls within Land type Ia16 within land Capability Class VII. The slope ranges from 0 – 2 % (Figure 13). Severe limitations make it unsuitable for cultivation and this restricts the area to grazing, woodlands or wildlife. Restrictions are more severe than those in Class VI because of limitations such as shallow soils (Mispah Soil Form), salts or sodicity and unfavourable climate conditions.



Figure 14: Flat terrains within the study area north of the Pan

11.1.7 Fauna (TBC, 2017)

The sections below are largely extracted from The Biodiversity Assessment, completed in March 2017 (refer to Appendix E for the full report).

Avifauna:

Based on the SAPAB2 database (2017) 87 bird species are expected to occur in the project area. Of the 87 expected bird species:

- Two (2) species are listed as Endangered (EN) on a regional basis;
- Two (2) species are listed as Vulnerable (VU) on a regional basis; and
- Six (6) species are listed as Near Threatened (NT) on a regional basis.

On a global scale, 1 species is listed as EN, 2 as VU and 3 as NT;

Of the 9 bird species of conservation concern, 7 are rated as having a high likelihood of occurrence and 2 as low.

During the site survey conducted in March 2017 a total of 10 bird species (11.5% of expected) were recorded, no bird species of conservation were recorded. The low species diversity is likely attributed to the short duration of the survey.

Mammals:

The IUCN Red List Spatial Data (IUCN, 2017) lists 48 mammal species that could be expected to occur within the project area. Of these, *Diceros bicornis* (Black rhinoceros) and *Ceratotherium simum* (Southern white rhino) are conservation

dependant species that only occur in protected areas such as game reserves. These species were omitted from the expected species list resulting in an expected mammal list of 46 species.

Of the 46 expected mammal species:

- 3 (6.5%) are listed as species of conservation concern either regionally or globally;
- 1 species is listed as CR, 1 as VU and 1 as NT on a regional scale. On a global scale, 1 species is listed as CR and 1 as VU;
- Of the 3 mammal species of conservation concern, 2 are rated as moderate to highly likely to occur in the project area;

The following conclusions were reached based on the results of the field survey:

- Mammal diversity was low. This was attributed to the short duration of the survey and the lack of intensive sampling, trapping etc.;
- No mammal species of conservation concern were observed during the survey however Brown Hyaena (*Parahyaena brunnea*) was confirmed to be present in the project area based on conversations with a local landowner.

Reptiles:

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Reptile Map database provided by the Animal Demography Unit (ADU, 2017) 13 reptile species are expected to occur in the project area. This includes 1 species namely Cape Sand snake (*Psammophis leightoni*) which is listed as VU both on a regional and global scale. Based on the distributional range of this species, which is primarily in the south-western Cape, the likelihood of occurrence of the project area is low.

Only 1 reptile species was observed in the project area during the March 2017 survey, *Trachylepis variegata* (Variegated skin). A further 4 species were confirmed to be present based on conversations with a local landowner, these include *Naja nivea* (Cape cobra), *Bitis arietans arietans* (Puffadder), *Bitis caudalis* (Horned adder) and *Psammophis notostictus* (Karoo sand snake). No reptile species of conservation concern were recorded during the survey.

Amphibian

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Amphibian Map database provided by the Animal Demography Unit (ADU, 2017) 6 amphibian species are expected to occur in the project area. Of these species 1, namely Giant bullfrog (*Pyxicephalus adspersus*) is listed as NT on a regional basis. The likelihood of occurrence of this species in the project area is rated as good.

No amphibian species were recorded during the March 2017 survey. This was attributed primarily to the short duration of the survey, as well as the dry conditions recorded during the survey.

11.1.8 Flora (TBC, 2017)

The proposed prospecting area is located in the Nama Karoo biome of the Northern Cape Province, and is associated with two nationally defined vegetation types being the Bushmanland Vloere (Azi5) and the Bushmanland Basin Shrubland (NKb6) (Mucina and Rutherford, 2012) (see Figure 15). The Vloere of the Northern Cape refer to the ephemeral pans and riverbeds of the Bushmanland basin, which represent the wetland ecosystems of this arid area.

The floristic component and ecology of these Vloere are not well understood as it is the least studied vegetation type in the country where the dominant succulent shrub genus *Salsola* is pending taxonomic revision. However, in general the centre of these pans (or the river drainage channel itself) are usually devoid of vegetation; where loosely patterned scrub are found around it are dominated by *Rhigozum trichotomum* and various species of *Salsola* and *Lycium*, with a mixture of no succulent dwarf shrubs of Nama-Karoo relationship. In places loose thickets of *Parkinsonia africana*, *Lebeckia linearifolia* and *Acacia karoo* can be found (Mucina and Rutherford, 2006).

A survey of the project area was completed in March 2017 by The Biodiversity Company (refer to Appendix E for a copy of the full Biodiversity Assessment). During the site survey vegetation cover was sparse and diversity low. A total of 8 plant species were recorded in the prospecting focus area. No plant species of conservation concern were recorded or are expected to occur.

The alien invasive plant species *Prosopis glandulosa* (Honey mesquite) was recorded around the margin of Verdoorst Kolk. This multi-stemmed acacia-like shrub or small tree has paired, straight spines and reddish-brown branchlets. *Prosopis* trees are listed as Category 3 invasive species in the Northern Cape and are extravagant users of readily available ground-water (Invasives.org, 2017).

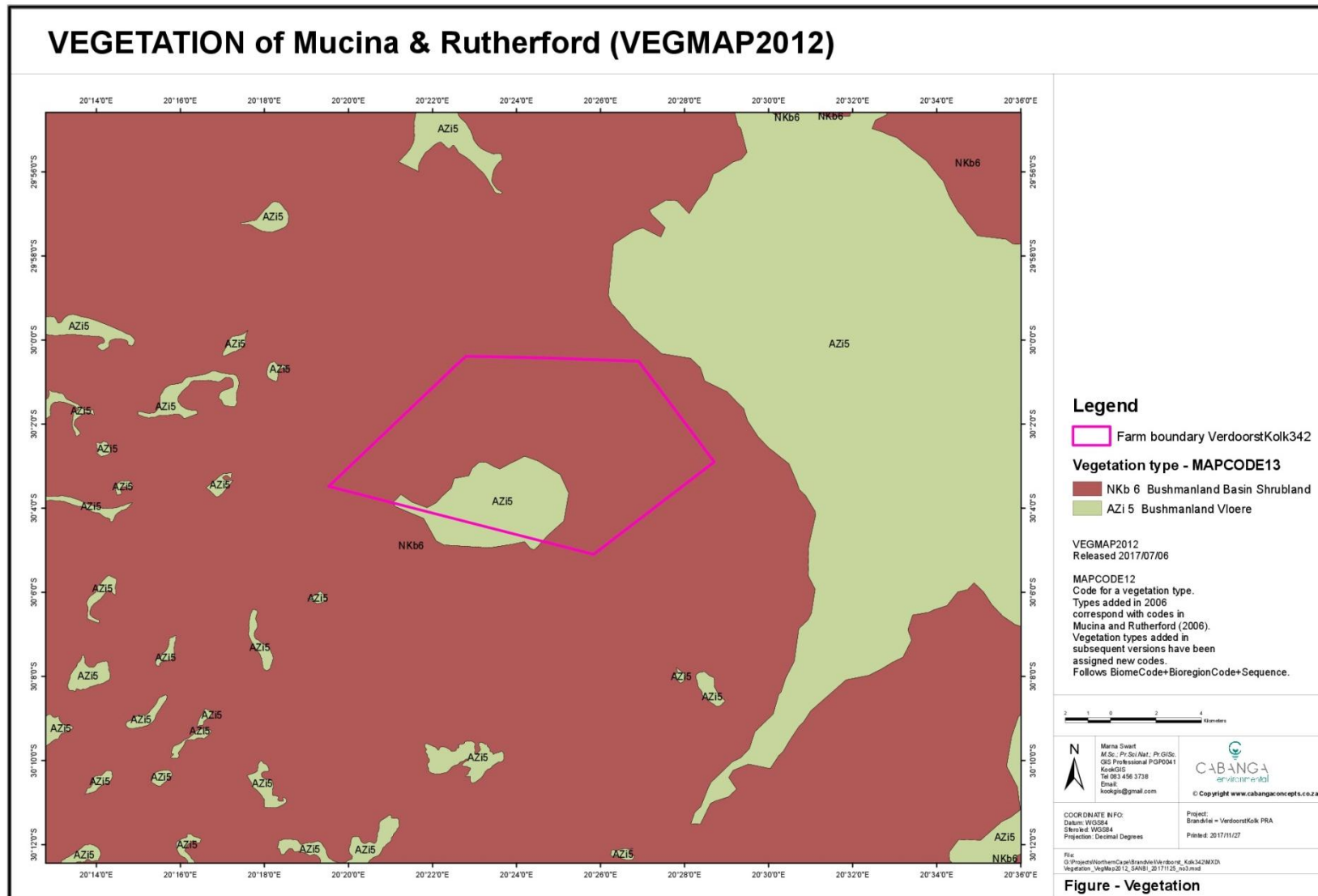


Figure 15: Vegetation Types

11.1.9 Wetlands (Cabanga, 2017)

The National Freshwater Ecosystem Priority Areas (NFEPA) project provides a collated, nationally consistent information source of wetland and river ecosystems for incorporating freshwater ecosystem and biodiversity goals into planning and decision-making processes (Nel, et al., 2011). The spatial layers (FEPA's) include the nationally delineated wetland areas that are classified into Hydrogeomorphic (HGM) types and ranked in terms of their biodiversity importance. This resource was consulted to evaluate the importance of the wetlands identified within the project area.

The pan associated with the study area as well as the drainage depression wetlands leading to it are assessed to be Rank 2 (Figure 16), which indicates that the wetlands are of very high national importance.

The wetland site visit was undertaken on 9th November 2017 to ground-truth the above desktop findings and complete the ecological assessments. The wetland was dry at the time of sampling and has been so for at least five years – these systems are extremely ephemeral (intermittently wet). There are major limitations to completing a wetland assessment in dry conditions; however, by using a combination of detailed desktop review, in-field assessment, input from local land owners and expert opinion, an ecological health assessment can be completed with moderately high confidence.

The nationally determined area of the wetland was found to be accurate; where the pan is ~ 1,582 ha in extent within a catchment of approximately 73,000 ha. In addition, there is a minimum of 800 ha of drainage wetlands found within this catchment draining into the pan, these are classified as valley floor depressions (Figure 17).

The pan was found to be in a near-pristine or natural condition. The main impact to this area is two small old salt works at the eastern edge, which are still somewhat intact despite being abandoned for approximately 10 and 30 years. There are some farm tracks which traverse some areas of this pan and around it; however these are not used very often and the farm occupants do not traverse over any other area of the pan to avoid disturbing the vegetation. No alien invasive species are present within the pan habitat but *Prosopis glandulosa* is present on the edges. Cattle farming occurs on the edge of the pan which will have some small impact on the pan and some evidence of cattle use of the pan was found. It can be concluded that the pan ecosystem struggles to regenerate from any impact due to the extreme climatic conditions; restoration of car tracks may occur during flood events.

The valley floor depression wetlands are in a largely natural condition (PES of B) with mostly intact soils and vegetation; however more land uses have been applied in these areas. The most widespread impact is the invasion of *Prosopis glandulosa*, which is a tree from South America and a declared category 3 invader in the region and thus should be actively removed from natural areas. The valley floor areas have

also been dammed in many areas of which most are abandoned and broken. In some areas there has been agricultural activities which in turn has led to local soil disturbance and alteration of hydrological functioning. Again, most of these areas are not in use and have not been for decades but the scars of the disturbance are very clear due to passive restoration rates of these habitats being extremely slow in this area.

These wetlands as a whole system can be given an area weighted PES of A/B being largely natural. Both wetland units identified on site were determined to have their greatest significance in their Ecological and Biodiversity roles in the ecosystem, with the pan having an Ecological Important and Sensitivity (EIS) of Very High and the drainage valley floor depressions being High. Given that these systems are the only surface expression of water, albeit only in flood conditions, the hydrological and human benefit is also of importance. The valley floor depressions particularly so, in that they drain into and feed the pan and provide damming capabilities.

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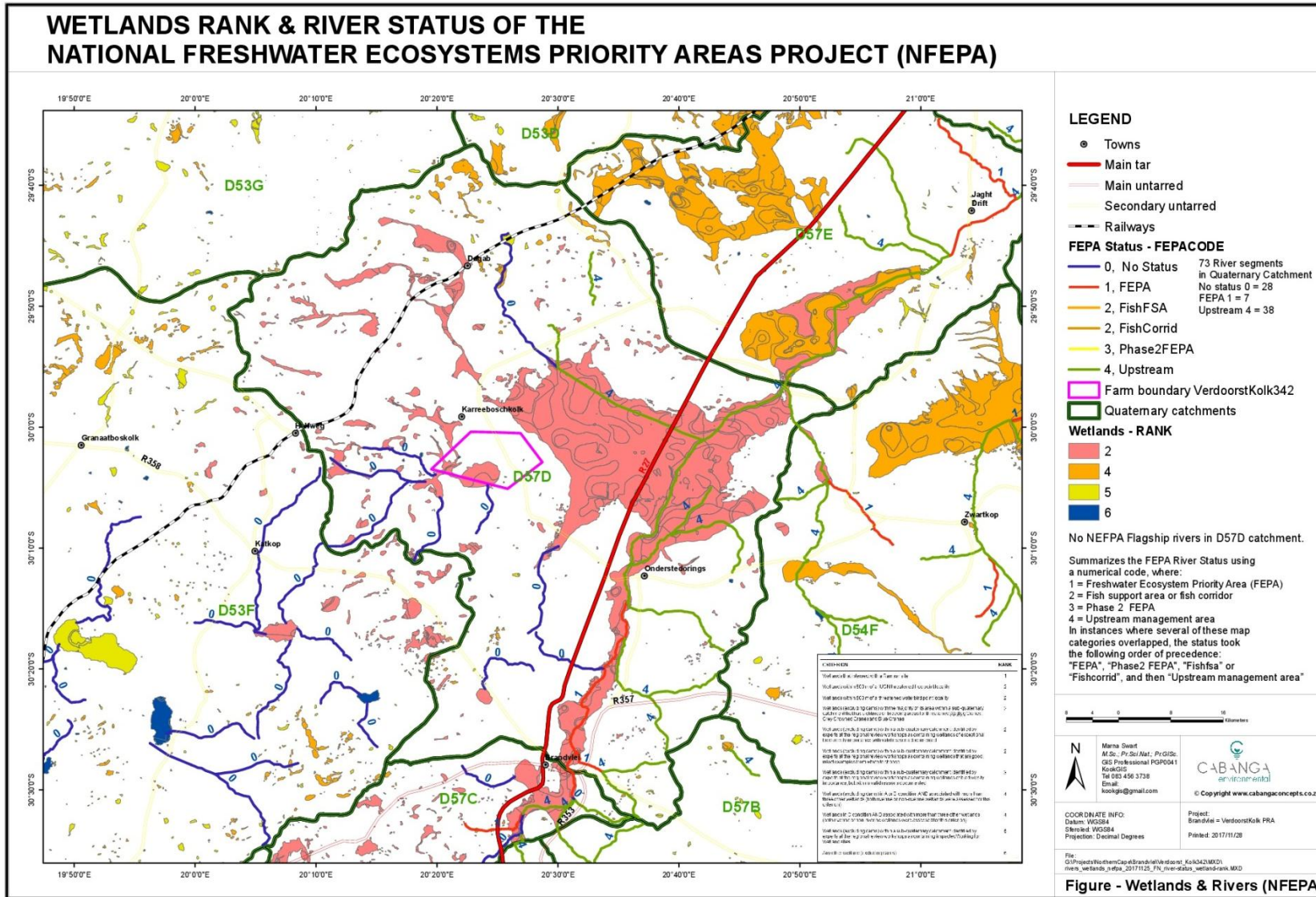


Figure 16: NFEP Wetlands and Rivers

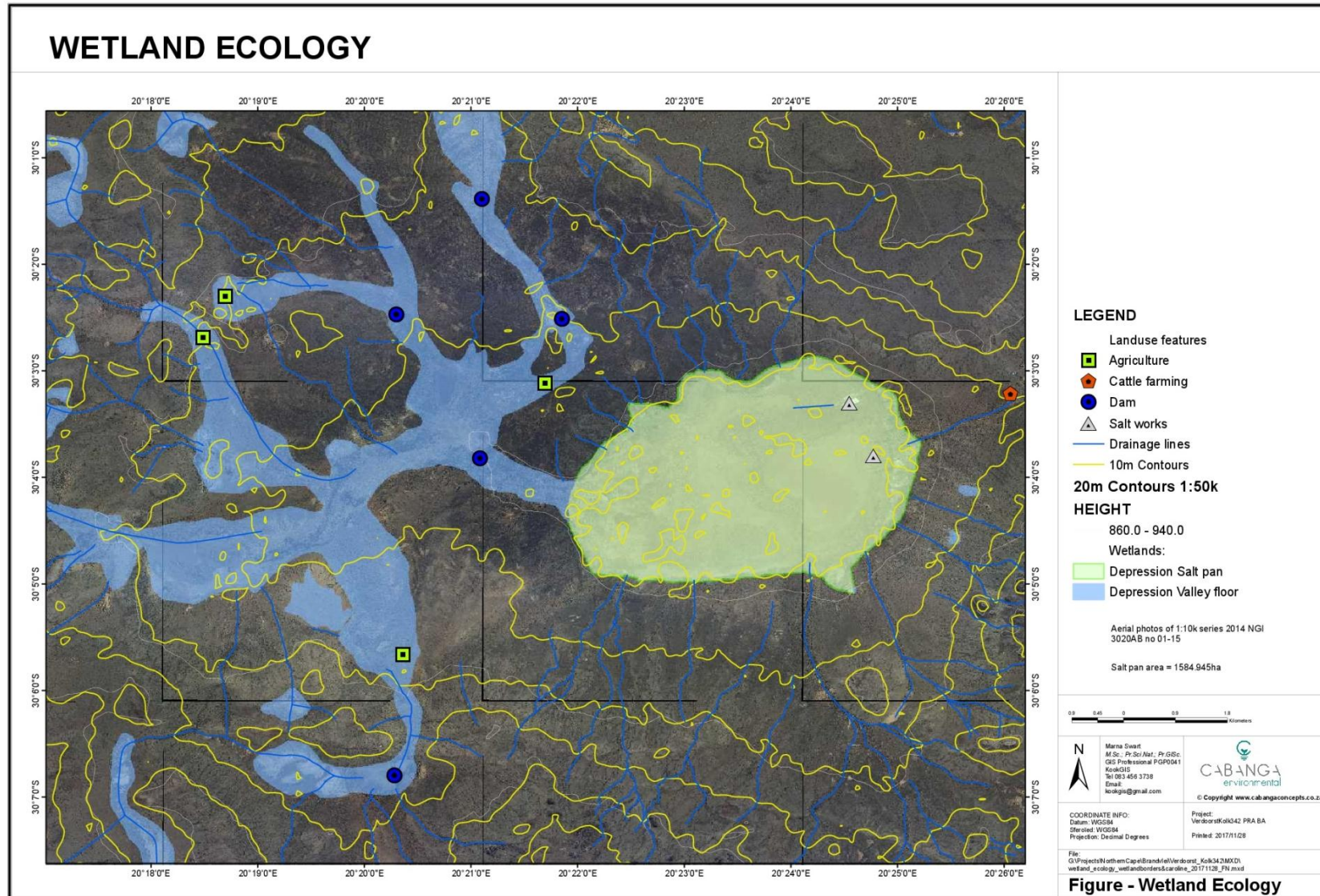


Figure 17: Wetland Delineation and Ecological Setting

11.1.10 Cultural Heritage(Archaetnos, 2017)

Please refer to Appendix G for a copy of the Phase I Cultural and Heritage Impact Assessment. The section below provides a brief summary of the cultural and heritage sites identified within the project area. Noted: None of the sites will be directly impacted on by the drilling programme.

A total of six (6) sites were identified within the proposed prospecting area (Figure 18):

Site 1: Graveyard

This is a fenced in graveyard, consisting of between four (4) to six (6) graves. Three of which have headstones with legible names and dates, being:

- Johannes van Rooyen, 12 September 1888 – 29 December 1954
- Cecilia van Rooyen, born van Niekerk, was Burger, 14 March 1892 – 19 September 1968
- S.C.Burger, 6 May 1891 – 26 December 1925

The fourth grave is stone packed and located just outside the outer fence. The last two 'graves' consist of cement dressing, and communications with the farmer (J.Bothma) indicate that at least one of these was only prepared, but never used.

Graves are always given a rating of high cultural significance due to it being a sensitive matter. Graves with an unknown date are always handled as if older than 60 years. Graves older than 60 years are regarded as heritage graves.

The graves received a field rating of Local Grade IIIB.

Site 2: Graves

This is an unfenced graveyard consisting of at least three stone packed graves. Two of these are smaller and likely represent children's graves. The graves are poorly preserved and no legible information is visible, these graves are therefore considered to be unknown graves and must be handled similar to heritage graves.

The graves received a field rating of Local Grade IIIB.

Site 3: Graves

This is an unfenced graveyard consisting of at least three stone packed graves. Only one has a headstone, but no legible information is visible. Glass and porcelain shards are found in the surrounding area.

The graves are poorly preserved, these graves are therefore considered to be unknown graves and must be handled similar to heritage graves.

The graves received a field rating of Local Grade IIIB.

Site 4: Historical Residential Remains

The site consists of a circle of stones with a diameter of approximately 6m, most likely

the remains of a hut or basis for a temporary shelter. A possible midden was identified approximately 20m from the circle. Material found includes glass, ceramic shards and metal.

These types of sites are reasonably rare and can be considered to have high significance. The field rating is Local Protection III B.

Site 5: Historical Residential Remains

Similar to Site 4, this site consists of a circle of stone, with one side squared to form a wall or threshold. The diameter of the site is approximately 8m.

There are two circles of stones nearby, which may be graves or other cultural feature. Cultural material dating to the late 19th/early 20th century was also identified.

It is most likely a shepherd's hut/camp site used by farmers during the early years before permanent structures were erected. Similar sites have been identified close to Beaufort West.

These types of sites are reasonably rare and can be considered to have high significance. The field rating is Local Protection III B.

Site 6: Graves

This is an unfenced graveyard, consisting of at least four stone packed graves. Two of the graves have slate headstones. Only one of which is partially legible, the following words could be made out or partially made out:

- Geliefde eggenoot SEG Farmer(?) [Loving husband]
- De 25 July in het.....getroud.....July in het jaar.....[the 25th July of the ...married.....July in the year]
- Hy is verreze.....gan weg van haar sicht....gan dat deze dag nis.....[He is risen....go away from her sight....go that this day....] – the latter comes from a Bible text.

The graves are poorly preserved; all four graves are considered to be unknown graves and must be handled similar to heritage graves.

The graves received a field rating of Local Grade IIIB.

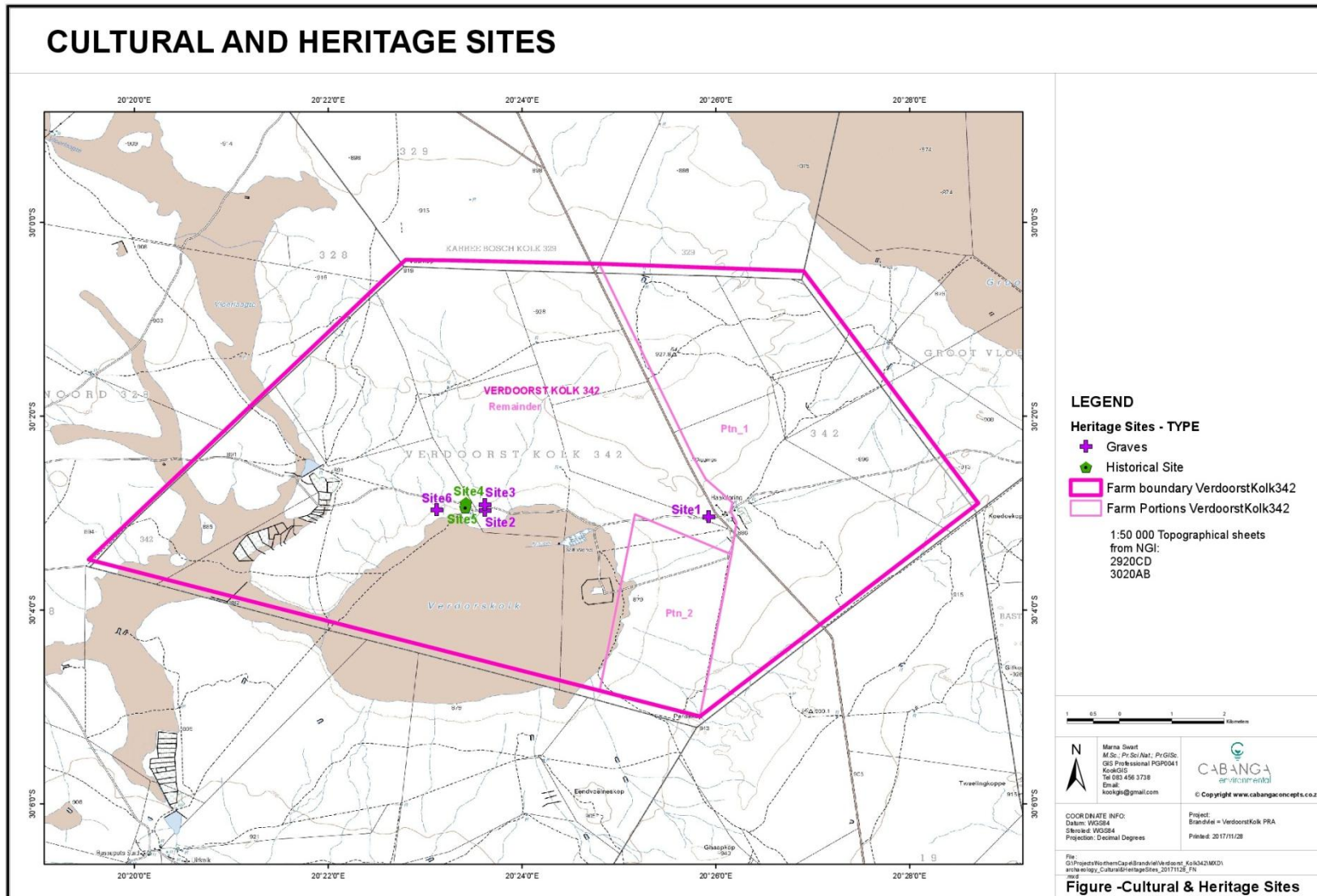


Figure 18: Cultural and Heritage Sites

11.1.11 Palaeontological Setting (Bamford, 2017)

A desktop Paleontological Impact Assessment was completed by Prof. M. Bamford, attached as Appendix H. The findings of which are summarised below.

Diamictites and tillites of the Dwyka Formation represent the retreating glaciers of the Late Carboniferous and do not commonly preserve fossils but there have been reports of vascular plants, trace fossils, organic-walled, microfossils, rare marine invertebrates and fish from the Douglas area far to the east (McLachlan and Anderson, 1973). From the Whitehill Formation Mesosaurus, an early reptile, has only been reported from Namibia, north of Kimberley and near Calvinia (McLachlan and Anderson, 1973; Oelofsen and Araujo, 1987). Whitehill Formation plants are also very rare. The Kalahari Group sediments could preserve Cenozoic fossils but most of it is aeolian, however, there are some pans and springs that trap and preserve fossils, for example Kathu Pan. None has been reported from this area.

The proposed prospecting area is on mudrocks of the Prince Albert Formation which represents suspension settling of muds and turbidites in a marine or deltaic environment. Deltaic deposits with phosphatic and siliceous concentrations are probably the result of chemical or biological processes occurring in a reducing environment (Johnson et al. 2006). Fossils have not been reported from the Prince Albert Formation in this area, and they are extremely rare in this formation elsewhere. Such settings are not good for the preservation of fossils. Dolerite dykes are also present in the proposed area and they would have destroyed any fossils that might have present in their near vicinity.

According to the SAHRIS palaeosensitivity map there is very little chance of finding fossils in this area. A survey of the geological formations and literature confirms this.

11.1.12 Socio-economic

The information below is largely extracted from <http://www.hantam.gov.za/> and http://www.statssa.gov.za/?page_id=993&id=hantam-municipality.

The proposed prospecting area falls within the Hantam Local Municipality of the Namaqwa District Municipality. The Hantam Municipality covers approximately 36,128km² and includes Calvinia (the centre) as well as Brandvlei, Loeriesfontein, Middelpoort and Nieuwoudtville. Farming is the main contributor to the economy, namely sheep, wool, lucerne as well as rooibos tea.

According to Census 2011, Hantam Municipality has a total population of 21 578, with a growth rate of 0.59% (2001-2011). Approximately 82.2% of the population are coloured, 12.1% are white, 4.4% are black African, and 0.7% consists of Indian/Asian. The remainder of the population (0.6%) is made up by other groups. The predominant spoken language is Afrikaans, followed by English and isiXhosa.

Of those aged 20 years and older, 18.8% completed Grade 12, 19.7% have some primary education, 8.4% completed primary education, 30.6% completed some

secondary education, 8,1% have some higher education and only 14,4% had no schooling. The unemployment rate for the Municipality is 11,8%.

There are 6 340 households in the municipality, with an average household size of 3.2 persons per household. Of the households, 59.8% have access to piped (tap) water inside the dwelling/institution, 35.9% have access to piped (tap) water inside the yard and 76.9% have access to electricity for lighting.

11.2 Description of the Current Land Use.

Land use within the study area is limited to grazing, this is mainly as a result of the shallow soil depth, erratic rainfall and high temperatures in summer. Agricultural potential is low within the study area. Grazing Capacity is set at one (1) large stock unit per 50 hectares and one (1) small stock unit per 10 Hectares. Supplementation of feed is necessary to sustain livestock within the area.

Historical salt farming was practiced onsite. Two small, old salt works were noted within the pan's footprint. These have been abandoned for approximately 10 and 30 years.

Other infrastructure on site includes farmsteads, roads and farm dams.

11.3 Description of Specific Environmental Features and Infrastructure on the site.

The project area has been assessed for biodiversity importance at a local, district and provincial scales in the past decade. The plans have mapped areas within the region that have biodiversity importance and must be managed accordingly. These areas have been mapped from a combination of spatial layers resulting in importance as well as from expert opinion and include Critical Biodiversity Areas (CBA's) and Ecological Support Areas (ESA's). These areas must be protected to safeguard their role in maintaining critical ecosystem services.

The Northern Cape Critical Biodiversity Areas was published in 2016 by the Northern Cape Department of Environment and Nature Conservation, which updates and replaces all older systematic biodiversity plans and associated products for the province, such as the Namakwa District Biodiversity Sector Plan (NDBSP, 2008) and the Cape Fine Scale Biodiversity Planning project (Ralston et al., 2009).

The vloere / salt pan and drainage areas (the wetlands) present in the study area was identified as a type 2 Critical Biodiversity Area (CBA2) by expert opinion in the terrestrial assessment (NDBSP, 2008). This area has subsequently been upgraded to CBA1 in the updated Northern Cape plan. Furthermore, much of the surrounding vegetation is mapped as CBA 2 (Figure 19).

The pan is not an aquatic CBA/ESA due to its extreme ephemeral state; despite being a wetland ecosystem.

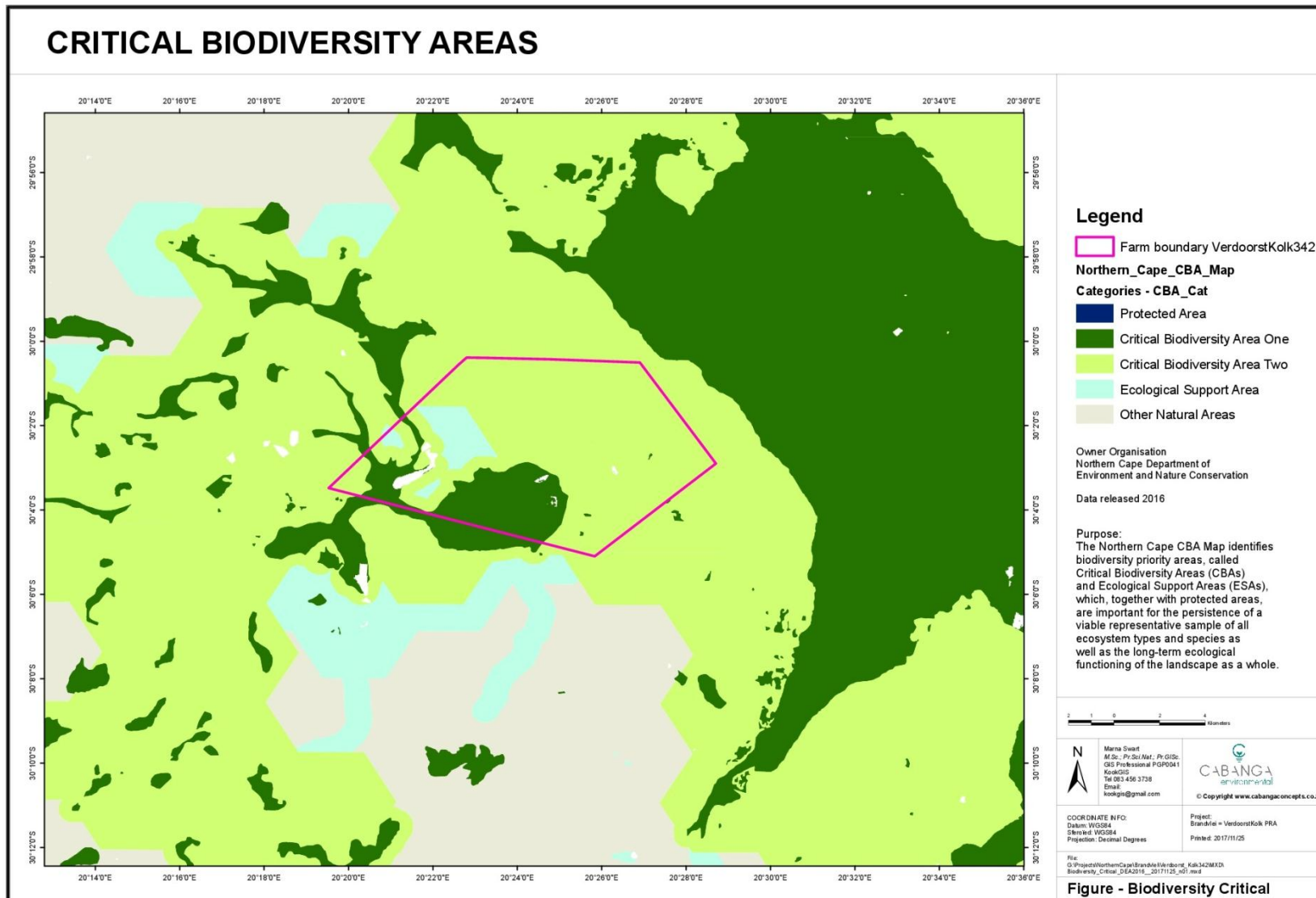


Figure 19: Terrestrial CBAs

11.4 Environmental and Current Land Use Map

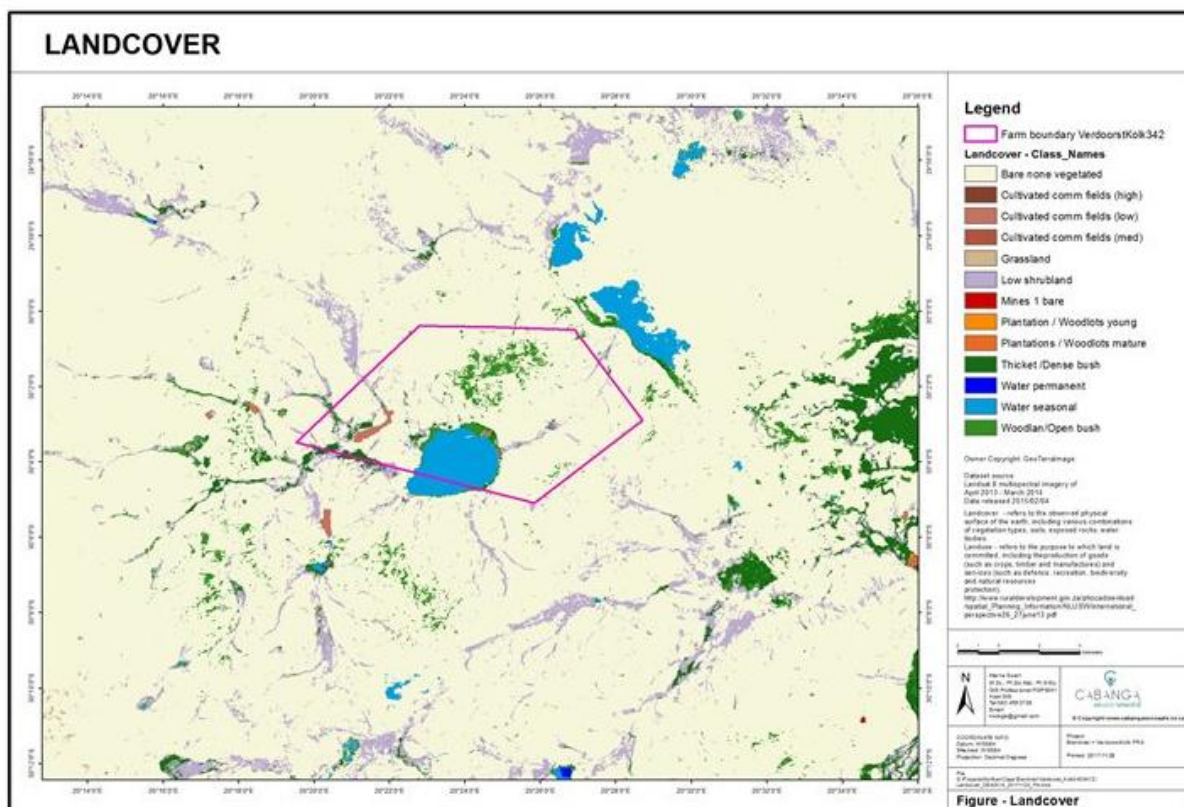


Figure 20: Land Cover

11.5 Impacts and Risks Identified including the Nature, Significance, Consequence, Extent, Duration and Probability of the Impacts

Potential impacts associated with the project were identified, these are summarised in Table 8 below. Please note that a detailed impact assessment matrix has been completed, and is included under Table 9 and details the nature, significance, consequence, extent, duration and probability of the impacts.

Table 8: List of Potential Impacts

Potential Impact	Details	Reversibility
Hydrocarbon contamination of from storage of diesel on site (less than 30m ³).	Damage to soils and surrounding plants and animals will be associated with the spill area. Hydrocarbons are very damaging to natural ecosystems, particularly wetlands.	Reversible only if immediately mitigated.
Contamination of site from ablution facility (chemical portable toilet).	Damage to soils and surrounding plants and animals will be associated with the spill area. Chemicals and sewage are damaging to natural ecosystems, particularly wetlands.	Reversible only if immediately mitigated
Contamination of site from illegal littering and dumping.	Damage to soils and surrounding plants and animals will be associated with illegal dumping and littering in the area.	Reversible with immediate action.
Creation of new tracks, compaction of soils and general disturbance to site through use of vehicles. Note: hyper-arid climate has very slow regeneration rate.	Damage to general site including soils, plants and animals is likely as currently the area is not traversed and is in a largely natural condition.	Reversible with rehabilitation action and over time.
Disturbance to near-pristine and sensitive vegetation and soils across all wetland areas with the driving of TLB and accompanying vehicle. Note areas are of critical biodiversity importance.	Damage to wetland soils and vegetation will be experienced as the site is easily traversable with small plants. These plants will be damaged and will require rain and some time to recover.	Reversible with rehabilitation action and over time.
Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning	Intact wetland soils and deeper materials will be locally damaged by the drilling to 5m. The surrounding plants and animals may also be damaged in the process and will take much longer to regenerate in such an environment.	Irreversible; however rehabilitation is still relevant.

Potential Impact	Details	Reversibility
of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.		
Damage to vegetation and possibly zooplankton egg banks. Natural restoration rate is extremely slow in this system. Note areas are of critical biodiversity importance.	Damage to wetland soils and vegetation will be experienced as the site is easily traversable with small plants. These plants will be damaged and will require rain and some time to recover.	Reversible with rehabilitation action and over time.
Introduction and establishment of alien invasive plant species	Alien and invasive plants are extremely damaging to the natural functioning of ecosystems.	Reversible with immediate and follow-up rehabilitation action.
Loss or displacement of faunal species of conservation concern.	Damage to the fauna of the area is possible including birds, lizards, insects and the zooplankton in the soils.	May be reversible with immediate and follow-up rehabilitation action.
Six sites were identified with high cultural significance. Whilst no sites will be directly impacted on by the proposed borehole locations, secondary impacts to these areas may occur if unmanaged (i.e. as a result of dust etc.).	Damage to heritage sites should not be experienced if mitigation measures are followed.	Reversible with immediate and follow-up rehabilitation action.
Generation of nuisance dust from drilling operations.	Inconvenience to neighbours as a result of nuisance dust liberated by vehicle movement and drilling activities on site.	Reversible.
Nuisance noise generated by the operators and drill rig on site.	Inconvenience to neighbours and possible disturbance of fauna due to noise from	Reversible.

Potential Impact	Details	Reversibility
	equipment, machinery and personnel on site.	
Safety and security risks to landowner / users	Access to site required for prospecting activities. Increased number of unfamiliar people may result in a risk of safety and security to the landowner/user.	Reversible.
Interference with existing land use.	Drilling activities may interfere with the existing land use (grazing).	Reversible.

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11.6 Methodology used in Determining and Ranking the Nature, Significance, Consequences, Extent, Duration and Probability of Potential Environmental Impacts and Risks;

The full methodology utilised is described below. Impact assessment methods were developed to: (1) identify the potential impacts of a proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts. The methodology used by Cabanga is as follows:

The status of the impact		
Status	Description	
Positive:	a benefit to the holistic environment	
Negative:	a cost to the holistic environment	
Neutral:	no cost or benefit	
The duration of the impact		
Score	Duration	Description
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
The extent of the impact		
Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description

1	Slight	Little effect - negligible disturbance/benefit
2	Slight to moderate	Effects observable - environmental impacts reversible with time
3	Moderate	Effects observable - impacts reversible with rehabilitation
4	Moderate to high	Extensive effects - irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration
The probability of the impact		
Score	Rating	Description
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur

Equation 1: Calculation of the Consequence Score for an impact in question

Consequence score

$$= \text{Duration rating} + \text{Extent rating} + \text{Reversibility rating} + \text{Magnitude rating}$$

Equation 2: Calculation of final Impact Significance Score

$$\text{Impact Significance rating} = (\text{Consequence Score}) \times \text{Probability}$$

The rating is described as follows:

Score out of 100	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

11.7 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

No site alternatives were considered, as discussed above. The positive and negative impacts associated with the project have been assessed in Table 9.

11.8 The Possible Mitigation Measures that could be Applied and the Level of Risk

No issues and concerns have been raised as of yet by Interested and Affected Parties.

11.9 Motivation where No Alternative Sites were Considered

With regard to location, the prospecting activities are delimited by the properties available for prospecting (i.e. not held by another company) and the geology of the area. The preliminary positions of the proposed prospecting boreholes have been sited to give a representative sample for the area of interest.

11.10 Statement Motivating the Alternative Development Location within the Overall Site

As mentioned earlier, Gypsum typically forms in the upper region of the weathering profile in salt pans and in shales of the Eccca Group of the Karoo Supergroup. This typically occurs in areas where evaporation rates are high and precipitation rates are low. Thus, the Verdoorst Kolk pan forms the focus area of the prospecting programme as this is where the mineral is most likely to be concentrated.

11.11 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.

Physical, biological and social/cultural impacts were assessed for the proposed project. The steps undertaken to assess these impacts included:

- Project screening and desktop investigations;
- Site surveys and specialist input;
- Public Participation; and
- The assessment and compilation of information by the EAP project team.

Impact identification has therefore been a consolidated approach based on Cabanga's professional experience and specialist input.

Table 9 below details the impact assessment matrix for the project.

11.12 Assessment of Each Identified Potentially Significant Impact and Risk

No construction phase is applicable to Prospecting and rehabilitation of each site will be undertaken concurrently, thus only the Operational Phase is applicable and assessed below. Activities have been assessed in terms of the Primary and Secondary Drilling Programmes.

Table 9: Environmental Impact Assessment Matrix

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Storage of diesel on site; less than 30 m ³ .	Hydrocarbon contamination of near-pristine and highly sensitive environment.	Neg	4	2	5	5	16	4	64 Moderate - High	<p>CONTROL/ PREVENT Diesel storage must be located the outside 100m buffer of all wetlands. Diesel container must not be put in direct contact with soils. Diesel must be removed from site as soon as it is no longer required. Hydrocarbons to be stored within a suitably bunded area in accordance with SABS standards. Taps to bunded areas will remain closed and only opened under controlled circumstances via an oil trap / separator.</p> <p>REMEDY Spill kits must be available onsite and site personnel trained on the use thereof. Area must be monitored for impacts and mitigated as soon as possible. If need be, a soil specialist should be consulted as the soils of the study area are very unique and sensitive. If a spill occurs on wetland soils, great care must be taken to rehabilitate spills as these soils are very sensitive and home to many dormant eggs and seeds that could be greatly damaged by hydrocarbons.</p>	2	1	3	3	9	3	27 Moderate - Low
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Ablution facilities (portable chemical toilets).	Contamination of site from sewage spills or leaks.	Neg	3	1	4	4	12	4	48 Moderate - High	<p>CONTROL/ PREVENT Toilets must be located outside the 100m buffer of all wetlands. Toilet must be removed as soon as it is no longer required. Contracting necessary reputable contractor to manage portable toilets.</p> <p>Toilets to be emptied on a regular basis for treatment at a suitably licensed facility. Proper housekeeping and hygienic practices.</p> <p>REMEDY Inspection and repair / replacement of damaged toilets.</p>	1	1	3	2	7	2	14 Low

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Waste generation	Contamination of site as a result of illegal littering/dumping	Neg	2	1	3	2	8	3	24 Moderate -Low	CONTROL/ PREVENT Environmental awareness training to be provided to all site personnel. Bins to be provided on site. Inspection and immediate action. Proper housekeeping and hygienic practices. REMEDY Clearing all litter and waste.	1	1	3	2	7	2	14 Low
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Driving of TLB and Bakkie around site on existing farm roads but also over vegetation.	Creation of new tracks, compaction of soils and general disturbance to site. Note: hyper-arid climate has very slow regeneration rate.	Neg	4	2	3	3	12	4	48 Moderate	CONTROL/ PREVENT Existing farms roads must be used as far as possible to minimize impact. Activity must be planned to minimize the tracks created across the site. All vehicles must follow the same tracks. REMEDY Rehabilitation of the tracks may be necessary if compaction occurs. A soil specialist should be consulted as the soils of the study area are very unique and sensitive. Monitoring of site to assess rehabilitation success should be done with repeat photography included in the monitoring.	3	1	3	2	9	3	27 Moderate - Low
Wetland Ecology	Primary drilling	Driving of TLB and accompanying vehicle within and around wetlands including the salt pan, drainage wetlands and their buffer areas.	Disturbance to near-pristine and sensitive vegetation and soils across all wetland areas and their buffer areas. Note areas are of critical biodiversity importance.	Neg	3	1	2	3	9	5	45 Moderate	CONTROL/ PREVENT Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible. Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. REMEDY All disturbed areas may need to be rehabilitated after vehicle traversing is complete.	3	1	2	2	8	4	32 Moderate - Low
Wetland Ecology	Primary drilling	Clearing of vegetation and drilling of 50 auger holes to max 5 m depth. Activity includes immediate backfilling and rehabilitation of impact footprint.	Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to	Neg	4	1	2	3	10	5	50 Moderate	CONTROL/ PREVENT Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. Vegetation removal must be over as small an area as possible. Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent	3	1	2	2	8	5	40 Moderate - Low

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)
			the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.									damage to intact crust layer during drilling and replacement of material. REMEDY Auger holes must be backfilled immediately after samples have been taken. Replaced material must be compacted. A small raised mound can be present to allow for settlement of material. Denuded areas to be vegetated with indigenous species.							
Wetland Ecology	Secondary drilling	Driving of TLB and accompanying vehicle in grid pattern within and around wetlands including the salt pan.	Further disturbance to near-pristine and sensitive vegetation and soils across all pan and associated wetland areas. Near-permanent damage to vegetation and possibly zooplankton egg banks. Natural restoration rate is extremely slow in this system. Note areas are of critical biodiversity importance.	Neg	3	1	2	3	9	5	45 Moderate	CONTROL/ PREVENT Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible. Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. REMEDY All disturbed areas may need to be rehabilitated after vehicle traversing is complete. This is to be assessed and soils sampled to test the impact to the area.	3	1	2	2	8	4	32 Moderate - Low
Wetland Ecology	Secondary drilling	Clearing of vegetation and drilling of 200 auger holes to max 5 m depth. Immediate backfilling and rehabilitation of impact footprint.	Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain	Neg	4	1	5	4	14	5	70 Moderate - High	CONTROL/ PREVENT Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. Vegetation removal must be over as small an area as possible. Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent damage to intact crust layer during drilling and replacement of material. REMEDY Auger holes must be backfilled immediately after samples have been taken. Replaced material must be compacted. A small raised mound can be present to allow for	3	1	4	3	11	5	55 Moderate

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	
			water as intact impermeable layers are disturbed.									settlement of material. Denuded areas to be vegetated with indigenous species.								
Biodiversity	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Introduction and establishment of alien invasive plant species	Neg	5	2	3	4	14	4	56 Moderate	<p>CONTROL/ PREVENT Prior to entering the site, all heavy machinery must be thoroughly cleaned and checked to avoid introduction of soil and seeds.</p> <p>REMEDY Concurrent rehabilitation of auger hole sites. Monitoring of site to assess rehabilitation success and to manage introduced alien invasive.</p>	4	2	3	2	11	3	33 Moderate - Low	
Biodiversity	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Loss of displacement of faunal species of conservation concern.	Neg	5	5	5	5	20	4	80 Moderate-High	<p>CONTROL/ PREVENT Prior to vegetation clearing, a detailed faunal survey must be conducted of each proposed prospecting site to assess the presence of faunal species of conservation concern. If any faunal species are present in the project footprint, species specific impact assessments need to be conducted and mitigation measures implemented which may include avoidance. All project staff need to be educated about the potential sensitivity of faunal species on the site. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited. No open fires permitted.</p> <p>REMEDY Rehabilitation of each site is completed after construction. Monitoring of site to assess rehabilitation success.</p>	4	5	3	4	16	2	32 Moderate - Low	
Cultural / Archaeological	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Six sites were identified with high cultural significance. Whilst no sites will be directly impacted by the proposed borehole locations, secondary impacts to these areas may occur if unmanaged.	Neg	5	5	5	4	20	4	80 Moderate-High	<p>CONTROL/ PREVENT All sites be managed in-situ. Sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage. Fencing must be maintained and the sites regularly inspected. Drilling must be limited to demarcated areas.</p> <p>REMEDY Care should be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed. Should any archaeological or cultural artefacts be unearthed, activities must be stopped</p>	1	1	1	2	5	2	10 Low	

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	
												immediately and SAHRA notified.								
Palaeontology	Primary and Secondary drilling	Excavation for the roads and infrastructure would penetrate only a few metres below ground surface so there would be minor deterioration of the surface of sites and a minor impact on any potential fossils. Auger drilling would penetrate deep into the mudrock to the gypsum which is not fossiliferous.	Damage to/loss of fossils	Neg	5	1	5	2	13	1	13 Low	<p>CONTROL/ PREVENT Include photographs of similar fossil plants in the environmental awareness programme, to ensure site personnel are familiar with and able to recognise potential fossils.</p> <p>REMEDY Should any fossils be seen on surface or found during drilling activities, these should be given a cursory inspection by the EO and put aside for safe keeping. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment, following which the palaeontologist should visit the site to inspect the selected material.</p> <p>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 any fossils are removed from the site a SAHRA permit must be obtained.</p>	5	1	3	2	11	1	11 Low	
Soil	Primary and Secondary drilling	Movement of machinery	Soil compaction	Neg	3	1	3	3	10	4	40 Moderate-Low	<p>CONTROL/ PREVENT Minimise operation and machinery movement to stipulated prospecting area/route only.</p> <p>REMEDY Rehabilitation of the tracks may be necessary if compaction occurs. A soil specialist should be consulted as the soils of the study area are very unique and sensitive. Monitoring of site to assess rehabilitation success should be done with repeat photography included in the monitoring. Auger holes to be filled and topsoiled.</p>	2	1	2	1	6	3	18 Low	
Soil	Primary and Secondary drilling	Operation of machinery.	Contamination of soil hydrocarbon spills / leaks.	Neg	1	2	3	4	10	4	40 Moderate-Low	<p>CONTROL/ PREVENT Diesel container must not be put in direct contact with soils. Machinery must not be left on sensitive soils for any longer than required to minimise risk of soil contamination. Maintaining all vehicles, equipment, machinery and equipment Drip trays must be placed under parked vehicles.</p> <p>REMEDY Spill kits must be available onsite and site</p>	1	1	3	2	7	2	14 Low	

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	
												<p>personnel trained on the use thereof. Area must be monitored for impacts and mitigated as soon as possible. If need be, a soil specialist should be consulted as the soils of the study area are very unique and sensitive. If a spill occurs on wetland soils, great care must be taken to rehabilitate spills as these soils are very sensitive and home to many dormant eggs and seeds that could be greatly damaged by hydrocarbons.</p>								
Air quality	Primary and Secondary drilling	Operation and movement of machinery	Generation of nuisance dust.	Neg	2	1	2	1	6	4	24 Moderate -Low	<p>CONTROL/ PREVENT Establish and enforce speed limits on all roads. REMEDY Consider undertaking wet dust suppression during times of high dust generation.</p>	2	1	1	1	5	2	10 Low	
Noise	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Inconvenience to neighbours and possible disturbance of fauna due to noise from equipment, machinery and personnel on site.	Neg	2	1	1	1	5	4	20 Low	<p>CONTROL/ PREVENT Maintaining all vehicles, equipment, machinery and equipment Noise control measures on noisy equipment. Limiting activities to daylight hours. REMEDY Regular communication with nearby I&APs.</p>	2	1	1	1	5	3	15 Low	
Safety & Security	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Access to site required for prospecting activities. Increased number of unfamiliar people may result in a risk of safety and security to the landowner/user.	Neg	2	1	2	2	7	4	28 Moderate -Low	<p>CONTROL/ PREVENT Limit activities to daylight hours. Access to be negotiated with the applicable land owner. REMEDY Farm fences must not be damaged, and gates are to be closed after gaining access. Regular communication with nearby I&APs.</p>	2	1	2	2	7	2	14 Low	
Land Use	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Drilling activities may interfere with the existing land use (grazing).	Neg	2	1	2	2	7	3	21 Moderate -Low	<p>CONTROL/ PREVENT Limit activities to daylight hours. Access to be negotiated with the applicable land owner. REMEDY Farm fences must not be damaged, and gates are to be closed after gaining access. Concurrent rehabilitation of auger hole sites. Monitoring of site to assess rehabilitation success and to manage introduced alien invasive.</p>	2	1	2	1	6	2	12 Low	

Aspect	Phase	Activity	Impact	STATUS	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Duration	Extent	Reversibility	Magnitude	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	
												Environmental awareness training to be provided to all project staff. No open fires permitted. Regular communication with landowner.								

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11.13 Summary of Specialist Reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT 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.
Biodiversity Assessment	<p>Prevent the introduction and establishment of alien invasive species. Prior to any heavy machinery entering the site it must be thoroughly cleaned and checked to avoid seed introduction.</p> <p>Prevent the loss or displacement of faunal species of conservation concern and prevent further reduction of faunal biodiversity.</p> <p>Rehabilitation of each site after construction.</p> <p>Areas that are denuded during prospecting need to be re-vegetated with indigenous vegetation to avoid creating an entry point for alien invasive species.</p> <p>Compilation of and implementation of an alien invasive management plan for the site.</p> <p>Monitoring of site to assess rehabilitation success and to manage introduced alien invasives.</p> <p>Prior to clearing of each site, a detailed faunal survey must be conducted of each</p>	X	The recommendations have been included in the mitigation measures section of Table 9 .

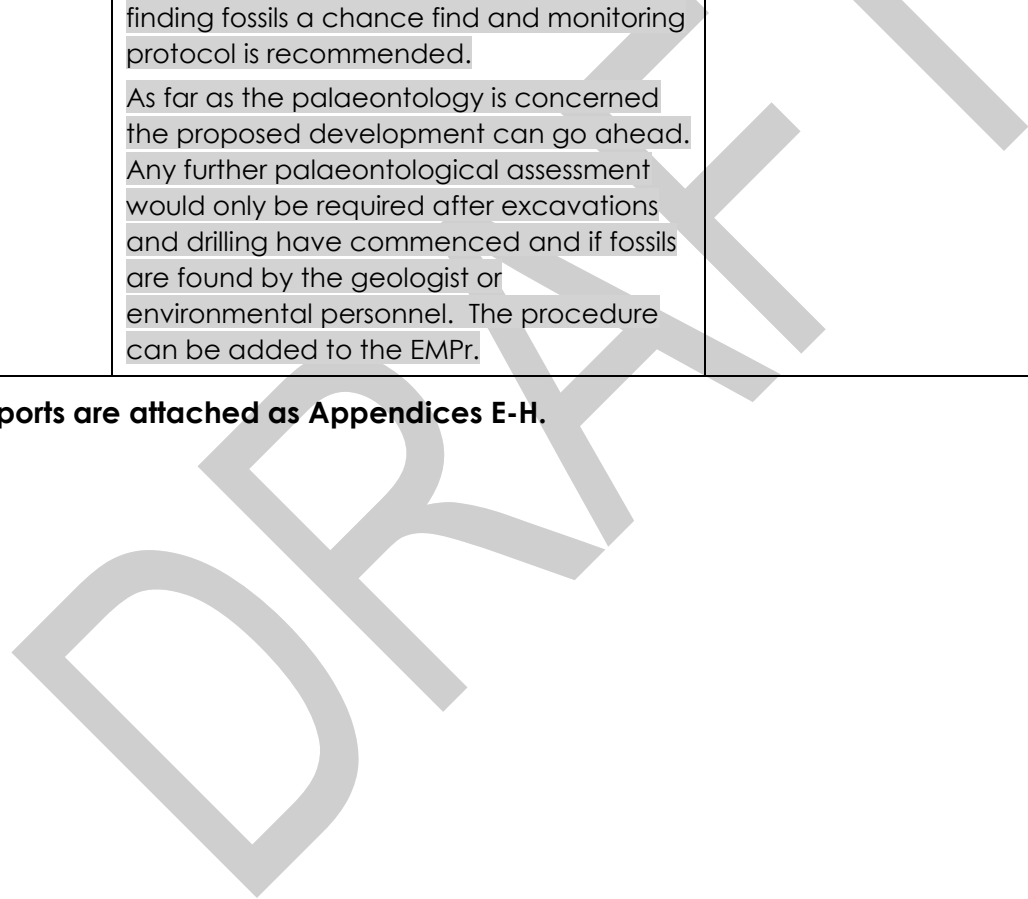
LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	<p>proposed prospecting site to assess the presence of faunal species of conservation concern. If any faunal species are present in the project footprint, species impact assessment need to be conducted and mitigation measures implemented which may include avoidance.</p> <p>All project staff need to be educated about the potential sensitivity of faunal species on site.</p>		
Wetland Ecology Assessment	<p>Activity must be carried out in dry conditions only.</p> <p>Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible.</p> <p>Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated.</p> <p>Wetland specialist and/or environmental officer (EO) must be present to monitor activity and ensure minimal environmental damage.</p>	X	The recommendations have been included in the mitigation measures section of Table 9 .

<p>LIST OF STUDIES UNDERTAKEN</p>	<p>RECOMMENDATIONS OF SPECIALIST REPORTS</p>	<p>SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)</p>	<p>REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.</p>
	<p>Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible.</p> <p>Vegetation removal must be over as small an area as possible.</p> <p>Plastic sheeting can be placed around expected auger hole and soil displacement area on top of top soils to prevent damage to intact crust layer during augering and replacement of material.</p> <p>All disturbed areas may need to be rehabilitated after vehicle traversing is complete. This should be assessed by a soil specialist if necessary.</p> <p>Auger holes must be backfilled immediately after samples have been taken. Replaced material must be compacted. A small raised mound can be present to allow for settlement of material.</p> <p>Monitoring of rehabilitation can occur to understand impact and ensure a no-net loss of wetland ecosystem function occurs.</p>		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT 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.
Archaeological Impact Assessment	<p>Six sites were identified. These are all outside the area of direct impact, but it is possible that a secondary impact may be experienced due to increased traffic and movement on site. Four of these sites (1-3 and 6) are grave sites, and two are residential sites.</p> <p>All sites should be fenced in and managed in-situ.</p> <p>Buffer zone of 20 must be implemented to prevent inadvertent damage.</p> <p>The subterranean presence of archaeological and/or historical sites, features, or artefacts remains a possibility. Care should be taken when development commences and if these are discovered, a qualified archaeologist should be called to investigate the occurrence. In this regard a 'Chance find Procedure' is indicated.</p> <p>Activities may continue after the HIA has been approved by SAHRA.</p>	X	The recommendations have been included in the mitigation measures section of Table 9 .
Palaeontological Impact Assessment	It is unlikely that any fossils occur in the prospecting right area because mostly the rocks are of marine origin or deltaic with turbidites. As there is a small chance of	X	The recommendations have been included in the mitigation measures section

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT 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.
	<p>finding fossils a chance find and monitoring protocol is recommended.</p> <p>As far as the palaeontology is concerned the proposed development can go ahead. Any further palaeontological assessment would only be required after excavations and drilling have commenced and if fossils are found by the geologist or environmental personnel. The procedure can be added to the EMPr.</p>		<p>of Table 9 .</p>

The relevant Specialist Reports are attached as Appendices E-H.



11.14 Environmental impact statement

11.14.1 Summary of the key findings of the environmental impact assessment;

An ephemeral depression wetland known as the Verdoorst Kolk pan and a number of associated drainage wetlands occur within the proposed prospecting area. As the prospecting programme will include auger drilling, impacts will be realised to the surrounding environment. These will require mitigation action and active management.

The environment associated with the Verdoorst Kolk pan is extremely sensitive and, due to the hyper-arid climatic conditions, natural restoration rates are extremely slow. A number of cultural and heritage sites were identified within the prospecting area and these are at risk from secondary impacts. The key impacts to the natural and cultural environment requiring mitigation and management are:

- Compaction of soils;
- Damage to sensitive topsoils;
- Damage to vegetation and disturbance of fauna, especially species of conservation concern;
- Spread of alien and invasive vegetation post-disturbance;
- Damage to seed and egg bank of dormant flora and fauna in top and subsoils;
- Altered local hydrology and geomorphology of intact ancient pan sediments;
- Contamination of soils from hydrocarbon spills and other pollutants; and
- Inadvertent damage to heritage and cultural site.

With proper implementation of the EMP, no post mitigation impacts are expected to exceed a Significance of Moderate-Low.

11.15 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 indicating any areas that should be avoided, including buffers.

The final site map indicating the preliminary location of both the Primary and Secondary drilling programmes is depicted in Figure 21 below.

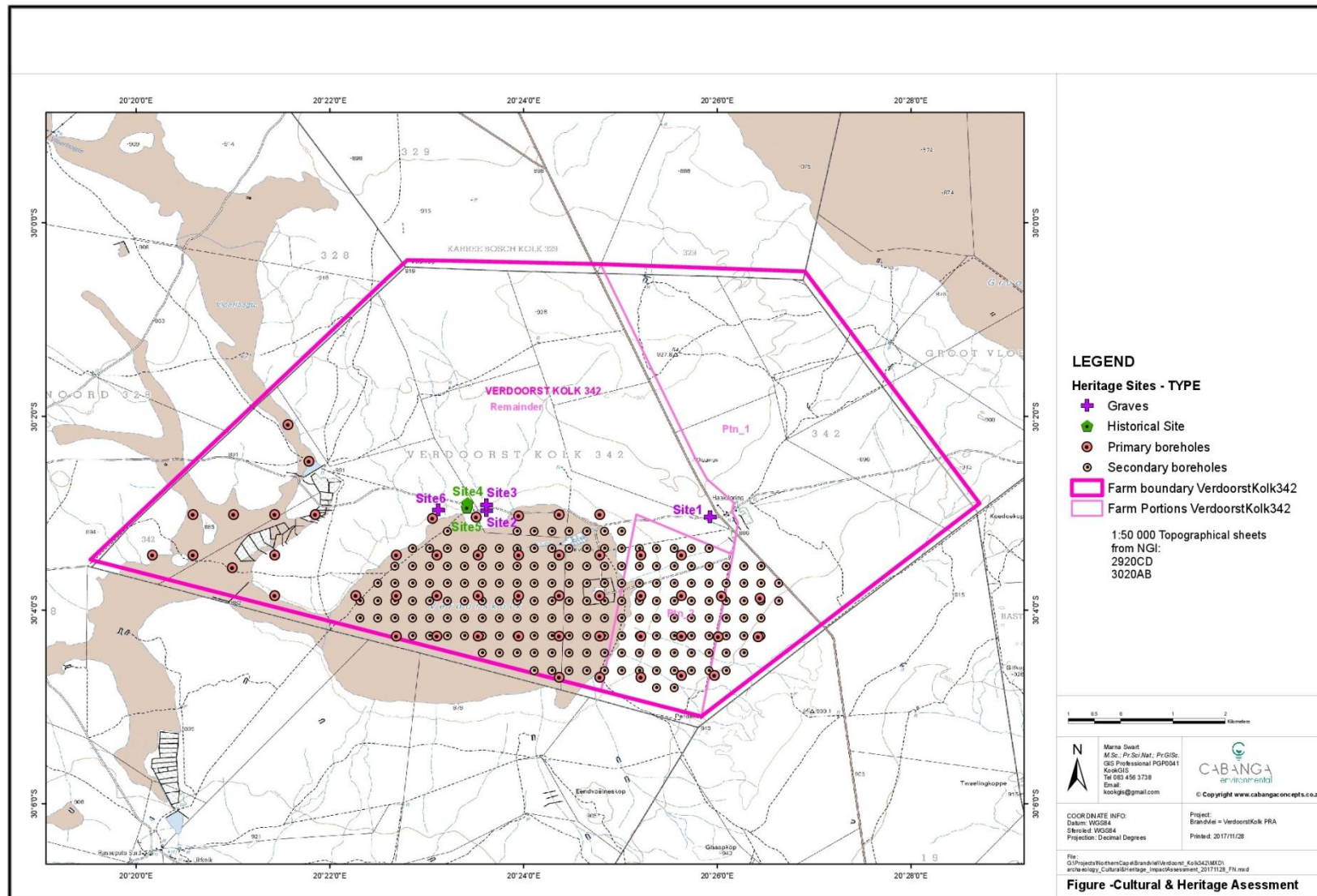


Figure 21: Final Site Map

11.16 Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives

Table 10 below, summarises the impacts associated with the project **post-mitigation**.

Table 10: Summary of Post Mitigation Significance

Aspect	Phase	Activity	Impact	SIGNIFICANCE (post-mitigation)
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Storage of diesel on site; less than 30 m ³ .	Hydrocarbon contamination of near-pristine and highly sensitive environment.	27 Moderate - Low
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Ablution facilities (portable chemical toilets).	Contamination of site from sewage spills or leaks.	14 Low
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Waste generation	Contamination of site as a result of illegal littering/dumping	14 Low
Soils, surface water, groundwater, biodiversity & wetland ecology	Primary and Secondary drilling	Driving of TLB and Bakkie around site on existing farm roads but also over vegetation.	Creation of new tracks, compaction of soils and general disturbance to site. Note: hyper-arid climate has very slow regeneration rate.	27 Moderate - Low

Aspect	Phase	Activity	Impact	SIGNIFICANCE (post-mitigation)
Wetland Ecology	Primary drilling	Driving of TLB and accompanying vehicle within and around wetlands including the salt pan, drainage wetlands and their buffer areas.	Disturbance to near-pristine and sensitive vegetation and soils across all wetland areas and their buffer areas. Note areas are of critical biodiversity importance.	32 Moderate - Low
Wetland Ecology	Primary drilling	Clearing of vegetation and drilling of 50 auger holes to max 5 m depth. Activity includes immediate backfilling and rehabilitation of impact footprint.	Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.	40 Moderate - Low
Wetland Ecology	Secondary drilling	Driving of TLB and accompanying vehicle in grid pattern within and around wetlands including the salt pan.	Further disturbance to near-pristine and sensitive vegetation and soils across all pan and associated wetland areas. Near-permanent damage to vegetation and possibly zooplankton egg banks. Natural restoration rate is extremely slow in this system. Note areas are of critical biodiversity importance.	32 Moderate - Low

Aspect	Phase	Activity	Impact	SIGNIFICANCE (post-mitigation)
Wetland Ecology	Secondary drilling	Clearing of vegetation and drilling of 200 auger holes to max 5 m depth. Immediate backfilling and rehabilitation of impact footprint.	Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.	55 Moderate
Biodiversity	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Introduction and establishment of alien invasive plant species	33 Moderate - Low
Biodiversity	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Loss of displacement of faunal species of conservation concern.	32 Moderate - Low
Cultural / Archaeological	Primary and Secondary drilling	All driving, clearing of vegetation, drilling of auger holes to max 5 m depth, immediate backfilling and rehabilitation of impact footprint.	Six sites were identified with high cultural significance. Whilst no sites will be directly impacted by the proposed borehole locations, secondary impacts to these areas may occur if unmanaged.	10 Low

Aspect	Phase	Activity	Impact	SIGNIFICANCE (post-mitigation)
Palaeontology	Primary and Secondary drilling	Excavation for the roads and infrastructure would penetrate only a few metres below ground surface so there would be minor deterioration of the surface of sites and a minor impact on any potential fossils. Auger drilling would penetrate deep into the mudrock to the gypsum which is not fossiliferous.	Damage to/loss of fossils	11 Low
Soil	Primary and Secondary drilling	Movement of machinery	Soil compaction	18 Low
Soil	Primary and Secondary drilling	Operation of machinery.	Contamination of soil hydrocarbon spills / leaks.	14 Low
Air quality	Primary and Secondary drilling	Operation and movement of machinery	Generation of nuisance dust.	10 Low

Aspect	Phase	Activity	Impact	SIGNIFICANCE (post-mitigation)
Noise	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Inconvenience to neighbours and possible disturbance of fauna due to noise from equipment, machinery and personnel on site.	15 Low
Safety & Security	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Access to site required for prospecting activities. Increased number of unfamiliar people may result in a risk of safety and security to the landowner/user.	14 Low
Land Use	Primary and Secondary drilling	Operation and movement of machinery. Personnel on site.	Drilling activities may interfere with the existing land use (grazing).	12 Low

12 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND OUTCOME FOR INCLUSION IN THE EMP

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts -PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:

- Ensure that mitigation and management measure are effective.
- Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
- Reduce duration of any potential negative impacts.

Environmental impact management outcomes are:

- Conduct prospecting activities responsibly and ensure operation is compliant with legislative requirements.
- Protect the biophysical environment as far as possible, specifically wetlands and riverine areas and any protected species observed on site.
- Protect the water resources in the area as far as possible.
- Ensure adequate rehabilitation to allow continued grazing land use.
- Ensure socially responsible activities.
- Protect historical and cultural sites, including fossils, if they are observed on site.

13 ASPECTS FOR INCLUSION IN THE CONDITIONS OF AUTHORISATION

Granting of the environmental authorisation should be subject to the following conditions:

- Prospecting activities may only commence on approval of the Water Use License and/or General Authorisation to be issued by the Department of Water Affairs with regards to activities within the regulated area of a watercourse (including wetlands).
- A suitably qualified person must be appointed to implement the EMP onsite. Regular inspections and monitoring is required to ensure full compliance with the EMP and other Regulatory requirements.
- Environmental awareness training is to be provided to all site personnel prior to commencement of activities.

14 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The following is a list of assumption, uncertainties and gaps as identified by the various specialist.

Biodiversity:

Due to the limited proposed project footprint (auger drilling) intensive sampling and trapping was not implemented for this study; and

The field survey focussed primarily on the prospecting focus area.

Wetland Ecology:

The method statement received from Witkop at the time of writing the report was assumed to be accurate.

Due to the large extent of the wetland and limited time, the areas where prospecting samples are planned was the focus of the rapid site assessment. The knowledge gained through the site visit was used then to extrapolate for areas not assessed.

A once off rapid site-visit was undertaken on 7th November 2017. At the time of sampling, the pan was completely dry and has been for at least five years due to very low rainfall. These systems are extremely ephemeral in that they only flood in rare high rainfall events in this hyper-arid region. Floral identification was therefore limited due to lack of characteristic features. Furthermore, many floral and faunal species will not be detectable as they will only appear in the presence of water. This significantly limits the biodiversity component of the assessment.

The salt pans within the assessed vegetation type are called Bushmanland vloere according to Mucina and Rutherford (2006), where it is stated that these ecosystems are the least studied habitat type in the country. This lack of knowledge is a significant limitation to this ecological assessment and particularly limits the findings of the risk and impact assessment as their sensitivity are not well documented.

- In order to assist with this, Dr. Betsie Milne, a wetlands ecologist in the Arid Lands Node of the South African Earth Observation Network (SAEON), was consulted for assistance as she is currently heading the national research on these systems.
- The precautionary approach was taken.

Therefore, the overall confidence level of the wetland assessment is Moderate (60%) due to the above.

Palaeontology:

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 basement rocks, dolomites, sandstones, shales, quartzites, basalts and sands and diamictites are typical for the country and do not contain any body fossil material. The sediments the Prince Albert Formation could contain trace fossils, however, they have yet to be recorded from the proposed site for prospecting.

Heritage and Cultural:

The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public.

In this particular case the vegetation under footing was reasonably open and the vegetation varied between medium and low. Accordingly both the horizontal and the vertical archaeological visibility was influenced positively and it was possible to see over a large distance with a diameter of approximately 300 m.

There were however a few areas where the vegetation cover was dense and high and due to the impenetrability thereof it has a negative effect on visibility.

A very large section of the surveyed area consists of a pan. It was dry during the survey and therefore accessed, but is regarded as a low risk area for finding cultural resources due to it being a water body.

Certain areas which are clearly disturbed are also seen as very low risk areas and were therefore not surveyed in detail and sometimes just driven through.

15 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

Based on the impact assessment undertaken and the proposed mitigation measures, it is the opinion of the EAP project team that the project be favourably considered but that mitigation measures should be strictly adhered to.

16 PERIOD FOR WHICH ENVIRONMENTAL AUTHORISATION IS REQUIRED

Prospecting activities are likely to require 2 years, including initial data assessment. The EA is requested for a period of 3 years in the event that additional permits or authorisations may be required once invasive prospecting activities commence.

17 UNDERTAKING

Undertaking at the end of the BA and EMP has been fully completed and signed.

18 FINANCIAL PROVISION

A total of R220,000.00 is required for rehabilitation of the prospecting activities. Please refer to Section 24 for the detailed calculations.

18.1 Explain how the Aforesaid Amount was Derived

The financial provision was calculated based on Witkop's past experience with similar scale projects and the operational costs associated therewith.

The rates utilised are indicated in the table below.

Table 11: Rehabilitation Rates

Description	Rates
General surface rehab (R/ha)	R100 000.00
Sealing of Auger Holes (R/hole)	R350.00
Aftercare (R/ha)	R20 000.00

18.2 Confirm that this Amount can be Provided for from Operating Expenditure

The applicant representative, Dr.J.Erasmus has confirmed that this amount can be provided for from operating expenditure.

19 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

19.1 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:-

19.1.1 Impact on the socio-economic conditions of any directly affected person

No impacts on the socio-economic conditions of any directly affected persons are currently foreseen as a result of the Prospecting Programme. Prospecting is limited to auger drilling; and thus the current land use of the properties in question will remain unchanged and can continue concurrent with the prospecting activities.

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

A Phase I Heritage Impact Assessment, as well as desktop Paleontological Impact Assessment, was completed for the proposed activities. Please refer to Appendices G and H.

Six Heritage and Cultural Sites were identified on site; these are not expected to be directly impacted on by the Prospecting Programme however mitigation measures have been proposed to prevent any inadvertent damage and limit the possibility of any secondary impacts. These include fencing all sites off, and implementing a 50m buffer.

The desktop palaeontological study indicates that it is unlikely that any fossils occur in the prospecting right area. However, a chance find protocol and monitoring programme has been included in the EMP in the event any fossils are unearthed.

19.1.3 Other matters required in terms of sections 24(4)(a) and (b) of the Act.

Section 24(4)(b)(i) of the Act specifies “investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity”

This has been addressed in the Part A: Section 9 above. As stipulated, the site is delimited by the prospecting rights area and the extent of the resource.

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PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

20 DETAILS OF THE EAP

The requirement for the provision of the details and expertise of the EAP are included in Part A, Section 2.3 herein and Appendix B as required.

21 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is included in Part A, Section 5 herein as required.

22 COMPOSITE MAP

Please refer to Part A, Figure 21 herein. Also refer to Appendix A for A3 format.

23 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

23.1 Determination of Closure Objectives

The closure objectives are:

- Ensure rehabilitated areas are physically stable and free draining;
- Ensure the functionality of the environment as well as the current land use is not adversely affected; and
- To ensure that alien invasive establishment and spread on areas disturbed by prospecting is prevented and controlled.
- Eliminate safety threats to animals and humans.

23.2 Volumes and Rate of Water Use Required for the Operation

No processing water requirements.

Water will be brought onto site for potable use, this is estimated at 5 litres per person/day.

23.3 Has a Water Use Licence has been Applied For

As the prospecting programme will directly impact a water resource, a Water Use License or General Authorisation is required in terms of Section 21(c) and (i) of the NWA. No application has been submitted as of yet however, the DWS has been notified as per the Regulations regarding the procedural requirements for water use license applications.

23.4 Impacts to be Mitigated in their Respective Phases

Table 12: Measures to rehabilitate the environment affected by undertaking the listed activity

Activity	Size and Scale	Mitigation	Compliance with Standards	Time Period for Implementation
Diesel Storage	Volumes below 30m ³ – area 125m ²	<p>CONTROL/ PREVENT</p> <p>Diesel storage must be located the outside 100m buffer of all wetlands. Diesel container must not be put in direct contact with soils. Diesel must be removed from site as soon as it is no longer required. Hydrocarbons to be stored within a suitably bunded area in accordance with SABS standards. Taps to bunded areas will remain closed and only opened under controlled circumstances via an oil trap / separator.</p> <p>REMEDY</p> <p>Spill kits must be available onsite and site personnel trained on the use thereof. Area must be monitored for impacts and mitigated as soon as possible. If need be, a soil specialist should be consulted as the soils of the study area are very unique and sensitive. If a spill occurs on wetland soils, great care must be taken to rehabilitate spills as these soils are very sensitive and home to many dormant eggs and seeds that could be greatly damaged by hydrocarbons.</p>	<p>Compliance with duty of care as per NEMA & NWA Compliance GN704 of the NWA</p>	Primary and Secondary Drilling
Ablution facilities (portable chemical toilets).	10m ²	<p>CONTROL/ PREVENT</p> <p>Toilets must be located outside the 100m buffer of all wetlands. Toilet must be removed as soon as it is no longer required. Contracting necessary reputable contractor to manage portable toilets. Toilets to be emptied on a regular basis for treatment at a suitably licensed facility. Proper housekeeping and hygienic practices.</p> <p>REMEDY</p> <p>Inspection and repair / replacement of damaged toilets.</p>	<p>Compliance with duty of care as per NEMA & NWA Compliance GN704 of the NWA</p>	Primary and Secondary Drilling
Waste Management	-	<p>CONTROL/ PREVENT</p> <p>Environmental awareness training to be provided to all site personnel. Bins to be provided on site. Inspection and immediate action. Proper housekeeping and hygienic practices.</p> <p>REMEDY</p> <p>Clearing all litter and waste.</p>	<p>Compliance with duty of care as per NEMA & NWA Compliance with NEM:WA</p>	Primary and Secondary Drilling

Activity	Size and Scale	Mitigation	Compliance with Standards	Time Period for Implementation
Access Routes.	3m wide x 1,008m length = 3,024 m ²	<p>CONTROL/ PREVENT</p> <p>Existing farms roads must be used as far as possible to minimize impact. Activity must be planned to minimize the tracks created across the site. All vehicles must follow the same tracks. Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible. Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. Prior to entering the site, all heavy machinery must be thoroughly cleaned and checked to avoid introduction of soil and seeds. All heritage sites to be managed in-situ. Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage. Fencing must be maintained and the sites regularly inspected. Implement and enforce speed limits. Noise control measures on noisy equipment. Limiting activities to daylight hours. Access to be negotiated with the applicable land owner. Farm fences must not be damaged, and gates are to be closed after gaining access</p> <p>REMEDY</p> <p>Rehabilitation of the tracks may be necessary if compaction occurs. A soil specialist should be consulted as the soils of the study area are very unique and sensitive. Monitoring of site to assess rehabilitation success should be done with repeat photography included in the monitoring. Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed. Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified. Should any fossils be seen on surface or found during drilling activities 'the chance find protocol as detailed in Appendix H must be followed. Before any fossils are removed from the site a SAHRA permit must be obtained. Undertaking wet dust suppression during times of high dust generation.</p>	Compliance with duty of care as per NEMA & NWA Compliance with NEM:BA Compliance with the NHRA Compliance with dust Regulations as per the NEM:AQA	Primary and Secondary Drilling
Clearing of vegetation and drilling of auger holes to max 5 m depth. Activity includes immediate backfilling and rehabilitation of impact footprint.	0,625 Ha	<p>CONTROL/ PREVENT</p> <p>Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible. Vegetation removal must be over as small an area as possible.</p>	Compliance with duty of care as per NEMA & NWA Compliance with	Primary and Secondary Drilling

Activity	Size and Scale	Mitigation	Compliance with Standards	Time Period for Implementation
		<p>Prior to vegetation clearing, a detailed faunal survey must be conducted of each proposed prospecting site to assess the presence of faunal species of conservation concern. If any faunal species are present in the project footprint, species specific impact assessments need to be conducted and mitigation measures implemented which may include avoidance.</p> <p>All project staff need to be educated about the potential sensitivity of faunal species on the site. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited. No open fires permitted.</p> <p>Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage.</p> <p>Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent damage to intact crust layer during drilling and replacement of material.</p> <p>All heritage sites to be managed in-situ.</p> <p>Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage.</p> <p>Fencing must be maintained and the sites regularly inspected.</p> <p>Machinery must not be left on sensitive soils for any longer than required to minimise risk of soil contamination.</p> <p>Maintaining all vehicles, equipment, machinery and equipment.</p> <p>Drip trays must be placed under parked vehicles.</p> <p>Noise control measures on noisy equipment.</p> <p>Limiting activities to daylight hours.</p> <p>REMEDY</p> <p>Auger holes must be backfilled immediately after samples have been taken.</p> <p>Replaced material must be compacted.</p> <p>A small raised mound can be present to allow for settlement of material.</p> <p>Denuded areas to be vegetated with indigenous species.</p> <p>Monitoring of site to assess rehabilitation success.</p> <p>Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed.</p> <p>Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified.</p> <p>Should any fossils be seen on surface or found during drilling activities 'the chance find protocol as detailed in Appendix H must be followed.</p> <p>Before any fossils are removed from the site a SAHRA permit must be obtained.</p> <p>Spill kits must be available onsite and site personnel trained on the use thereof.</p> <p>Regular communication with nearby I&APs.</p>	<p>NEM:BA</p> <p>Compliance with the NHRA</p> <p>Compliance with dust Regulations as per the NEM:AQA</p>	

23.5 Impact Management Outcomes

Table 13: Description of the impact management outcomes

Activity	Potential Impacts	Phase	Aspects Affected	Mitigation Type	Standard to be achieved
Diesel Storage	Hydrocarbon contamination of near-pristine and highly sensitive environment.	Primary and Secondary Drilling	Soils, surface water, groundwater, biodiversity & wetland ecology	<p>CONTROL/ PREVENT</p> <p>Diesel storage must be located the outside 100m buffer of all wetlands.</p> <p>Diesel container must not be put in direct contact with soils.</p> <p>Diesel must be removed from site as soon as it is no longer required.</p> <p>Hydrocarbons to be stored within a suitably bunded area in accordance with SABS standards. Taps to bunded areas will remain closed and only opened under controlled circumstances via an oil trap / separator.</p> <p>REMEDY</p> <p>Spill kits must be available onsite and site personnel trained on the use thereof.</p> <p>Area must be monitored for impacts and mitigated as soon as possible.</p> <p>If need be, a soil specialist should be consulted as the soils of the study area are very unique and sensitive. If a spill occurs on wetland soils, great care must be taken to rehabilitate spills as these soils are very sensitive and home to many dormant eggs and seeds that could be greatly damaged by hydrocarbons.</p>	Prevent the contamination of soils and sensitive environments.
Ablution facilities (portable chemical toilets).	Contamination of site from sewage spills or leaks.	Primary and Secondary Drilling	Soils, surface water, groundwater, biodiversity & wetland ecology	<p>CONTROL/ PREVENT</p> <p>Toilets must be located outside the 100m buffer of all wetlands.</p> <p>Toilet must be removed as soon as it is no longer required.</p> <p>Contracting necessary reputable contractor to manage portable toilets.</p> <p>Toilets to be emptied on a regular basis for treatment at a suitably licensed facility.</p> <p>Proper housekeeping and hygienic practices.</p> <p>REMEDY</p> <p>Inspection and repair / replacement of damaged toilets.</p>	Prevent the contamination of soils and sensitive environments. Reduced bacterial contamination and associated health effects on neighbouring areas.

Activity	Potential Impacts	Phase	Aspects Affected	Mitigation Type	Standard to be achieved
Waste Management	Contamination of site as a result of illegal littering/dumping	Primary and Secondary Drilling	Soils, surface water, groundwater, biodiversity & wetland ecology	<p>CONTROL/ PREVENT</p> <p>Environmental awareness training to be provided to all site personnel. Bins to be provided on site. Inspection and immediate action. Proper housekeeping and hygienic practices.</p> <p>REMEDY</p> <p>Clearing all litter and waste.</p>	Prevent the contamination of soils and sensitive environments. Attain "cradle to grave" management of waste on site.
Access Routes.	Disturbance to near-pristine and sensitive vegetation and soils across all wetland areas and their buffer areas. Note areas are of critical biodiversity importance.	Primary and Secondary Drilling	Soils, biodiversity & wetland ecology	<p>CONTROL/ PREVENT</p> <p>Existing farms roads must be used as far as possible to minimize impact. Activity must be planned to minimize the tracks created across the site. All vehicles must follow the same tracks. Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible. Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. Prior to entering the site, all heavy machinery must be thoroughly cleaned and checked to avoid introduction of soil and seeds. All heritage sites to be managed in-situ. Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage. Fencing must be maintained and the sites regularly inspected. Implement and enforce speed limits. Noise control measures on noisy equipment. Limiting activities to daylight hours. Access to be negotiated with the applicable land owner. Farm fences must not be damaged, and gates are to</p>	Reduce compaction of soil. Vehicles, machinery and equipment maintained within operational specification and legislative requirements. Prevent disturbance to sensitive fauna and flora. Limit disturbance to the wetlands and maintain the current PES. Keep the environmental disturbance to a minimum, and successfully rehabilitate any disturbed areas Prevent the encroachment of alien invasive species. Preservation of heritage sites. Reduce safety risks to land owner and user. Limit nuisance noise and dust generation. Maintain existing land use (grazing) and limit disturbance to cattle as far as possible.

Activity	Potential Impacts	Phase	Aspects Affected	Mitigation Type	Standard to be achieved
				<p>be closed after gaining access</p> <p>REMEDY Rehabilitation of the tracks may be necessary if compaction occurs. A soil specialist should be consulted as the soils of the study area are very unique and sensitive. Monitoring of site to assess rehabilitation success should be done with repeat photography included in the monitoring. Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed. Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified. Should any fossils be seen on surface or found during drilling activities 'the chance find protocol as detailed in Appendix H must be followed. Before any fossils are removed from the site a SAHRA permit must be obtained. Undertaking wet dust suppression during times of high dust generation.</p>	
<p>Clearing of vegetation and drilling of auger holes to max 5 m depth. Activity includes immediate backfilling and rehabilitation of impact footprint.</p>	<p>Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.</p>	<p>Primary and Secondary Drilling</p>	<p>Soils, biodiversity & wetland ecology</p>	<p>CONTROL/ PREVENT Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible. Vegetation removal must be over as small an area as possible. Prior to vegetation clearing, a detailed faunal survey must be conducted of each proposed prospecting site to assess the presence of faunal species of conservation concern. If any faunal species are present in the project footprint, species specific impact assessments need to be conducted and mitigation measures implemented which may include avoidance. All project staff need to be educated about the potential sensitivity of faunal species on the site. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited. No open fires permitted.</p>	<p>Reduce compaction of soil. Prevent disturbance to sensitive fauna and flora. Limit disturbance to the wetlands and maintain the current PES. Keep the environmental disturbance to a minimum, and successfully rehabilitate any disturbed areas Prevent the encroachment of alien invasive species. Preservation of heritage sites. Reduce safety risks to land</p>

Activity	Potential Impacts	Phase	Aspects Affected	Mitigation Type	Standard to be achieved
				<p>Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage.</p> <p>Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent damage to intact crust layer during drilling and replacement of material.</p> <p>All heritage sites to be managed in-situ.</p> <p>Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage.</p> <p>Fencing must be maintained and the sites regularly inspected.</p> <p>Machinery must not be left on sensitive soils for any longer than required to minimise risk of soil contamination.</p> <p>Maintaining all vehicles, equipment, machinery and equipment.</p> <p>Drip trays must be placed under parked vehicles.</p> <p>Noise control measures on noisy equipment.</p> <p>Limiting activities to daylight hours.</p> <p>REMEDY</p> <p>Auger holes must be backfilled immediately after samples have been taken.</p> <p>Replaced material must be compacted.</p> <p>A small raised mound can be present to allow for settlement of material.</p> <p>Denuded areas to be vegetated with indigenous species.</p> <p>Monitoring of site to assess rehabilitation success.</p> <p>Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed.</p> <p>Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified.</p> <p>Should any fossils be seen on surface or found during drilling activities 'the chance find protocol as detailed</p>	<p>owner and user.</p> <p>Limit nuisance noise and dust generation.</p> <p>Maintain existing land use (grazing) and limit disturbance to cattle as far as possible.</p>

Activity	Potential Impacts	Phase	Aspects Affected	Mitigation Type	Standard to be achieved
				in Appendix H must be followed. Before any fossils are removed from the site a SAHRA permit must be obtained. Spill kits must be available onsite and site personnel trained on the use thereof. Regular communication with nearby I&APs.	

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23.6 Impact Management Actions

Table 14: Description of the impact management actions

Activity	Potential Impacts	Mitigation	Time Period for Implementation	Compliance with Standards
Diesel Storage	Hydrocarbon contamination of near-pristine and highly sensitive environment.	<p>CONTROL/ PREVENT</p> <p>Diesel storage must be located the outside 100m buffer of all wetlands.</p> <p>Diesel container must not be put in direct contact with soils.</p> <p>Diesel must be removed from site as soon as it is no longer required.</p> <p>Hydrocarbons to be stored within a suitably bunded area in accordance with SABS standards. Taps to bunded areas will remain closed and only opened under controlled circumstances via an oil trap / separator.</p> <p>REMEDY</p> <p>Spill kits must be available onsite and site personnel trained on the use thereof.</p> <p>Area must be monitored for impacts and mitigated as soon as possible.</p> <p>If need be, a soil specialist should be consulted as the soils of the study area are very unique and sensitive. If a spill occurs on wetland soils, great care must be taken to rehabilitate spills as these soils are very sensitive and home to many dormant eggs and seeds that could be greatly damaged by hydrocarbons.</p>	Primary and Secondary Drilling	Compliance with duty of care as per NEMA & NWA Compliance GN704 of the NWA
Ablution facilities (portable chemical toilets).	Contamination of site from sewage spills or leaks.	<p>CONTROL/ PREVENT</p> <p>Toilets must be located outside the 100m buffer of all wetlands.</p> <p>Toilet must be removed as soon as it is no longer required.</p> <p>Contracting necessary reputable contractor to manage portable toilets.</p> <p>Toilets to be emptied on a regular basis for treatment at a suitably licensed facility.</p> <p>Proper housekeeping and hygienic practices.</p> <p>REMEDY</p> <p>Inspection and repair / replacement of damaged toilets.</p>	Primary and Secondary Drilling	Compliance with duty of care as per NEMA & NWA Compliance GN704 of the NWA

Activity	Potential Impacts	Mitigation	Time Period for Implementation	Compliance with Standards
Waste Management	Contamination of site as a result of illegal littering/dumping	<p>CONTROL/ PREVENT Environmental awareness training to be provided to all site personnel. Bins to be provided on site. Inspection and immediate action. Proper housekeeping and hygienic practices.</p> <p>REMEDY Clearing all litter and waste.</p>	Primary and Secondary Drilling	Compliance with duty of care as per NEMA & NWA Compliance with NEM:WA
Access Routes.	Disturbance to near-pristine and sensitive vegetation and soils across all wetland areas and their buffer areas. Note areas are of critical biodiversity importance.	<p>CONTROL/ PREVENT Existing farms roads must be used as far as possible to minimize impact. Activity must be planned to minimize the tracks created across the site. All vehicles must follow the same tracks. Detailed plan of route for driving between sample areas must be done and ensure activity is maintained within these areas to keep affected area as small as possible. Botanist must do detailed walk of proposed routes to check for species of conservation concern, which must first be relocated. Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage. Prior to entering the site, all heavy machinery must be thoroughly cleaned and checked to avoid introduction of soil and seeds. All heritage sites to be managed in-situ. Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage. Fencing must be maintained and the sites regularly inspected. Implement and enforce speed limits. Noise control measures on noisy equipment. Limiting activities to daylight hours. Access to be negotiated with the applicable land owner. Farm fences must not be damaged, and gates are to be closed after gaining access</p> <p>REMEDY Rehabilitation of the tracks may be necessary if compaction occurs. A soil specialist should be consulted as the soils of the study area are very unique and sensitive. Monitoring of site to assess rehabilitation success should be done with repeat</p>	Primary and Secondary Drilling	Compliance with duty of care as per NEMA & NWA Compliance with NEM:BA Compliance with the NHRA Compliance with dust Regulations as per the NEM:AQA

Activity	Potential Impacts	Mitigation	Time Period for Implementation	Compliance with Standards
		<p>photography included in the monitoring.</p> <p>Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed.</p> <p>Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified.</p> <p>Should any fossils be seen on surface or found during drilling activities the chance find protocol as detailed in Appendix H must be followed.</p> <p>Before any fossils are removed from the site a SAHRA permit must be obtained.</p> <p>Undertaking wet dust suppression during times of high dust generation.</p>		
<p>Clearing of vegetation and drilling of auger holes to max 5 m depth. Activity includes immediate backfilling and rehabilitation of impact footprint.</p>	<p>Drilling will lead to the ancient and intact pan geological profile being impacted through the perforation of the consolidated layers, which have led to the wetland habitat forming. Realised impacts to the functioning of the hydrogeological system are uncertain; but may result in localised dewatering of rain water as intact impermeable layers are disturbed.</p>	<p>CONTROL/ PREVENT</p> <p>Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible.</p> <p>Vegetation removal must be over as small an area as possible.</p> <p>Prior to vegetation clearing, a detailed faunal survey must be conducted of each proposed prospecting site to assess the presence of faunal species of conservation concern. If any faunal species are present in the project footprint, species specific impact assessments need to be conducted and mitigation measures implemented which may include avoidance.</p> <p>All project staff need to be educated about the potential sensitivity of faunal species on the site. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited. No open fires permitted.</p> <p>Wetland specialist and/or EO must be present to monitor activity and ensure minimal environmental damage.</p> <p>Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent damage to intact crust layer during drilling and replacement of material.</p> <p>All heritage sites to be managed in-situ.</p> <p>Heritage sites are to be demarcated and fenced off, and 20m buffer zones implemented to prevent and inadvertent damage.</p> <p>Fencing must be maintained and the sites regularly inspected.</p> <p>Machinery must not be left on sensitive soils for any longer than required to minimise risk of soil contamination.</p> <p>Maintaining all vehicles, equipment, machinery and equipment.</p>	<p>Primary and Secondary Drilling</p>	<p>Compliance with duty of care as per NEMA & NWA</p> <p>Compliance with NEM:BA</p> <p>Compliance with the NHRA</p> <p>Compliance with dust Regulations as per the NEM:AQA</p>

Activity	Potential Impacts	Mitigation	Time Period for Implementation	Compliance with Standards
		<p>Drip trays must be placed under parked vehicles. Noise control measures on noisy equipment. Limiting activities to daylight hours.</p> <p>REMEDY Auger holes must be backfilled immediately after samples have been taken. Replaced material must be compacted. A small raised mound can be present to allow for settlement of material. Denuded areas to be vegetated with indigenous species. Monitoring of site to assess rehabilitation success. Care should be taken when development commences that if any heritage sites are discovered, a qualified archaeologist be called in to investigate the occurrence; i.e. the "Chance Fine Procedure" must be followed. Should any archaeological or cultural artefacts be unearthed, activities must be stopped immediately and SAHRA notified. Should any fossils be seen on surface or found during drilling activities 'the chance find protocol as detailed in Appendix H must be followed. Before any fossils are removed from the site a SAHRA permit must be obtained. Spill kits must be available onsite and site personnel trained on the use thereof. Regular communication with nearby I&APs.</p>		

24 FINANCIAL PROVISION

24.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

The closure objectives are:

- Ensure rehabilitated areas are physically stable and free draining;
- Ensure the functionality of the environment as well as the current land use is not adversely affected; and
- To ensure that alien invasive establishment and spread on areas disturbed by prospecting is prevented and controlled.
- Eliminate safety threats to animals and humans.

To achieve the closure objectives, Therefore effective mitigation measures need to be implemented on site to prevent, control and remedy the impacts to the environment. These measures include:

- Locating the site camp and associated diesel storage and chemical toilets outside of sensitive area (100m from wetland areas).
- Inspect and maintain portable toilets to reduce risk of contamination through sewage spills.
- Implementing good housekeeping procedures.
- Reduce risk of contamination to the environment from vehicles, machinery, drill rigs and equipment (emissions, hydrocarbon spills, and excessive noise) by ensuring regular maintenance of vehicles and machinery. Making drip trays available at all times, and storing hydrocarbons within SABS approved bunding.
- Keep hydrocarbon spill kits on site at all times to clear any spills that occur.
- Bins to be provided and all waste removed from site for disposal at a licensed facility.
- Utilising existing farm roads and tracks as far as possible.
- Activities must be planned in consultation with the landowner/user to minimize the tracks created across the site and disturbance to the current land use.
- Surveying proposed routes and prospecting sites to prevent impact to heritage sites, fossils and sensitive fauna and flora (to be completed by the EO and/or specialist where applicable).
- Properly demarcate areas for auger drilling and ensure activity is maintained within the demarcations to keep affected area as small as possible.
- Plastic sheeting can be placed around expected auger hole and soil displacement area to prevent damage to intact crust layer during drilling and replacement of material.
- Auger holes must be backfilled immediately after samples have been taken. Replaced material must be compacted. A small raised mound can be present to allow for settlement of material.

- Denuded areas to be vegetated with indigenous species.
- Heritage sites to be fenced off and a 20m buffer implemented.
- 'Chance find procedure' to be implemented should any fossils be discovered.
- Limit activities to daylight hours.
- Access to be negotiated with the applicable land owner.
- Farm fences must not be damaged, and gates are to be closed after gaining access.
- Regularly communicate prospecting intentions to local land owners / users.
- Limit activities to daylight hours.
- Consider the use of wet dust suppression to be undertaken during times of high dust generation.
- Establish and enforce speed limits on all roads.
- Keep vehicles and machinery free from plant matter to reduce risk of introduction and spread of alien and invasive species.
- Implement the inspection and monitoring plan stipulated in the EMP and take the necessary action for any issues observed on site.

24.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

The BAR and EMP has been made available for public review and comment for a period of 30 days.

24.3 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

Part A, Figure 21 indicates the aerial extent of the proposed prospecting activities.

Rehabilitation will be undertaken concurrently i.e. auger holes will be rehabilitated immediately on completion of sampling before continuing to the next site.

Denuded areas will be vegetated with local, indigenous species.

24.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The rehabilitation plan aims to mitigate the negative impacts associated with the prospecting activities ultimately ensuring that functionality of the environment is not adversely affected, and that the current PES of the wetlands are maintained.

24.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

Table 15: Rehabilitation Cost Estimate

Total Disturbance Footprints	Number	Area (m²)
Equipment storage and sample laydown area	5	1000
Camp area	5	500
Fuel storage area	5	125
Chemical toilets area	2	10
Temporary access routes/tracks in meters	1052	3157
300mm Diameter Auger Drilled Holes to 5m max	250	6250
Total Affected Area (meters squared)		11041.67

Estimated Total Rehabilitation Costs		
	Rates	Cost
General surface rehab (R/ha)	R100 000.00	R110 416.67
Sealing of Auger Holes (R/hole)	R350.00	R 87 500.00
Aftercare (R/ha)	R20 000.00	R 22 083.33
Grand total		R 220 000.00

24.6 Confirm that the financial provision will be provided as determined

A signed undertaking and proof of funds will be submitted to the DMR upon request.

25 MECHANISMS FOR MONITORING COMPLIANCE

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- **Monitoring of Impact Management Actions**
- **Monitoring and reporting frequency**
- **Responsible persons**
- **Time period for implementing impact management actions**
- **Mechanism 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
General housekeeping inspections	General day-to-day compliance with EMP	Visual inspections Completion of checklists to be kept on file	Geologist / Site Manager	Weekly inspections as prospecting progresses.
Internal EMP performance assessment	Compliance with the approved EMP and conditions stipulated within EA	Formal audit report for internal purposes	Geologist / Site Manager	Annually
External EMP performance assessment and environmental compliance	Compliance with the approved EMP and conditions stipulated within EA Compliance with NEMA and NWA Regulations.	Formal audit report for submission to the Competant Authorities	EAP	Annually
Rehabilitation monitorin	Rehabilitation to be undertaken in terms of the work method statemetn and rehabilitation plan	Rehabilitation success monitoring Photograph record to be maintained Sign off by landowner	Geologist / Site Manager	Monthly as prospecting progresses

25.1 Indicate the frequency of the submission of the Performance Assessment Report

An annual performance assessment (or at a frequency stipulated in the EA) will be conducted by an external consultant throughout the life of prospecting as required under NEMA. This is conducted to assess the adequacy and compliance to the EMP, EA and the relevant legislation.

26 ENVIRONMENTAL AWARENESS PLAN

26.1 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

The Geologist and Site Manager must be conversant in environmental legislation, with special reference to the MPRDA, NEMA and the NWA.

The contractor / driller will be responsible for training its staff in terms of general environmental awareness. This will include basic training on the contents of this EMP; and will be conducted prior to commencement of prospecting activities. The aim of the environmental awareness training will be to highlight the potential impacts of the prospecting activities, and to highlight no-go areas.

The contractor / driller will ensure that records are kept of all training sessions / inductions. The Environmental Manager will monitor these records and undertake regular follow ups.

26.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

Training, as detailed above, will address the specific measures and actions as listed in the EMP and also conditions of the environmental authorisation (EA). In this way the prospecting team will be provided the knowledge required to conduct the prospecting activities without resulting in environmental non-compliance, the liability of which would lie with Witkop. Secondly, informing the prospecting team of the EMP will also assist the team in identifying if an impact is likely to occur / has occurred and communicate this appropriately to the Environmental Manager.

In order for appropriate action to be taken, proper communications network and reporting protocol must be established.

27 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

Any requirements made by the authority or under the conditions of the EA will be attended to.

The financial provision will be reviewed annually.

28 UNDERTAKING

The EAP herewith confirms

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein;

Signature of the environmental assessment practitioner:

Name of company:

Date:

-END-